Subatomic Particle Gizmo Name _____Sci # _____

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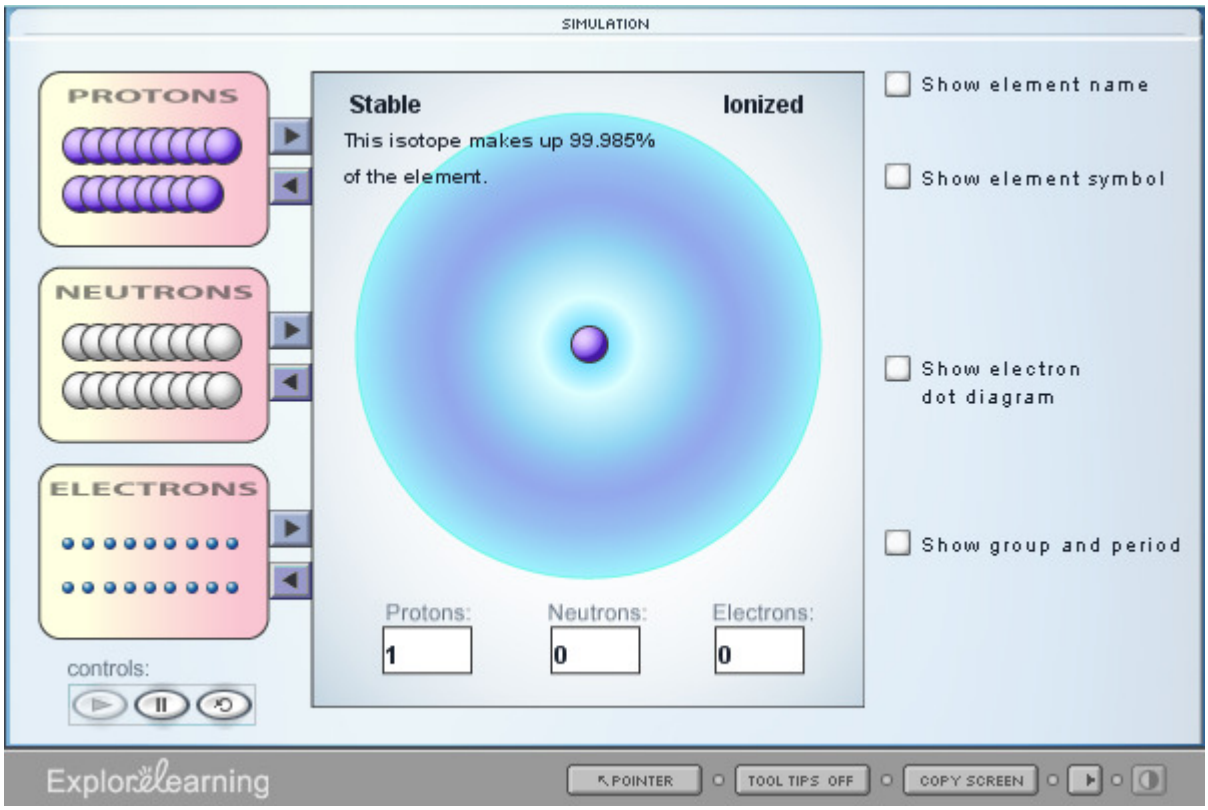
Once you log in, find the GIZMO named "Element Builder" Gizmo and select "Launch Gizmo."

Location of Subatomic Particles

1. In this Gizmo™, subatomic particles (protons, neutrons and electrons) can be added to an atom or removed from it by clicking the arrows next to each supply of particles. Remove any protons (the program will not let you remove the last proton), neutrons, or electrons that are currently in the atom by clicking the left arrows. You can also highlight the number with the cursor and change the numbers manually. Below is what the screen should look like when you begin. The center of the atom is the ***nucleus*** and the area around the nucleus is the ***electron cloud***.



   a. Using the right arrows, add 1 proton, 2 neutrons, and 2 electrons to the atom so that there are 2 of each of the three particles located in the atom. Fill in the following chart.

Particle	Location
Proton	
Neutron	
Electron	

Identity of the Atom

2. Place a check in the "Show element name" box, which is in the top right portion of the gizmo. Manipulate the number of protons to achieve the number of protons in the data table. Do not worry about the number of neutrons or electrons. Experiment with adding one and removing one proton to and from the atom. Fill in the following table. Once you have the identity of the element, look at the periodic table and write down the atomic number for the element, this is the larger number located by the element symbol.

Number of protons	Name of element	Atomic Number from Periodic Table
2		
3		
1		

   a. **Does changing the number of protons change the identity of the element you have built?**

   b. **What is the relationship between the number of protons and the atomic number for an element?**

3. Now you will do the same thing as step 2 except you will be changing the number of neutrons. Make sure that you begin with 2 each for the protons, neutrons, and electrons. Add one neutron to the atom to place 3 neutrons in the atom. Record the name of the element and look at the periodic table to find the atomic number. Next, take 2 neutrons away (a total of 1 should now be in the atom.) Again record the name of the atom and the atomic number from the periodic table.

Number of neutrons	Name of element	Atomic Number from Periodic Table
2		
3		
1		

   a. **Does changing the number of neutrons change the identity of the element you have built?**

   b. **Does changing the number of neutrons change the affect the atomic number?**

4. Make sure that you have 2 each for the protons, neutrons, and electrons. Add one electron to the atom to place 3 electrons in the atom. Record the name of the element and look at the periodic table to find the atomic number. Next, take 2 electrons away (a total of 1 should now be in the atom.) Again record the name of the atom and the atomic number from the periodic table.

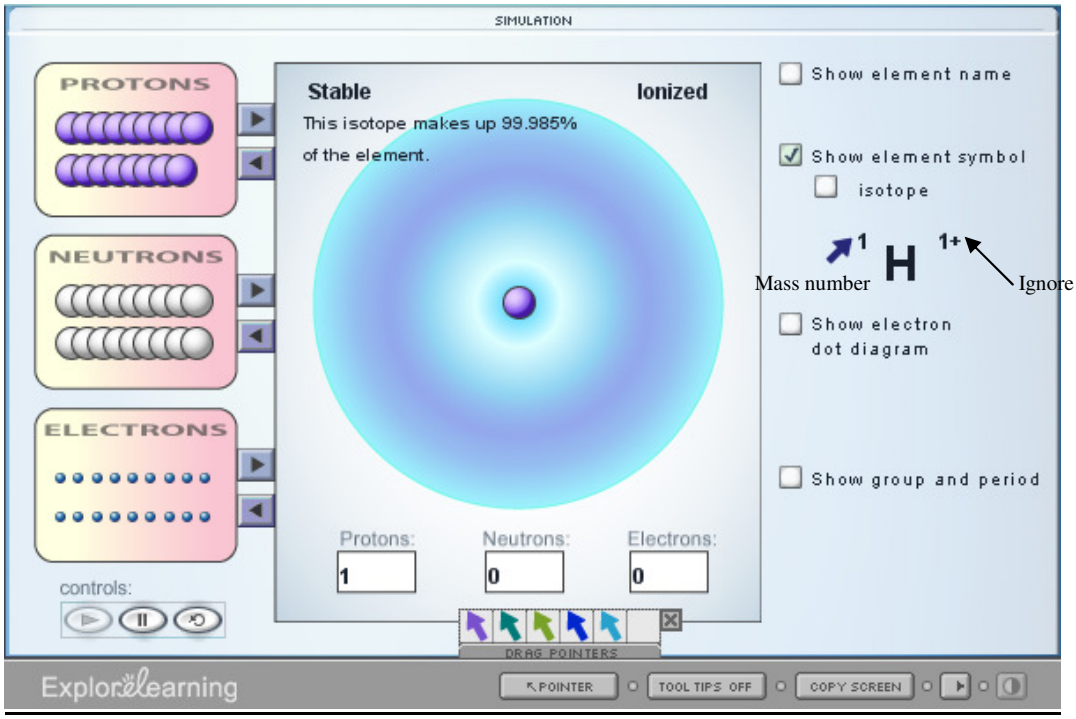
Number of electrons	Name of element	Atomic Number from Periodic Table
2		
3		
1		

a. Does changing the number of electrons change the identity of the element you have built?

KEY FACT: Now looking at questions 2a, 3a, and 4a, which subatomic particle is responsible for the identity of an atom?

Mass of an atom

5. Build an atom again with exactly 2 protons, 2 neutrons, and 2 electrons. Check "Show element symbol." Be sure "isotope" is not selected. Make adjustments to the atom to attain the number of protons, neutrons, and electrons as shown in the data table. Then finish filling in the table. ***The number to the upper left of the symbol indicates the mass of the atom.*** (See where the pointer is pointing in the screen shot.)



Number of protons	Number of neutrons	Number of electrons	Identity of atom (give name)	Mass of atom
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3	2	2		
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a. Does the proton affect the mass of an atom? You MUST EXPLAIN by referring to an example or data from above .

b. Does the neutron affect the mass of an atom? You MUST justify your answer. You MUST EXPLAIN by referring to an example or data from above.

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d. Looking at the atom in the Gizmo, where is most of the mass of an atom concentrated? Explain.

5. Which 2 subatomic particles affect the mass of an atom?

KEY FACT: Write a mathematical formula to show the relationship between the number of protons, the number of neutrons, and the mass number for an atom.

SUMMARY: Based on this gizmo, the number of protons equals the _____ _____ from the periodic table. The number of protons determines the _____ of an atom. The _____ and _____ determines the mass of an atom. The protons and neutrons are located in the _____ of an atom and electrons are in the _____ _____.

- How many protons are in the nucleus of an atom of Carbon (C)? _____
- What is the formula for finding the mass number of an atom? _____
- If an atom of C has 7 neutrons in the nucleus, then it would have a mass number of _____ (see previous 2 questions).
- How many electrons would be found in the nucleus? _____

Subatomic Particle Gizmo Name _____Sci # _____

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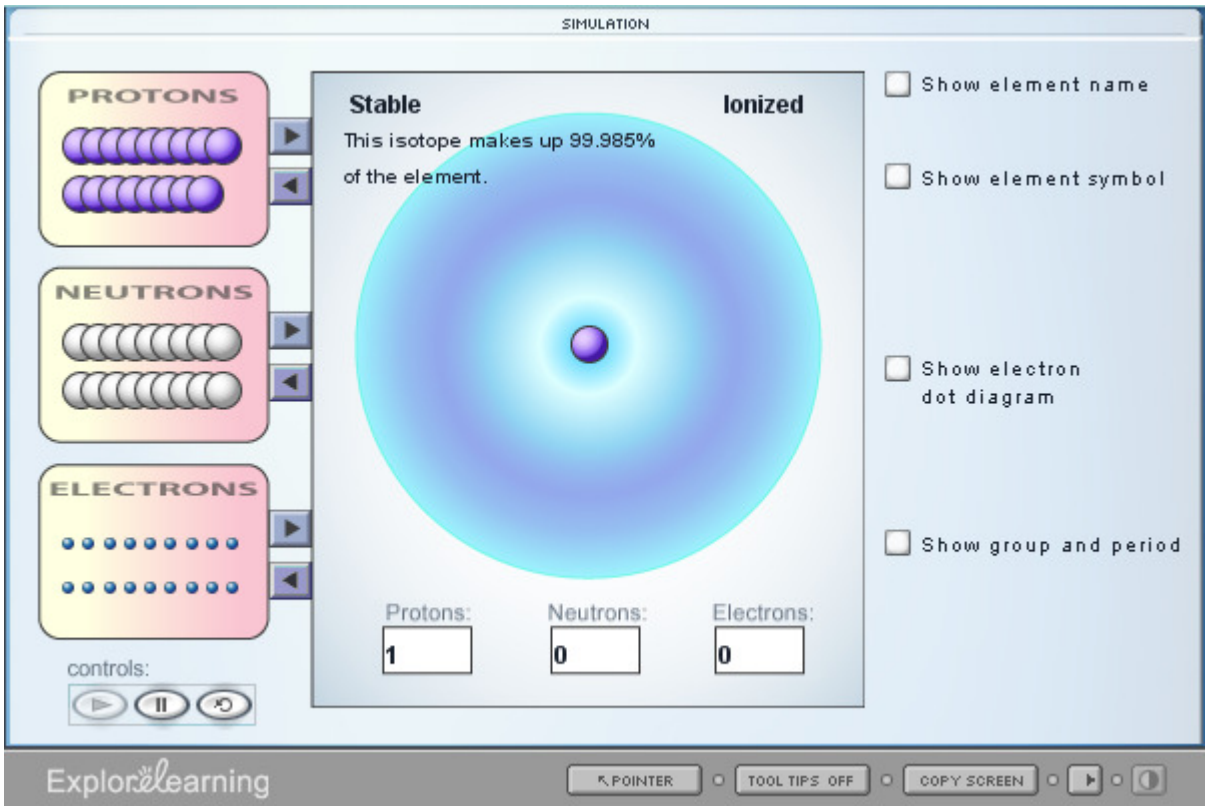

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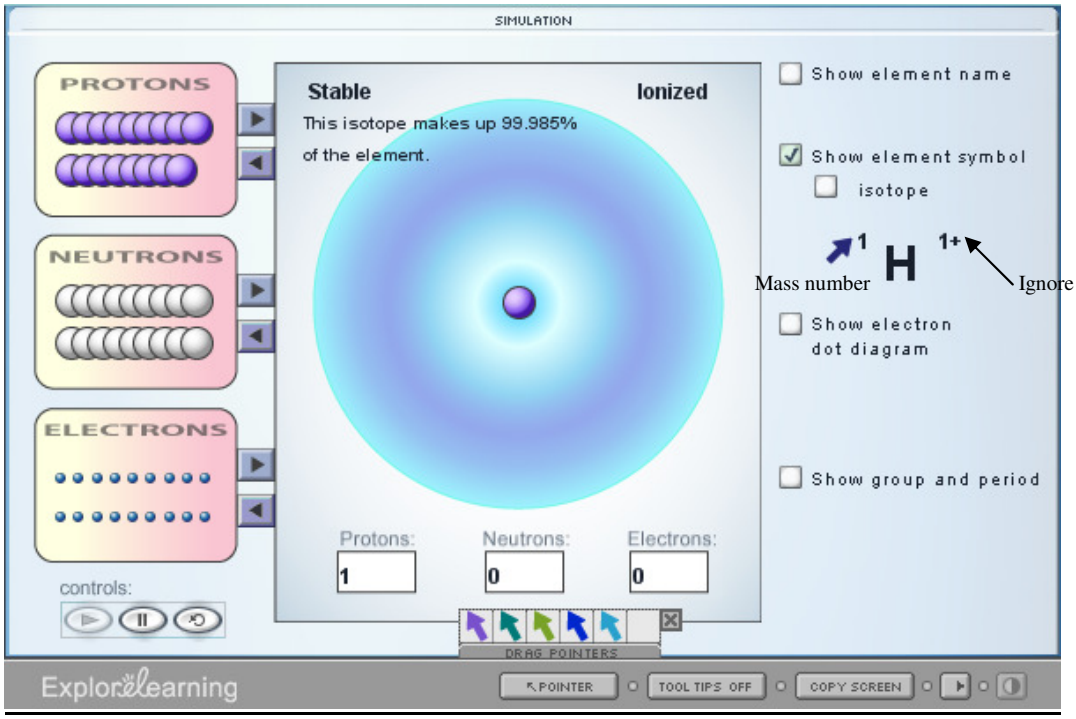

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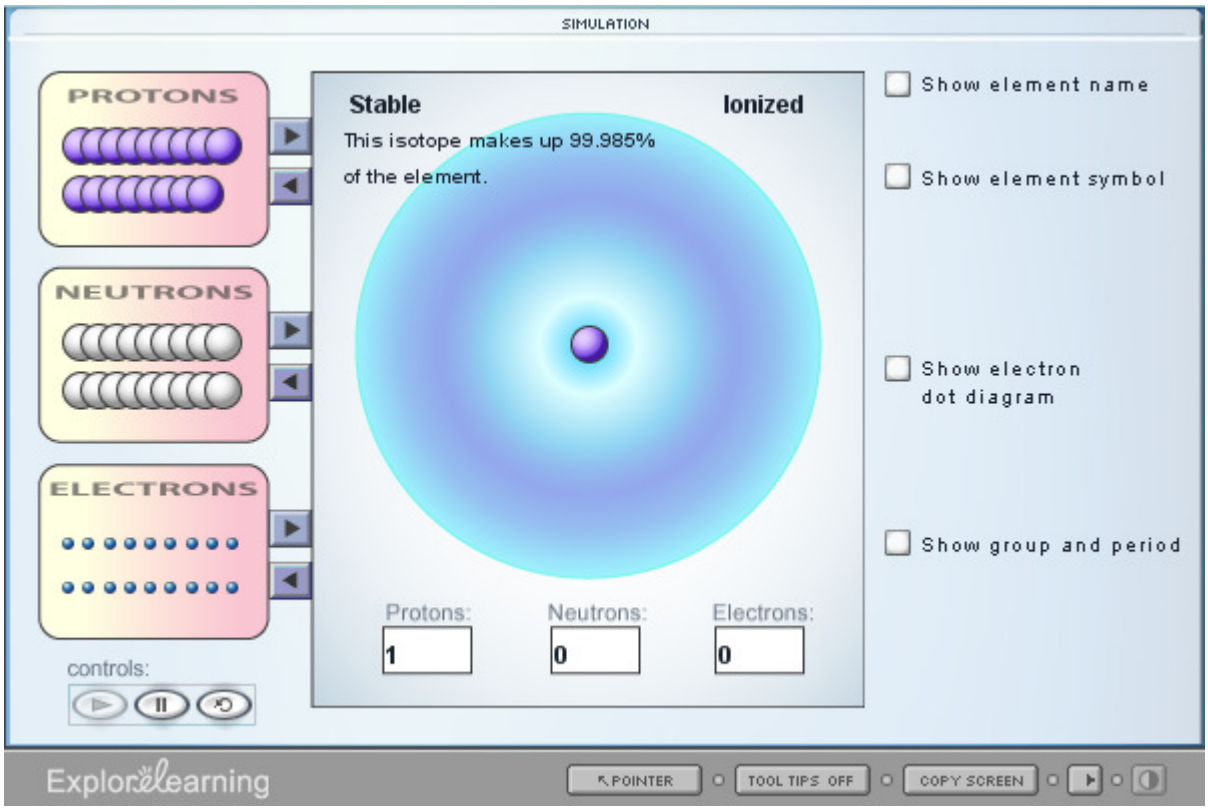

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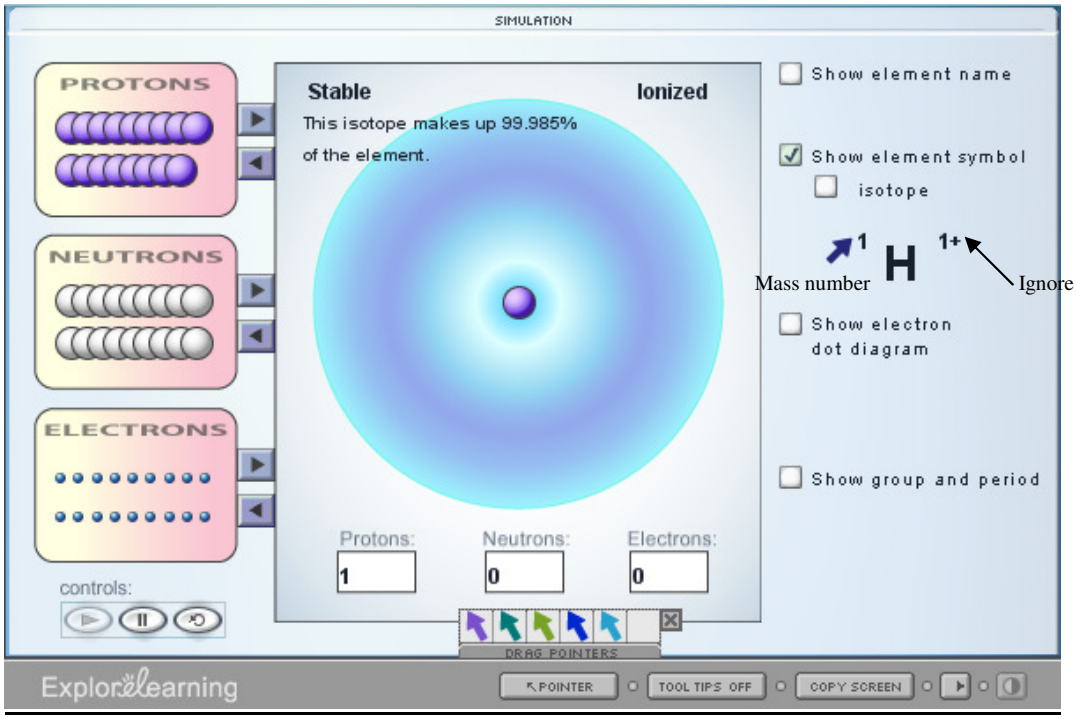

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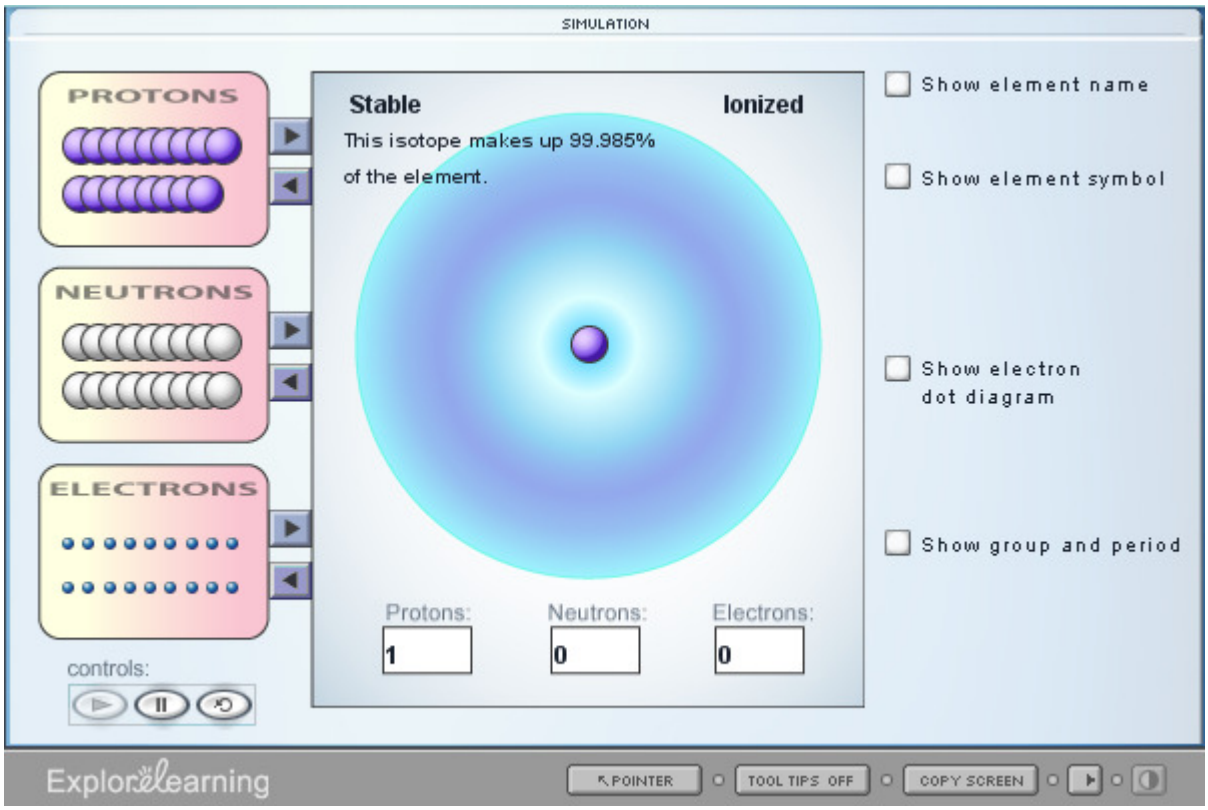

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Number of electrons	Name of element	Atomic Number from Periodic Table
2		
3		
1		

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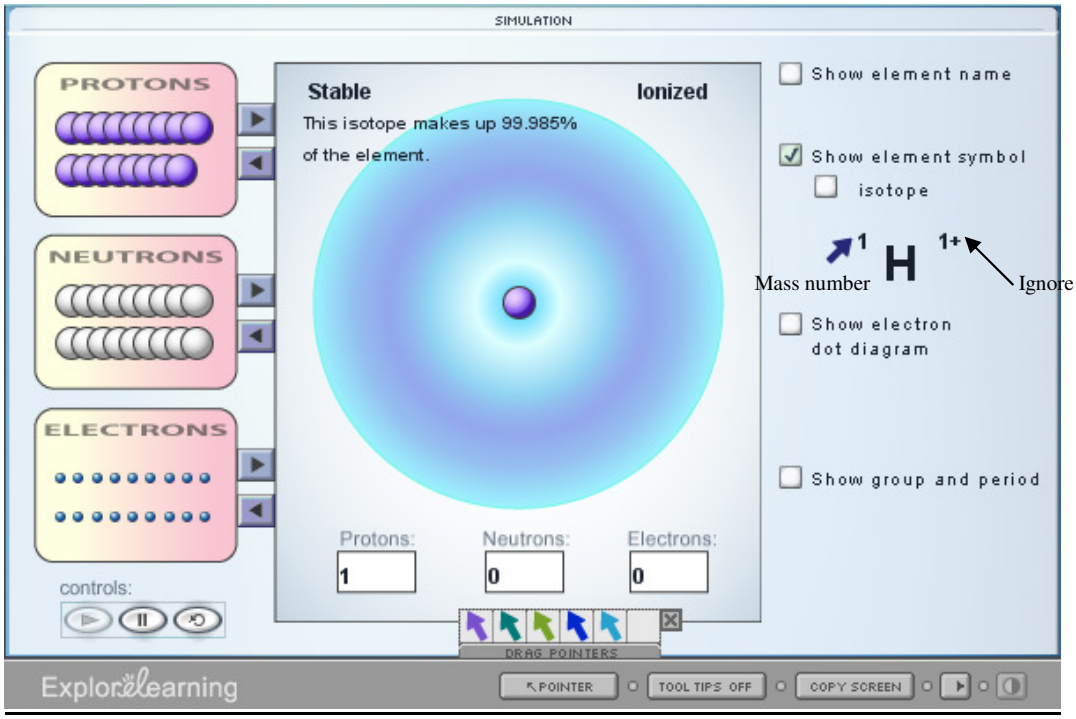

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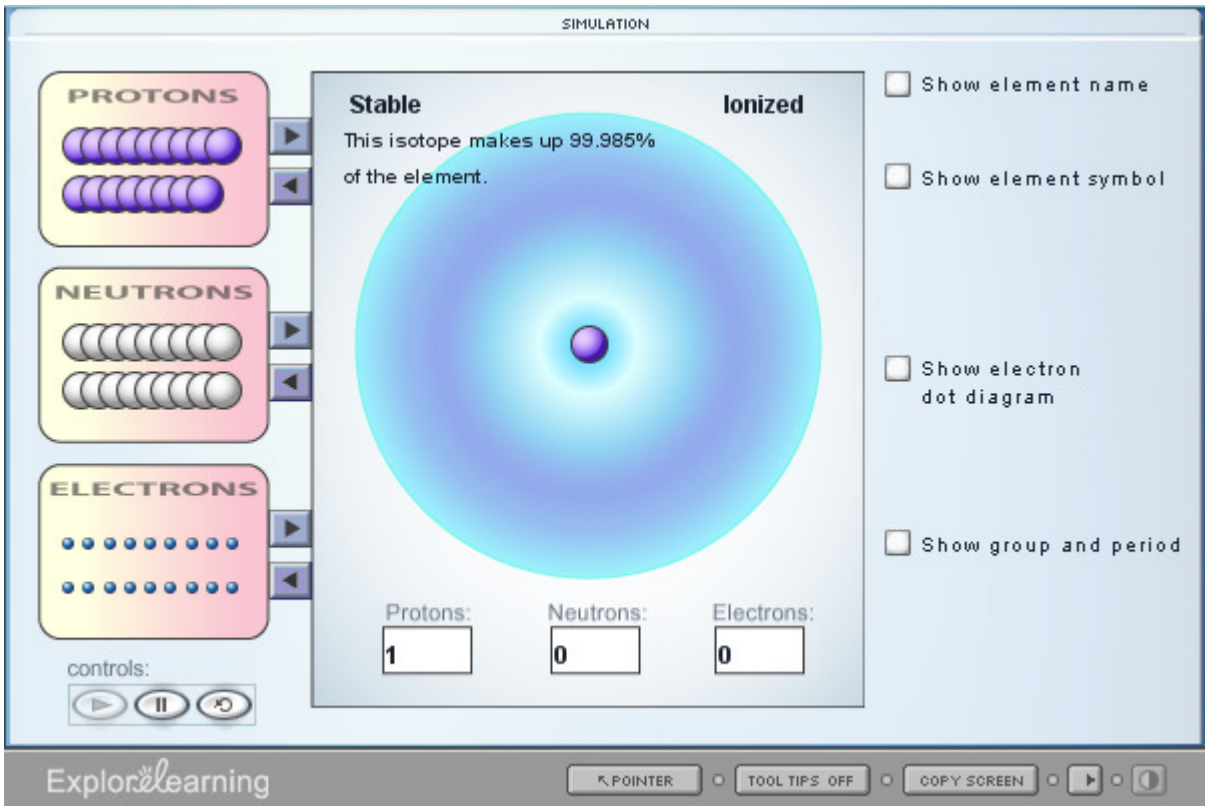

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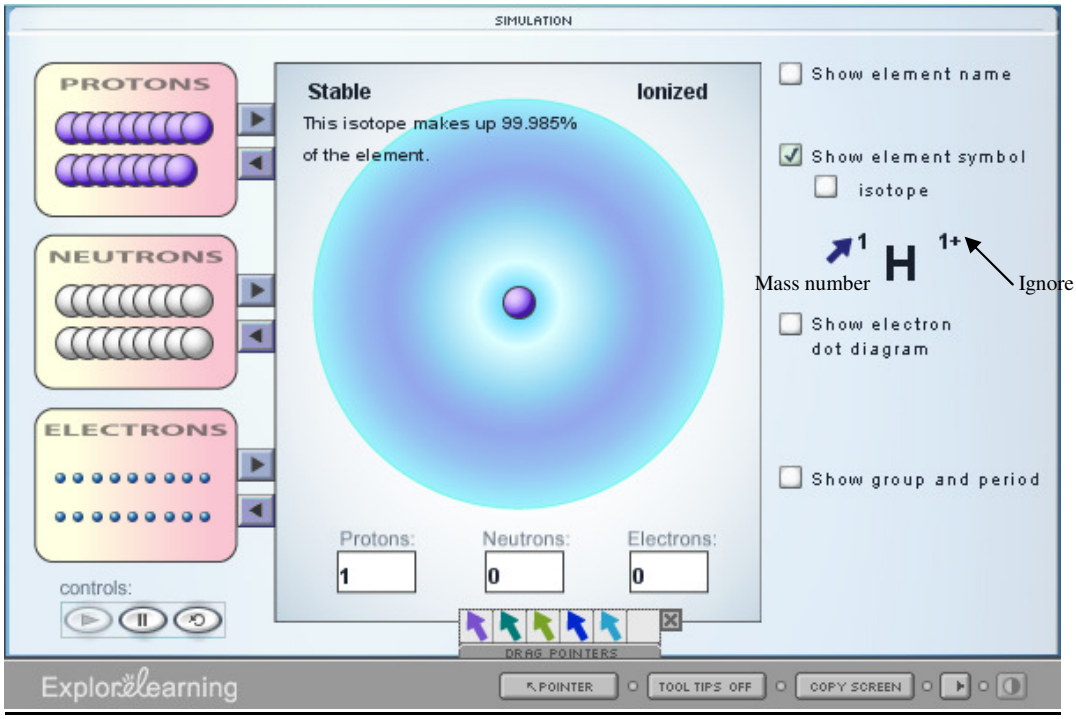

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Subatomic Particle Gizmo Name _____Sci # _____

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Once you log in, find the GIZMO named "Element Builder" Gizmo and select "Launch Gizmo."

Location of Subatomic Particles

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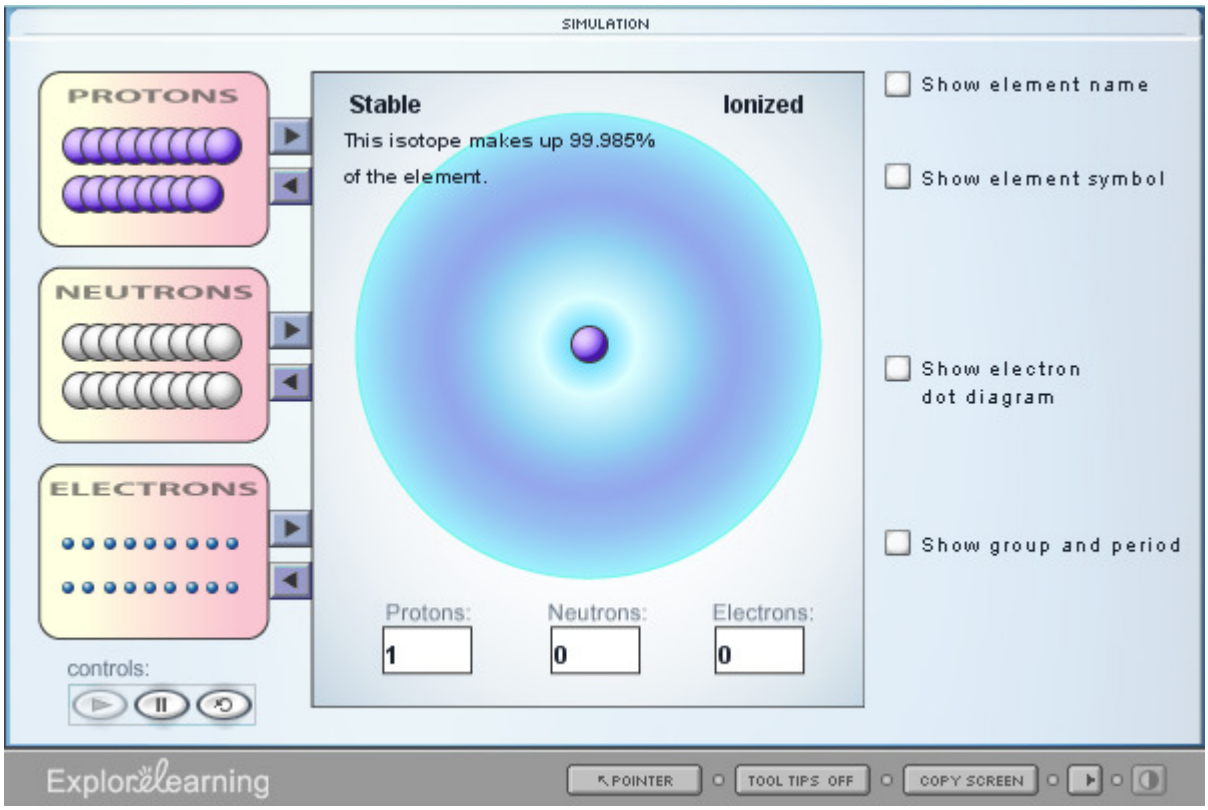

   a. Using the right arrows, add 1 proton, 2 neutrons, and 2 electrons to the atom so that there are 2 of each of the three particles located in the atom. Fill in the following chart.

Particle	Location
Proton	
Neutron	
Electron	

Identity of the Atom

2. Place a check in the "Show element name" box, which is in the top right portion of the gizmo. Manipulate the number of protons to achieve the number of protons in the data table. Do not worry about the number of neutrons or electrons. Experiment with adding one and removing one proton to and from the atom. Fill in the following table. Once you have the identity of the element, look at the periodic table and write down the atomic number for the element, this is the larger number located by the element symbol.

Number of protons	Name of element	Atomic Number from Periodic Table
2		
3		
1		

   a. **Does changing the number of protons change the identity of the element you have built?**

   b. **What is the relationship between the number of protons and the atomic number for an element?**

3. Now you will do the same thing as step 2 except you will be changing the number of neutrons. Make sure that you begin with 2 each for the protons, neutrons, and electrons. Add one neutron to the atom to place 3 neutrons in the atom. Record the name of the element and look at the periodic table to find the atomic number. Next, take 2 neutrons away (a total of 1 should now be in the atom.) Again record the name of the atom and the atomic number from the periodic table.

Number of neutrons	Name of element	Atomic Number from Periodic Table
2		
3		
1		

   a. **Does changing the number of neutrons change the identity of the element you have built?**

   b. **Does changing the number of neutrons change the affect the atomic number?**

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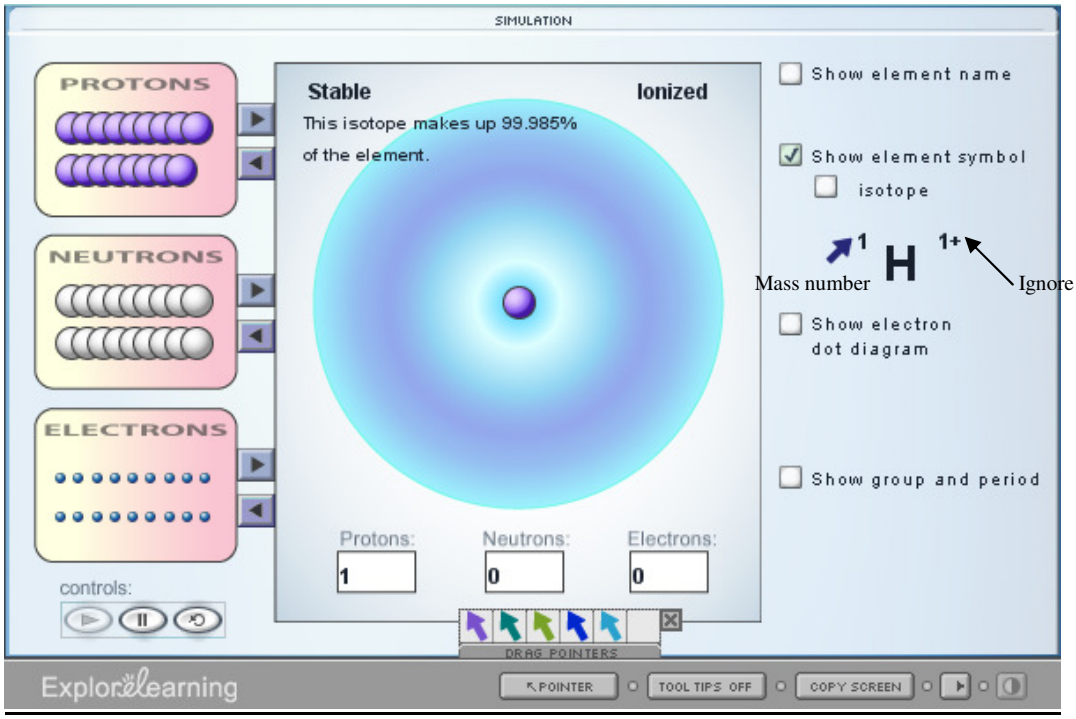
Number of electrons	Name of element	Atomic Number from Periodic Table
2		
3		
1		

a. Does changing the number of electrons change the identity of the element you have built?

KEY FACT: Now looking at questions 2a, 3a, and 4a, which subatomic particle is responsible for the identity of an atom?

Mass of an atom

5. Build an atom again with exactly 2 protons, 2 neutrons, and 2 electrons. Check "Show element symbol." Be sure "isotope" is not selected. Make adjustments to the atom to attain the number of protons, neutrons, and electrons as shown in the data table. Then finish filling in the table. ***The number to the upper left of the symbol indicates the mass of the atom.*** (See where the pointer is pointing in the screen shot.)



Number of protons	Number of neutrons	Number of electrons	Identity of atom (give name)	Mass of atom
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3	2	2		
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a. Does the proton affect the mass of an atom? You MUST EXPLAIN by referring to an example or data from above .

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5. Which 2 subatomic particles affect the mass of an atom?

KEY FACT: Write a mathematical formula to show the relationship between the number of protons, the number of neutrons, and the mass number for an atom.

SUMMARY: Based on this gizmo, the number of protons equals the _____ _____ from the periodic table. The number of protons determines the _____ of an atom. The _____ and _____ determines the mass of an atom. The protons and neutrons are located in the _____ of an atom and electrons are in the _____ _____.

- How many protons are in the nucleus of an atom of Carbon (C)? _____
- What is the formula for finding the mass number of an atom? _____
- If an atom of C has 7 neutrons in the nucleus, then it would have a mass number of _____ (see previous 2 questions).
- How many electrons would be found in the nucleus? _____

Subatomic Particle Gizmo Name _____Sci # _____

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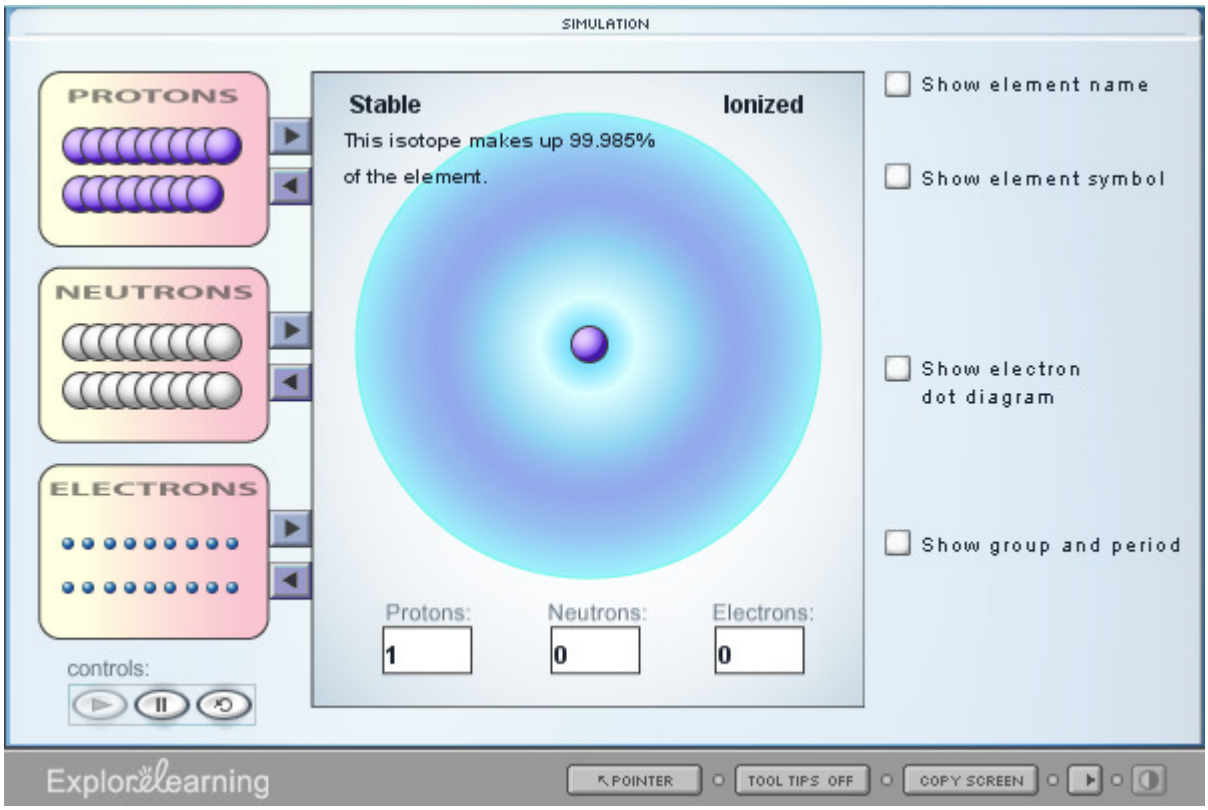

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Particle	Location
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Identity of the Atom

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3		
1		

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3		
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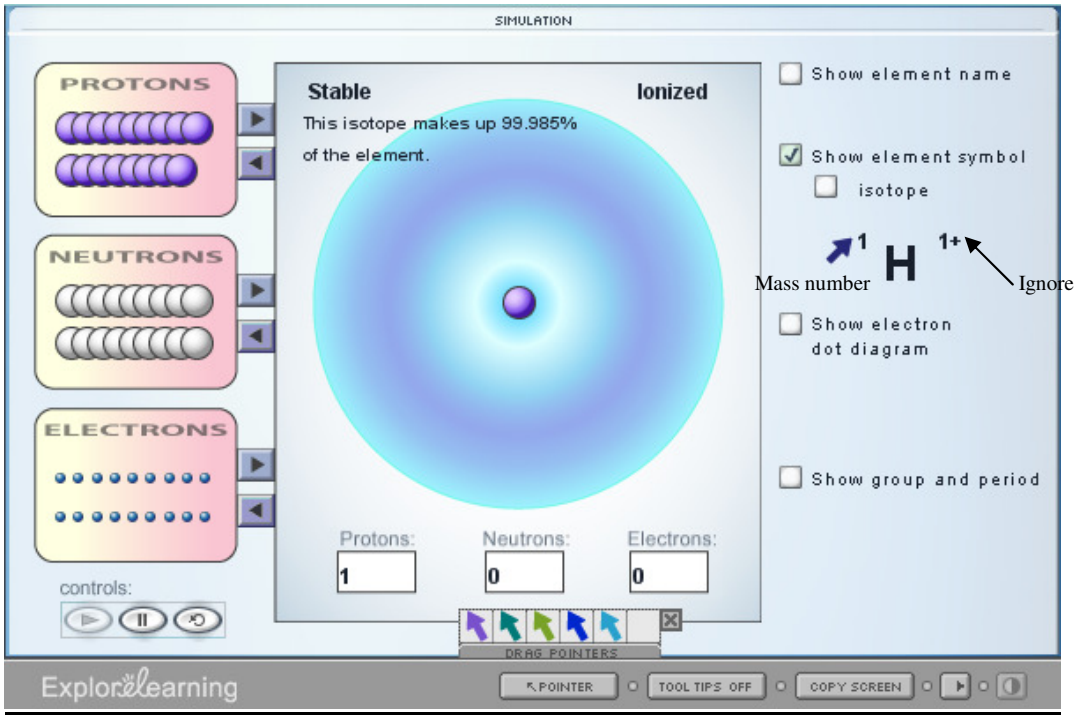

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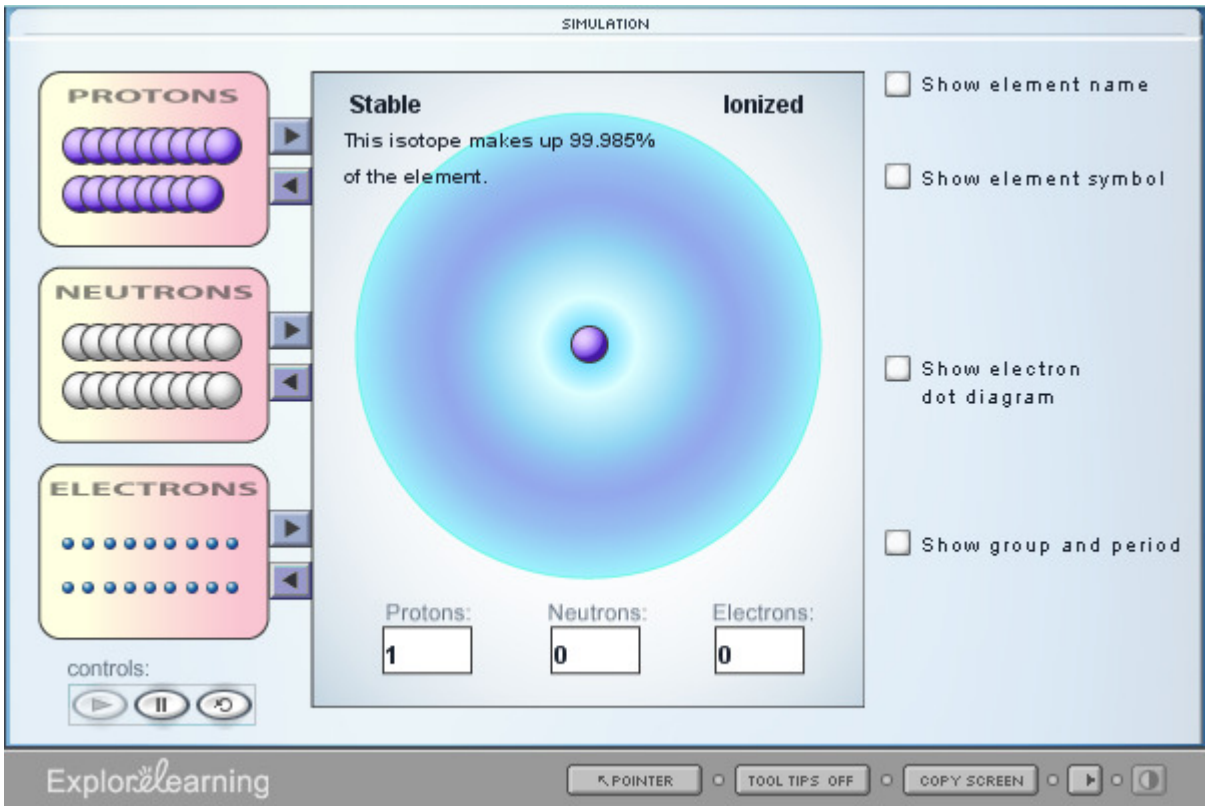

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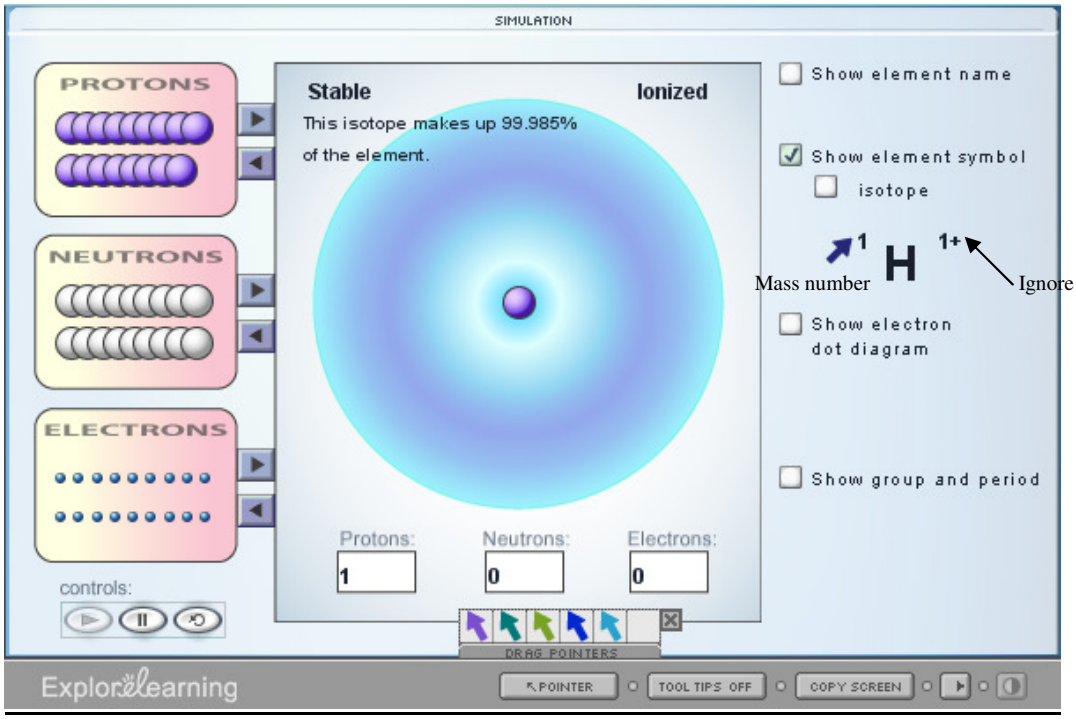

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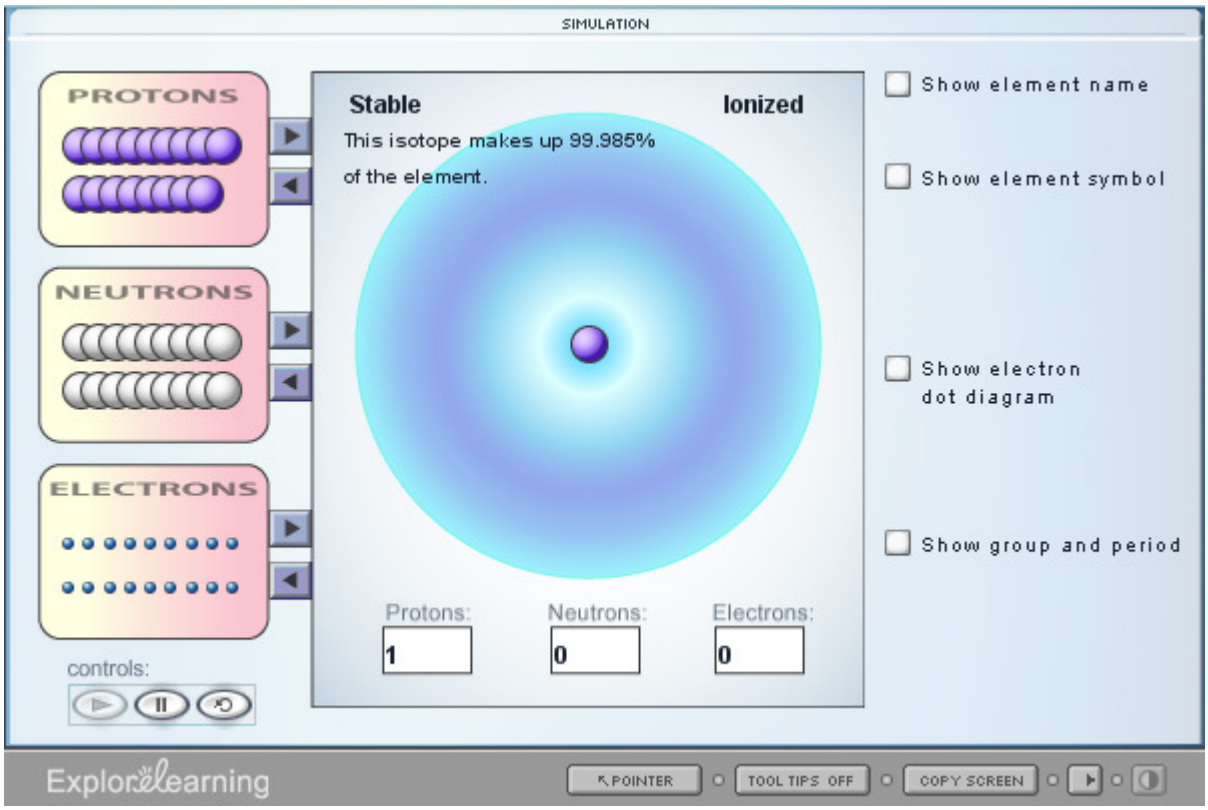

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Number of electrons	Name of element	Atomic Number from Periodic Table
2		
3		
1		

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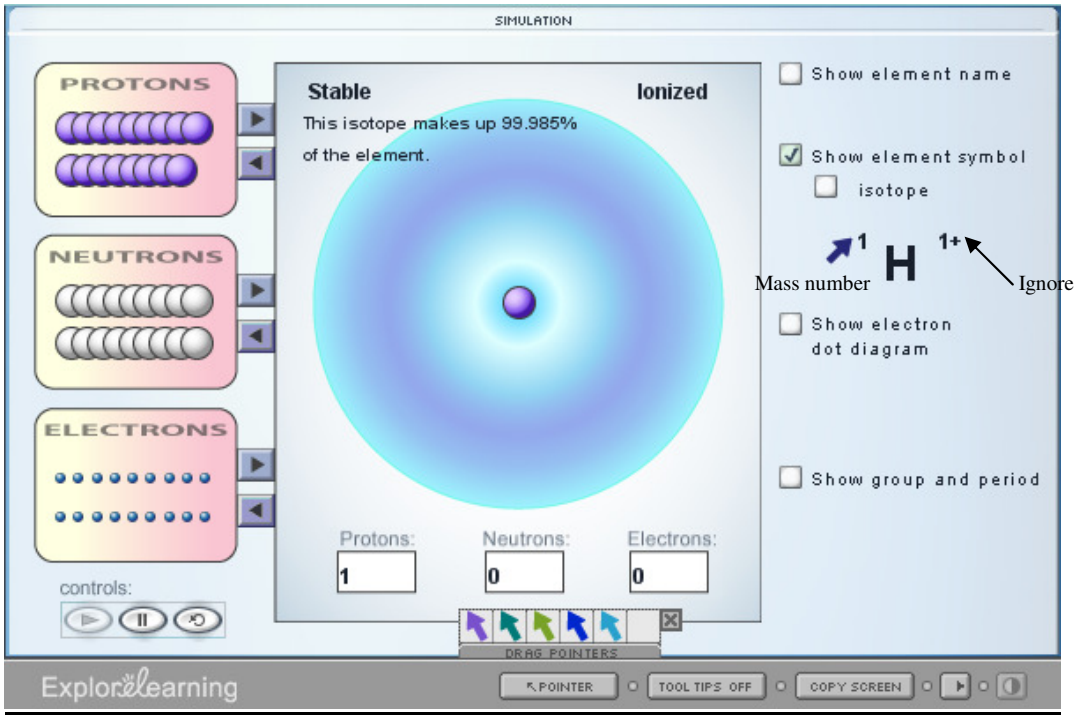

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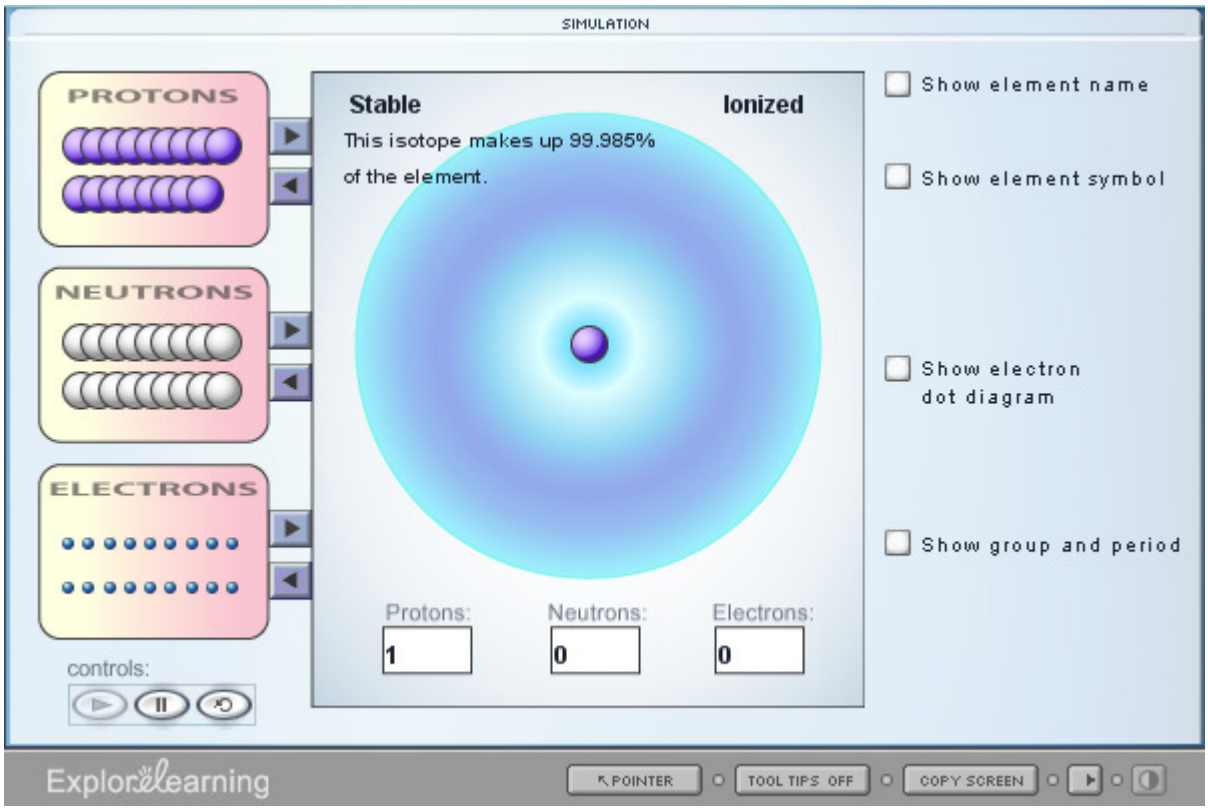

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3		
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2		
3		
1		

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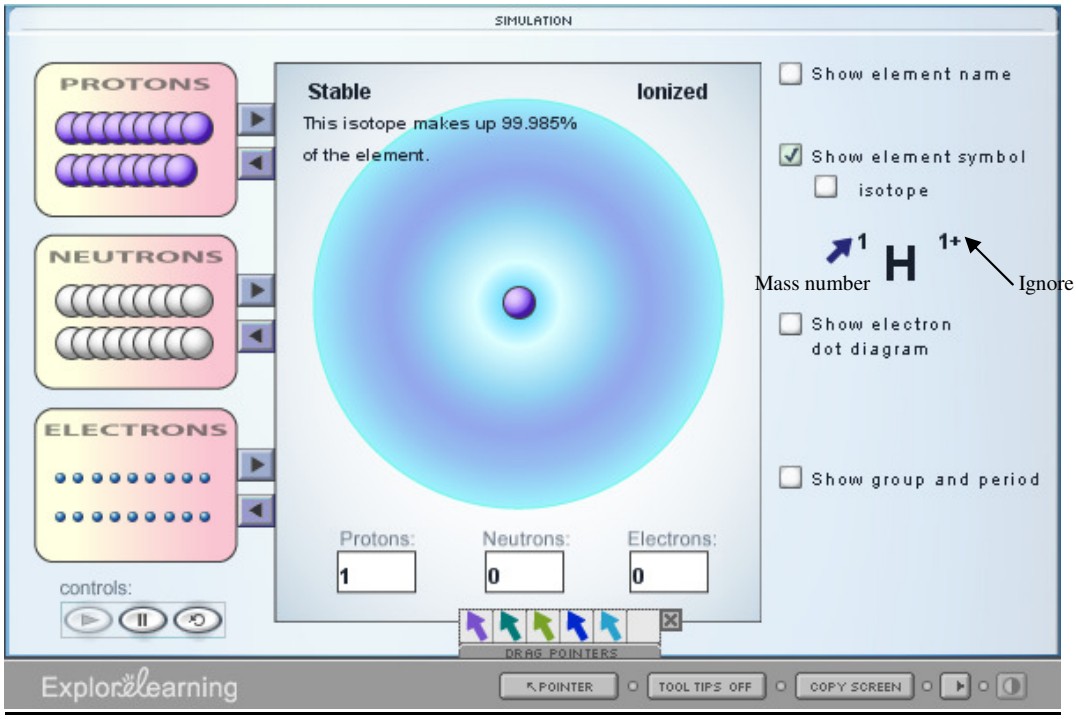

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Subatomic Particle Gizmo Name _____Sci # _____

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Once you log in, find the GIZMO named "Element Builder" Gizmo and select "Launch Gizmo."

Location of Subatomic Particles

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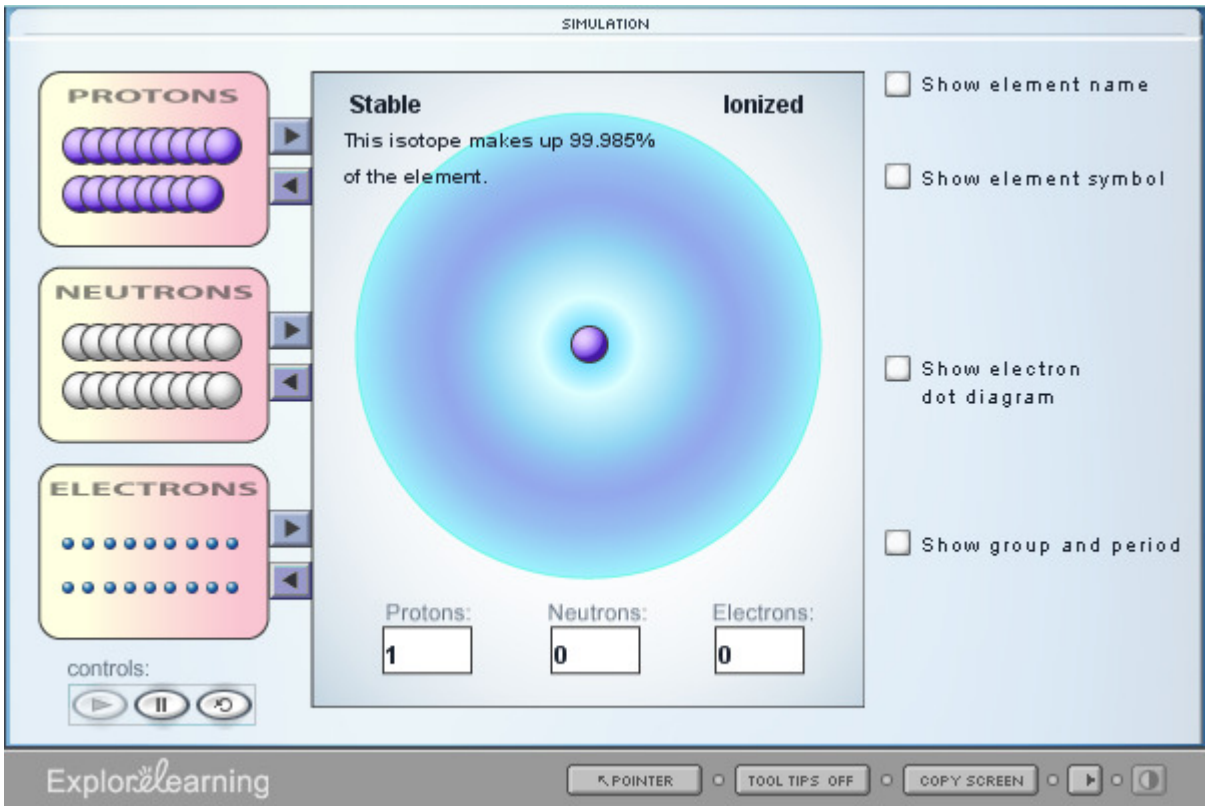

   a. Using the right arrows, add 1 proton, 2 neutrons, and 2 electrons to the atom so that there are 2 of each of the three particles located in the atom. Fill in the following chart.

Particle	Location
Proton	
Neutron	
Electron	

Identity of the Atom

2. Place a check in the "Show element name" box, which is in the top right portion of the gizmo. Manipulate the number of protons to achieve the number of protons in the data table. Do not worry about the number of neutrons or electrons. Experiment with adding one and removing one proton to and from the atom. Fill in the following table. Once you have the identity of the element, look at the periodic table and write down the atomic number for the element, this is the larger number located by the element symbol.

Number of protons	Name of element	Atomic Number from Periodic Table
2		
3		
1		

   a. **Does changing the number of protons change the identity of the element you have built?**

   b. **What is the relationship between the number of protons and the atomic number for an element?**

3. Now you will do the same thing as step 2 except you will be changing the number of neutrons. Make sure that you begin with 2 each for the protons, neutrons, and electrons. Add one neutron to the atom to place 3 neutrons in the atom. Record the name of the element and look at the periodic table to find the atomic number. Next, take 2 neutrons away (a total of 1 should now be in the atom.) Again record the name of the atom and the atomic number from the periodic table.

Number of neutrons	Name of element	Atomic Number from Periodic Table
2		
3		
1		

   a. **Does changing the number of neutrons change the identity of the element you have built?**

   b. **Does changing the number of neutrons change the affect the atomic number?**

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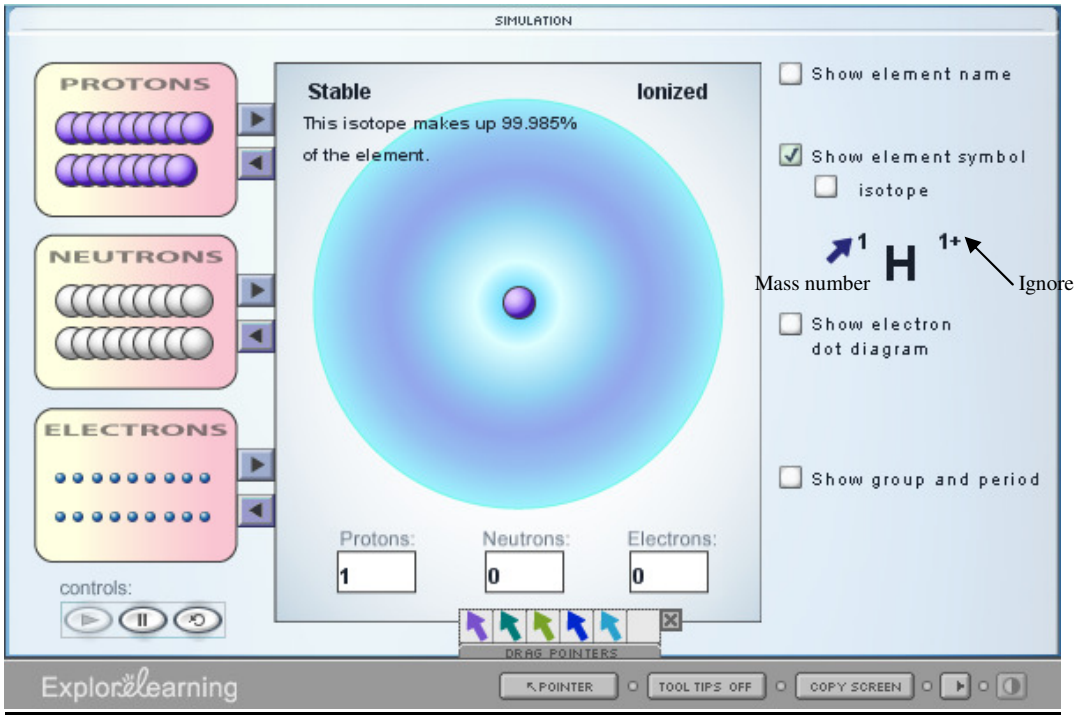
Number of electrons	Name of element	Atomic Number from Periodic Table
2		
3		
1		

a. Does changing the number of electrons change the identity of the element you have built?

KEY FACT: Now looking at questions 2a, 3a, and 4a, which subatomic particle is responsible for the identity of an atom?

Mass of an atom

5. Build an atom again with exactly 2 protons, 2 neutrons, and 2 electrons. Check "Show element symbol." Be sure "isotope" is not selected. Make adjustments to the atom to attain the number of protons, neutrons, and electrons as shown in the data table. Then finish filling in the table. ***The number to the upper left of the symbol indicates the mass of the atom.*** (See where the pointer is pointing in the screen shot.)



Number of protons	Number of neutrons	Number of electrons	Identity of atom (give name)	Mass of atom
2	2	2		
3	2	2		
2	3	2		
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a. Does the proton affect the mass of an atom? You MUST EXPLAIN by referring to an example or data from above .

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d. Looking at the atom in the Gizmo, where is most of the mass of an atom concentrated? Explain.

5. Which 2 subatomic particles affect the mass of an atom?

KEY FACT: Write a mathematical formula to show the relationship between the number of protons, the number of neutrons, and the mass number for an atom.

SUMMARY: Based on this gizmo, the number of protons equals the _____ _____ from the periodic table. The number of protons determines the _____ of an atom. The _____ and _____ determines the mass of an atom. The protons and neutrons are located in the _____ of an atom and electrons are in the _____ _____.

- How many protons are in the nucleus of an atom of Carbon (C)? _____
- What is the formula for finding the mass number of an atom? _____
- If an atom of C has 7 neutrons in the nucleus, then it would have a mass number of _____ (see previous 2 questions).
- How many electrons would be found in the nucleus? _____

Subatomic Particle Gizmo Name _____Sci # _____

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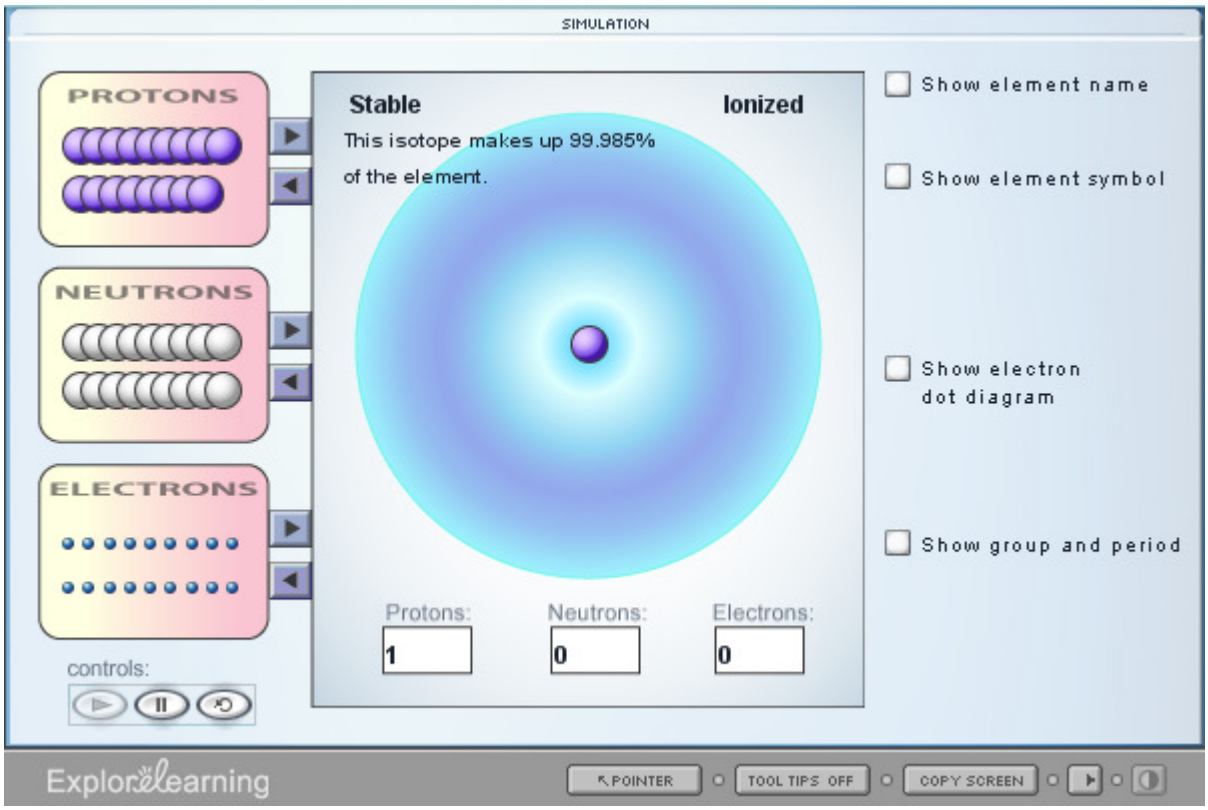

   a. Using the right arrows, add 1 proton, 2 neutrons, and 2 electrons to the atom so that there are 2 of each of the three particles located in the atom. Fill in the following chart.

Particle	Location
Proton	
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Identity of the Atom

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3		
1		

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3		
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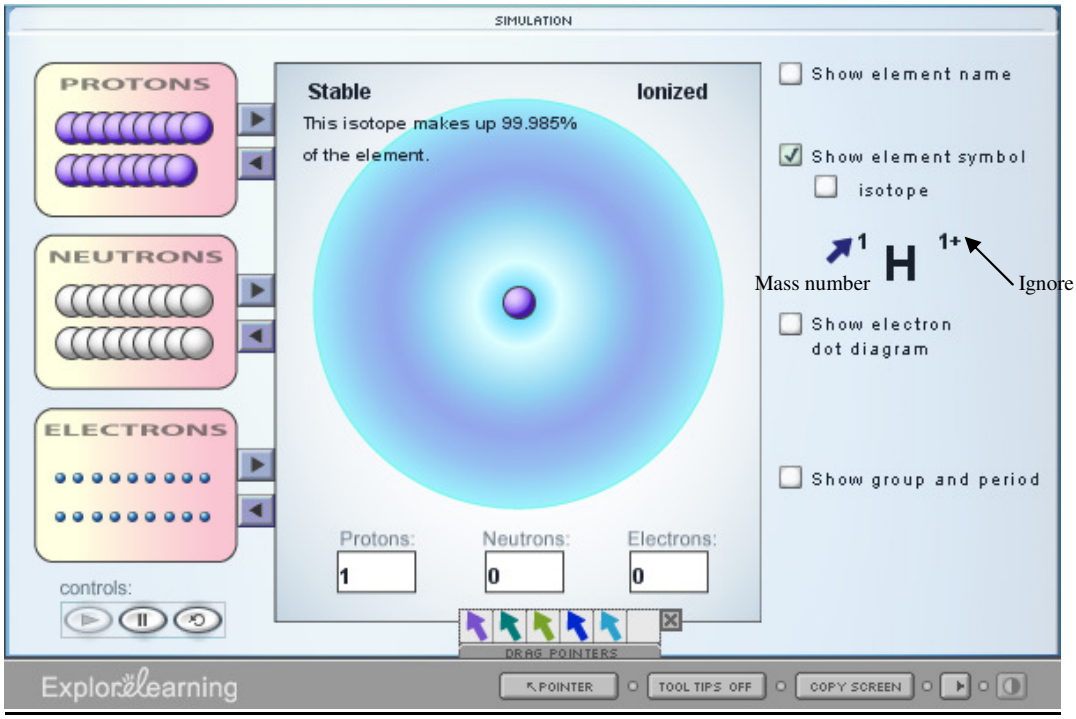
5. Build an atom again with exactly 2 protons, 2 neutrons, and 2 electrons. Check "Show element symbol." Be sure "isotope" is not selected. Make adjustments to the atom to attain the number of protons, neutrons, and electrons as shown in the data table. Then finish filling in the table. ***The number to the upper left of the symbol indicates the mass of the atom.*** (See where the pointer is pointing in the screen shot.)



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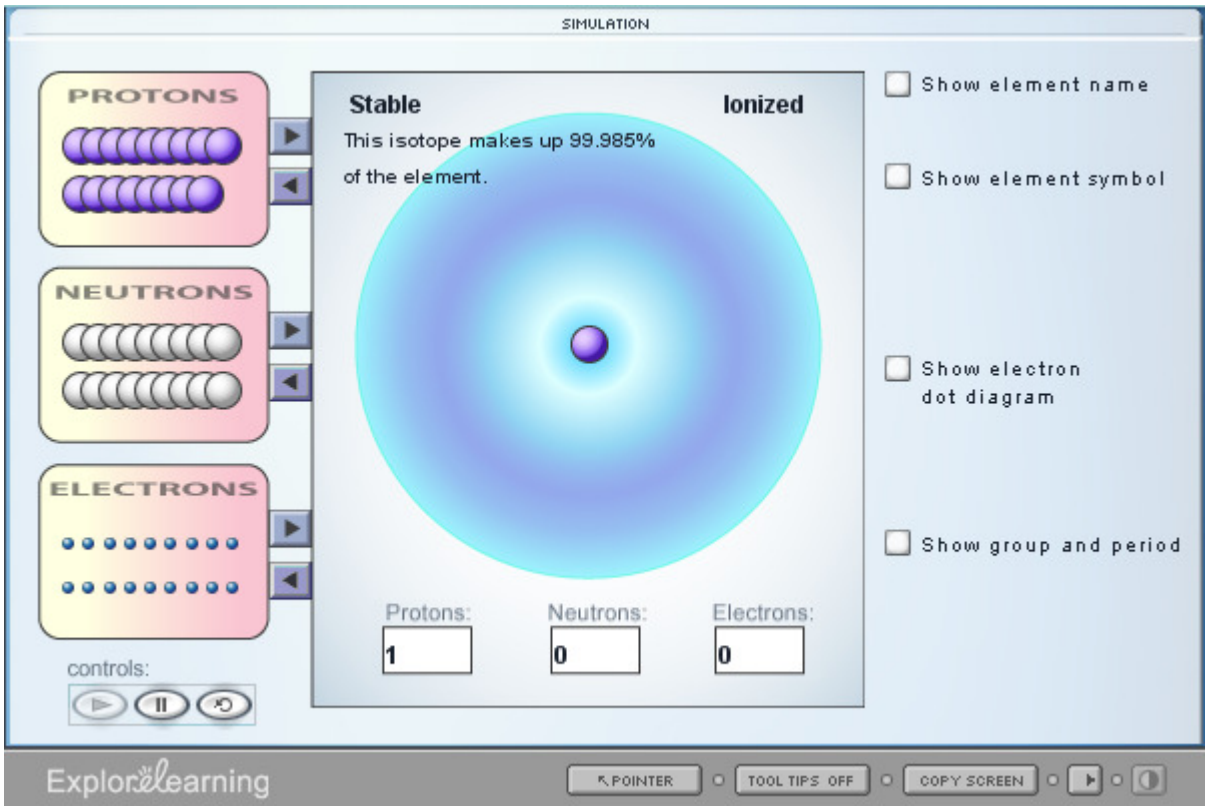

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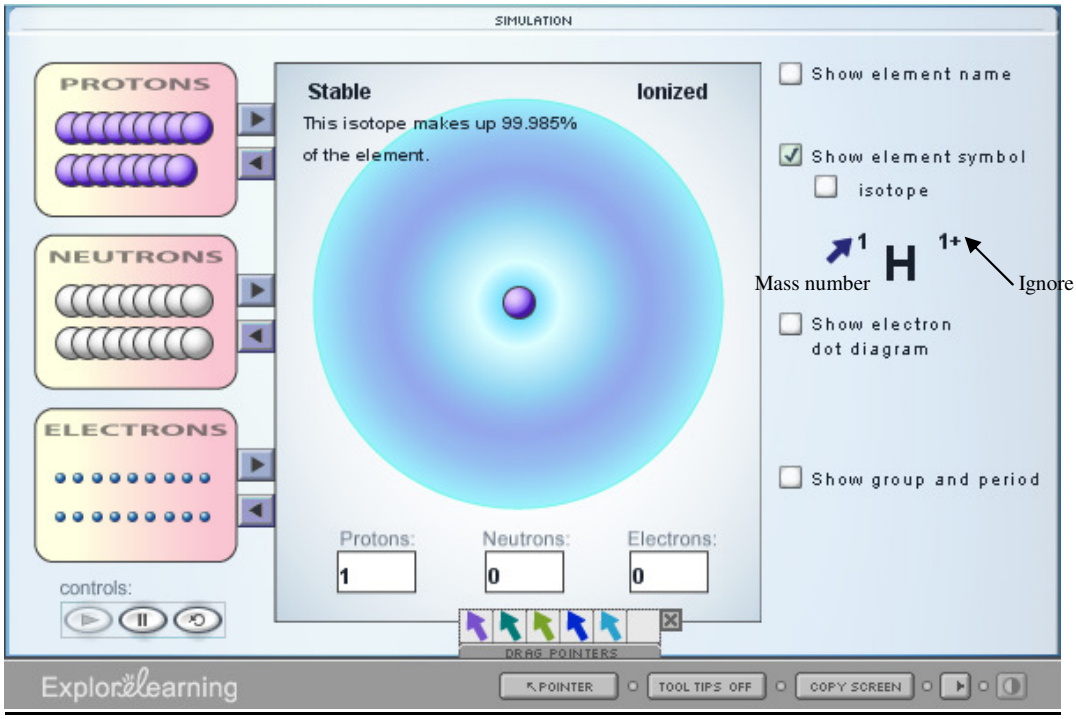

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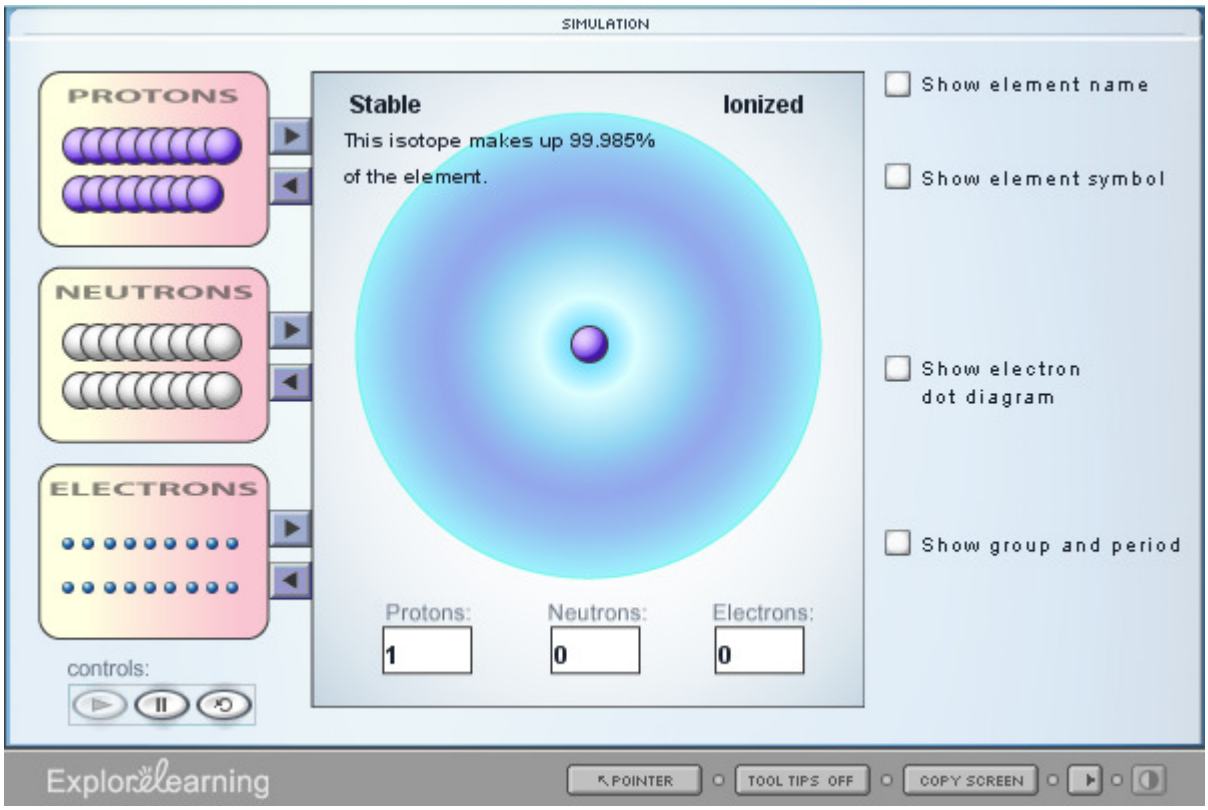

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3		
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Number of electrons	Name of element	Atomic Number from Periodic Table
2		
3		
1		

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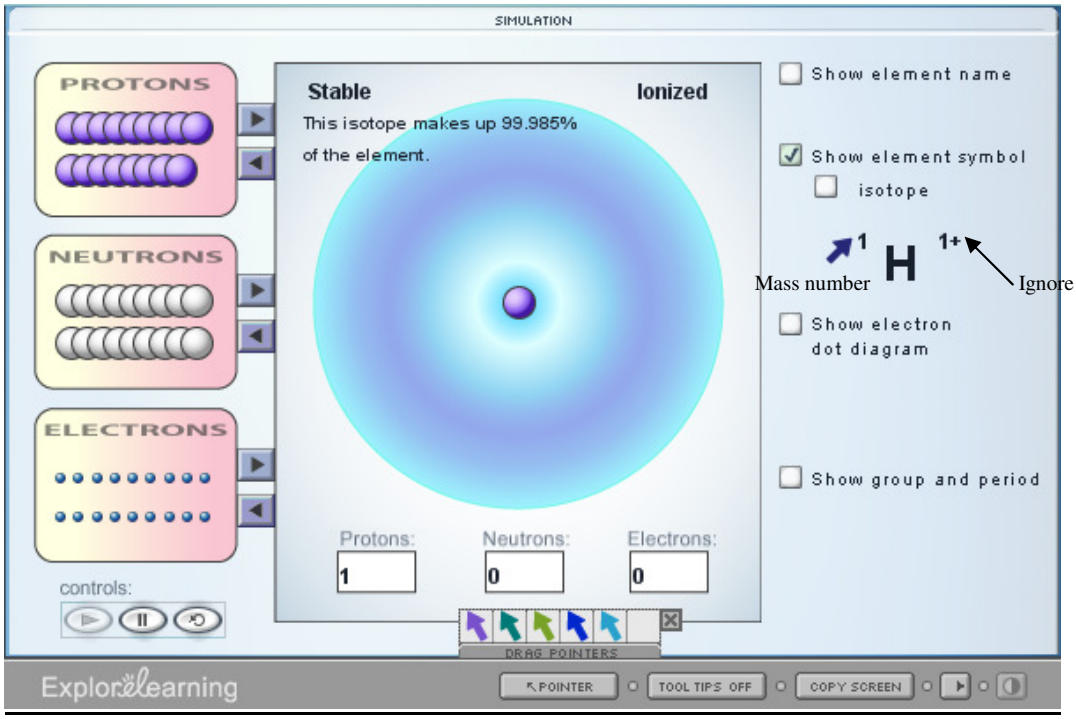

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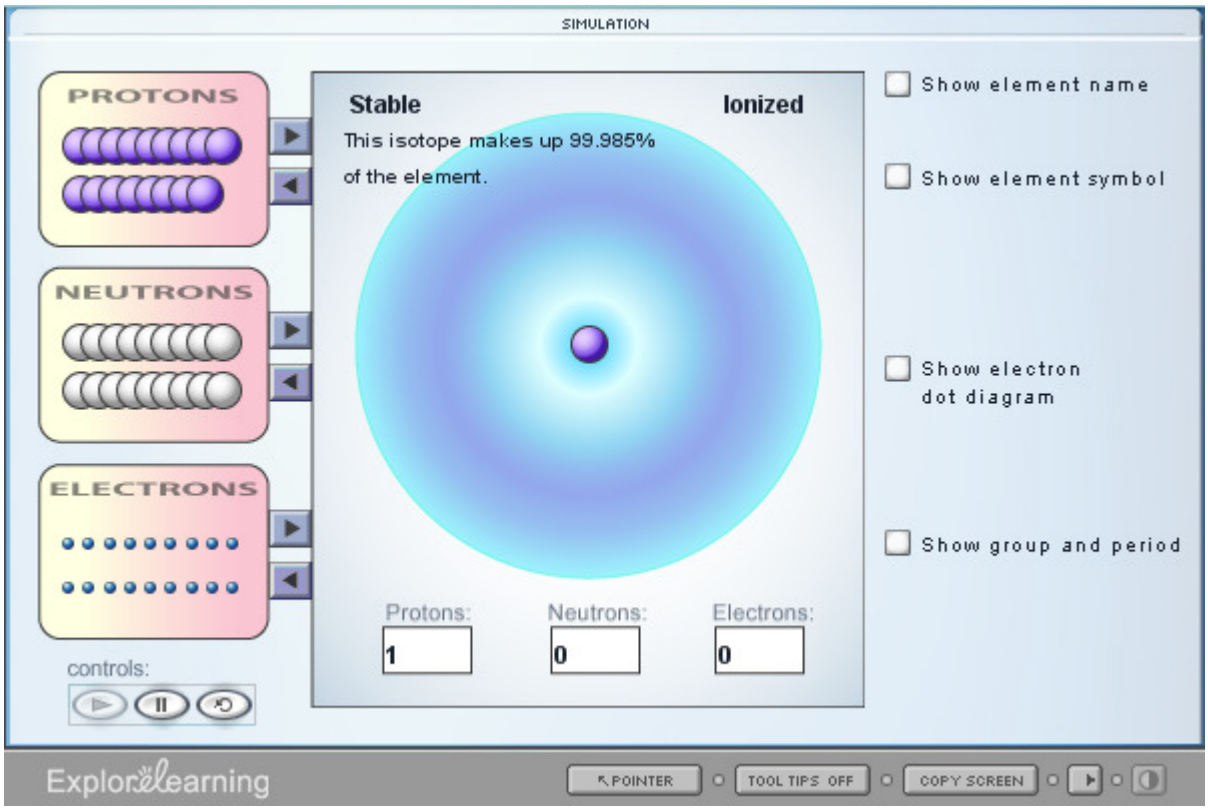

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2		
3		
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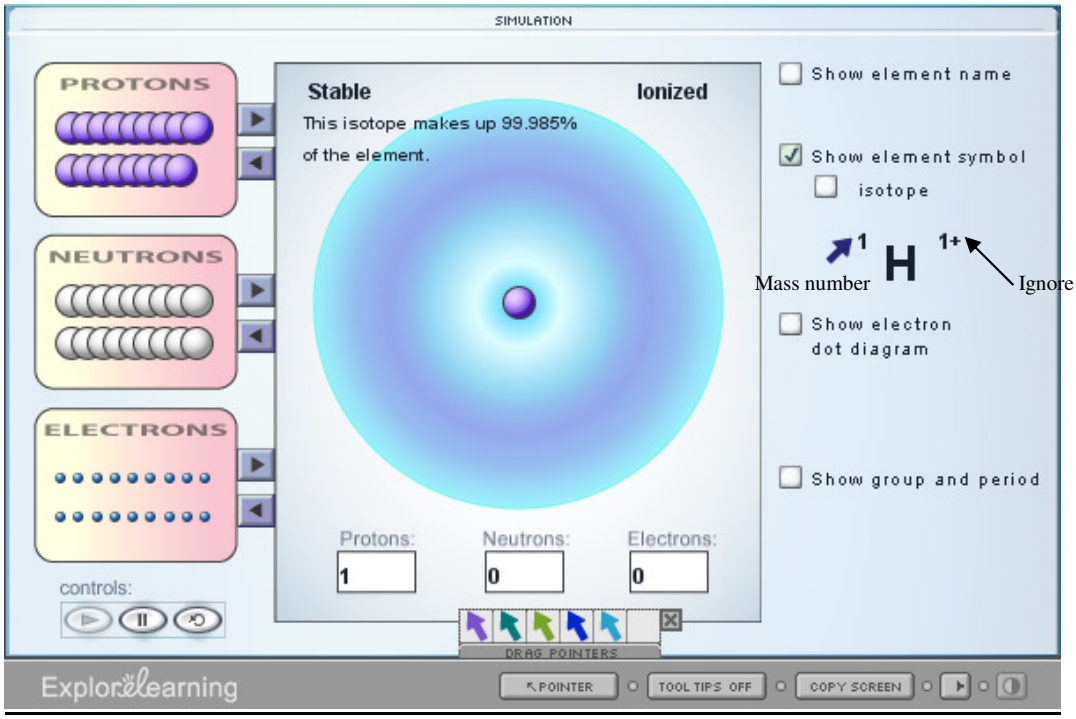

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Subatomic Particle Gizmo Name _____Sci # _____

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Once you log in, find the GIZMO named "Element Builder" Gizmo and select "Launch Gizmo."

Location of Subatomic Particles

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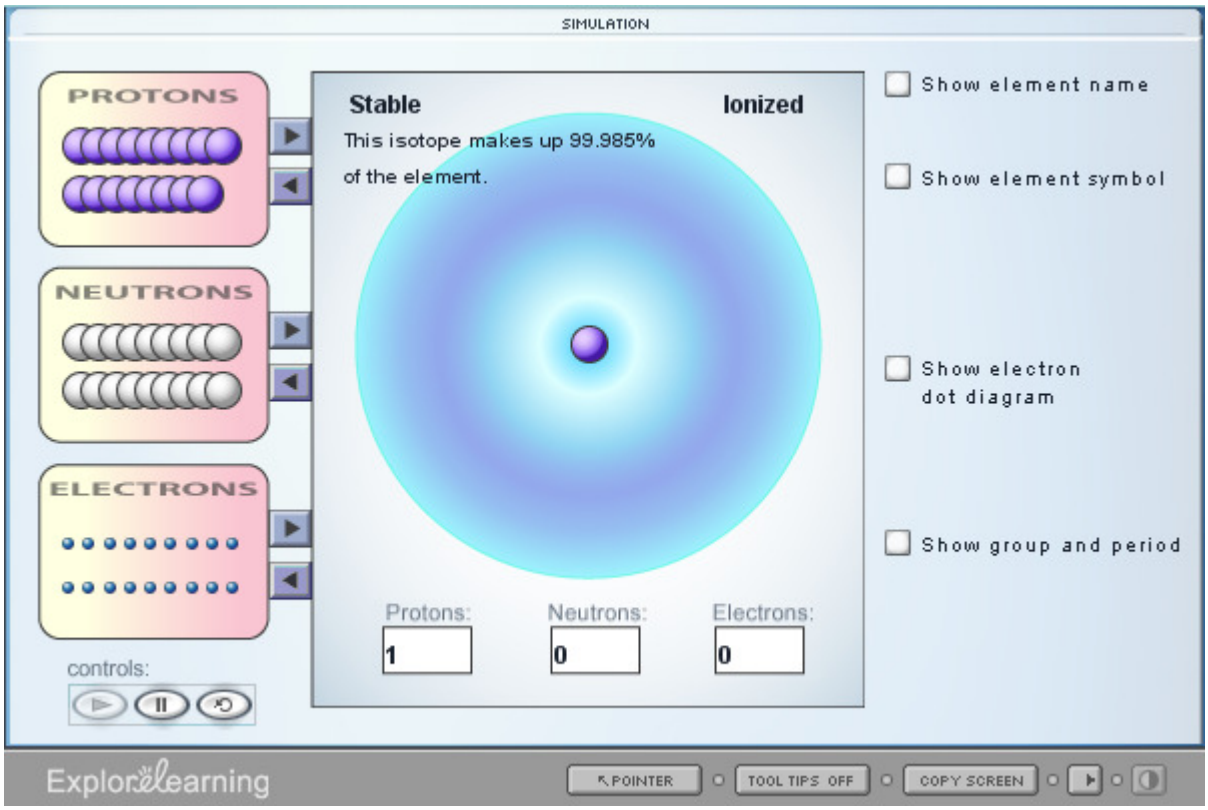

   a. Using the right arrows, add 1 proton, 2 neutrons, and 2 electrons to the atom so that there are 2 of each of the three particles located in the atom. Fill in the following chart.

Particle	Location
Proton	
Neutron	
Electron	

Identity of the Atom

2. Place a check in the "Show element name" box, which is in the top right portion of the gizmo. Manipulate the number of protons to achieve the number of protons in the data table. Do not worry about the number of neutrons or electrons. Experiment with adding one and removing one proton to and from the atom. Fill in the following table. Once you have the identity of the element, look at the periodic table and write down the atomic number for the element, this is the larger number located by the element symbol.

Number of protons	Name of element	Atomic Number from Periodic Table
2		
3		
1		

   a. **Does changing the number of protons change the identity of the element you have built?**

   b. **What is the relationship between the number of protons and the atomic number for an element?**

3. Now you will do the same thing as step 2 except you will be changing the number of neutrons. Make sure that you begin with 2 each for the protons, neutrons, and electrons. Add one neutron to the atom to place 3 neutrons in the atom. Record the name of the element and look at the periodic table to find the atomic number. Next, take 2 neutrons away (a total of 1 should now be in the atom.) Again record the name of the atom and the atomic number from the periodic table.

Number of neutrons	Name of element	Atomic Number from Periodic Table
2		
3		
1		

   a. **Does changing the number of neutrons change the identity of the element you have built?**

   b. **Does changing the number of neutrons change the affect the atomic number?**

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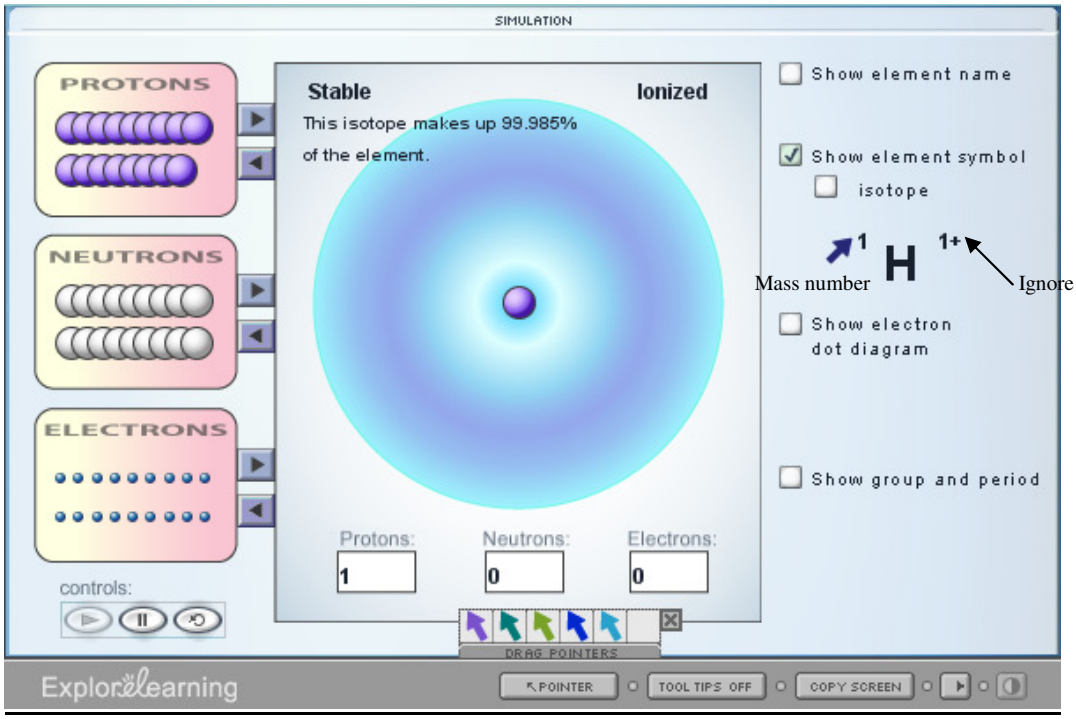
Number of electrons	Name of element	Atomic Number from Periodic Table
2		
3		
1		

a. Does changing the number of electrons change the identity of the element you have built?

KEY FACT: Now looking at questions 2a, 3a, and 4a, which subatomic particle is responsible for the identity of an atom?

Mass of an atom

5. Build an atom again with exactly 2 protons, 2 neutrons, and 2 electrons. Check "Show element symbol." Be sure "isotope" is not selected. Make adjustments to the atom to attain the number of protons, neutrons, and electrons as shown in the data table. Then finish filling in the table. ***The number to the upper left of the symbol indicates the mass of the atom.*** (See where the pointer is pointing in the screen shot.)



Number of protons	Number of neutrons	Number of electrons	Identity of atom (give name)	Mass of atom
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3	2	2		
2	3	2		
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a. Does the proton affect the mass of an atom? You MUST EXPLAIN by referring to an example or data from above .

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d. Looking at the atom in the Gizmo, where is most of the mass of an atom concentrated? Explain.

5. Which 2 subatomic particles affect the mass of an atom?

KEY FACT: Write a mathematical formula to show the relationship between the number of protons, the number of neutrons, and the mass number for an atom.

SUMMARY: Based on this gizmo, the number of protons equals the _____ _____ from the periodic table. The number of protons determines the _____ of an atom. The _____ and _____ determines the mass of an atom. The protons and neutrons are located in the _____ of an atom and electrons are in the _____ _____.

- How many protons are in the nucleus of an atom of Carbon (C)? _____
- What is the formula for finding the mass number of an atom? _____
- If an atom of C has 7 neutrons in the nucleus, then it would have a mass number of _____ (see previous 2 questions).
- How many electrons would be found in the nucleus? _____

Subatomic Particle Gizmo Name _____Sci # _____

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Location of Subatomic Particles

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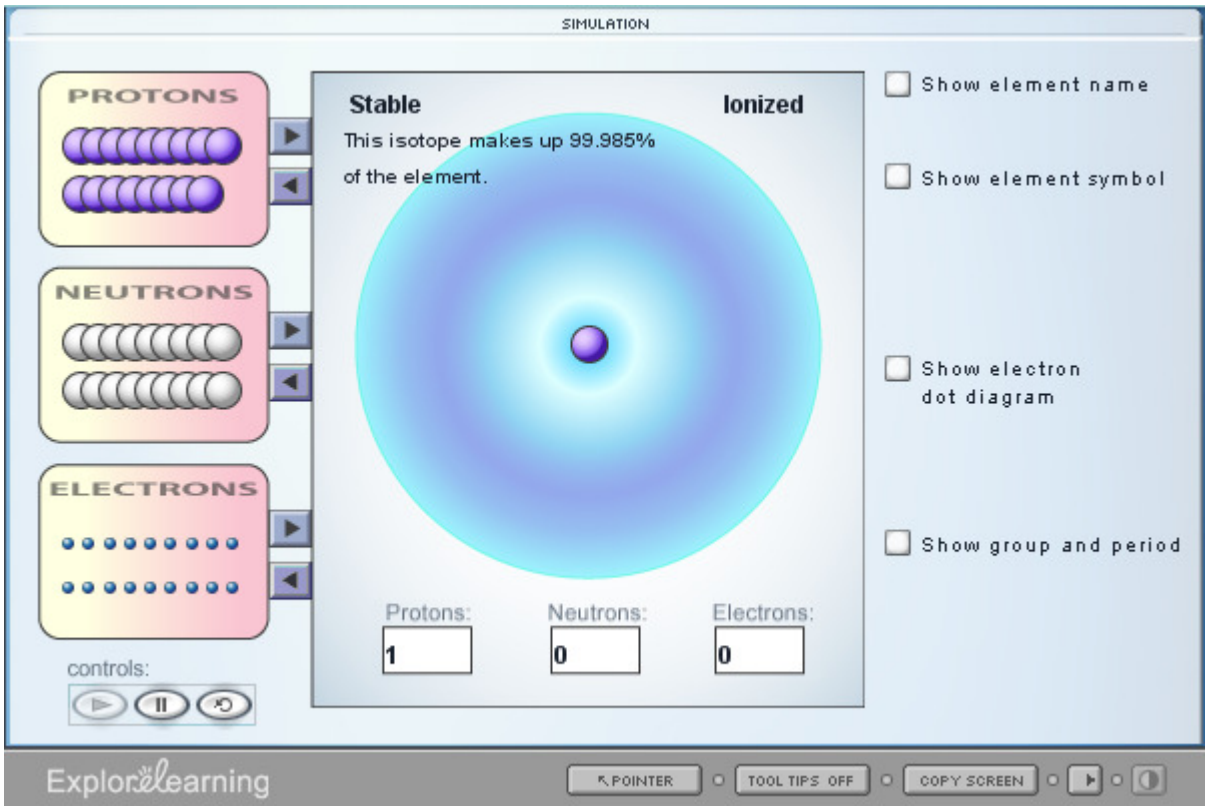

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Particle	Location
Proton	
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Electron	

Identity of the Atom

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3		
1		

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3		
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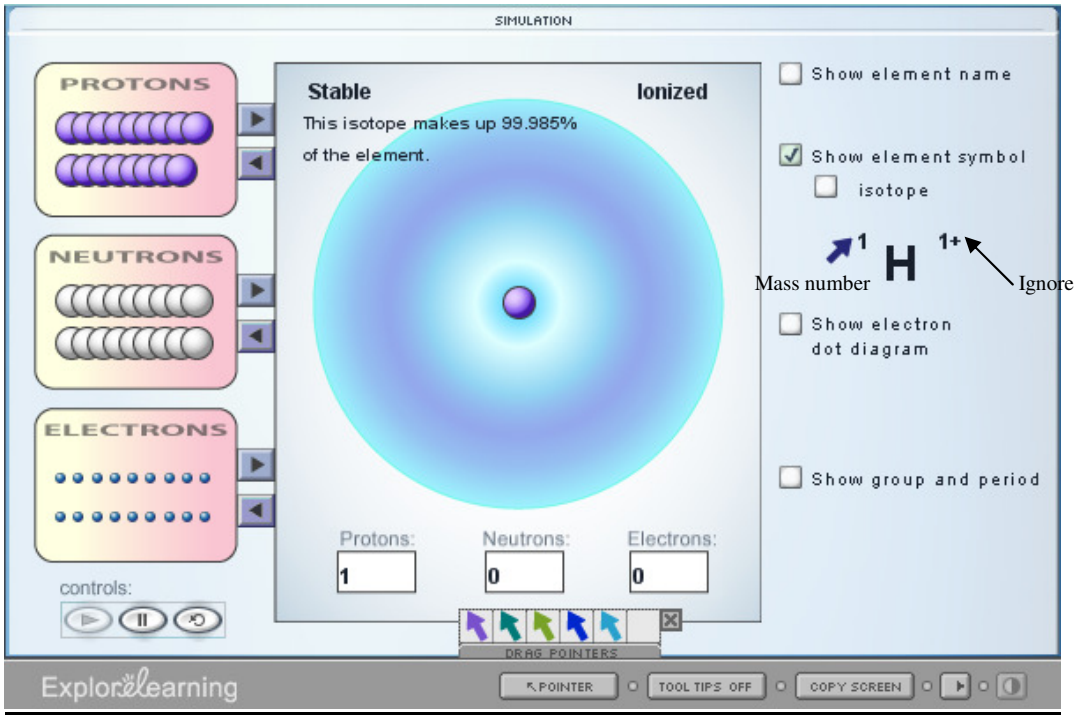

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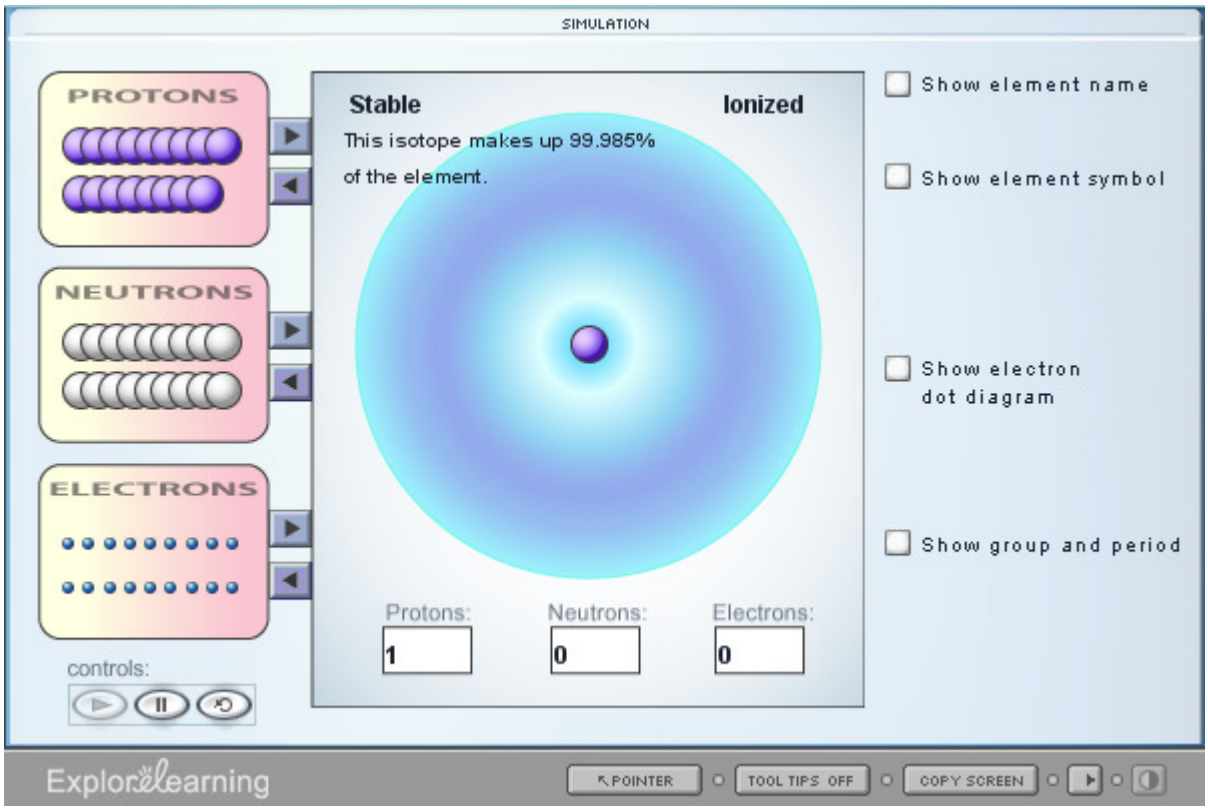

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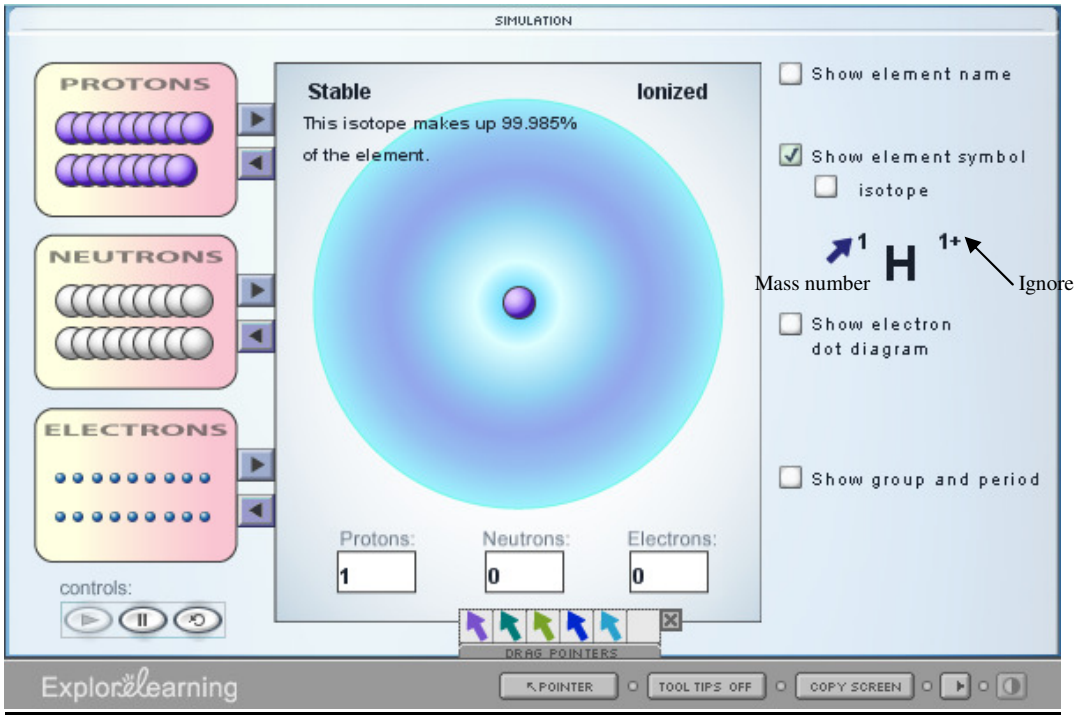

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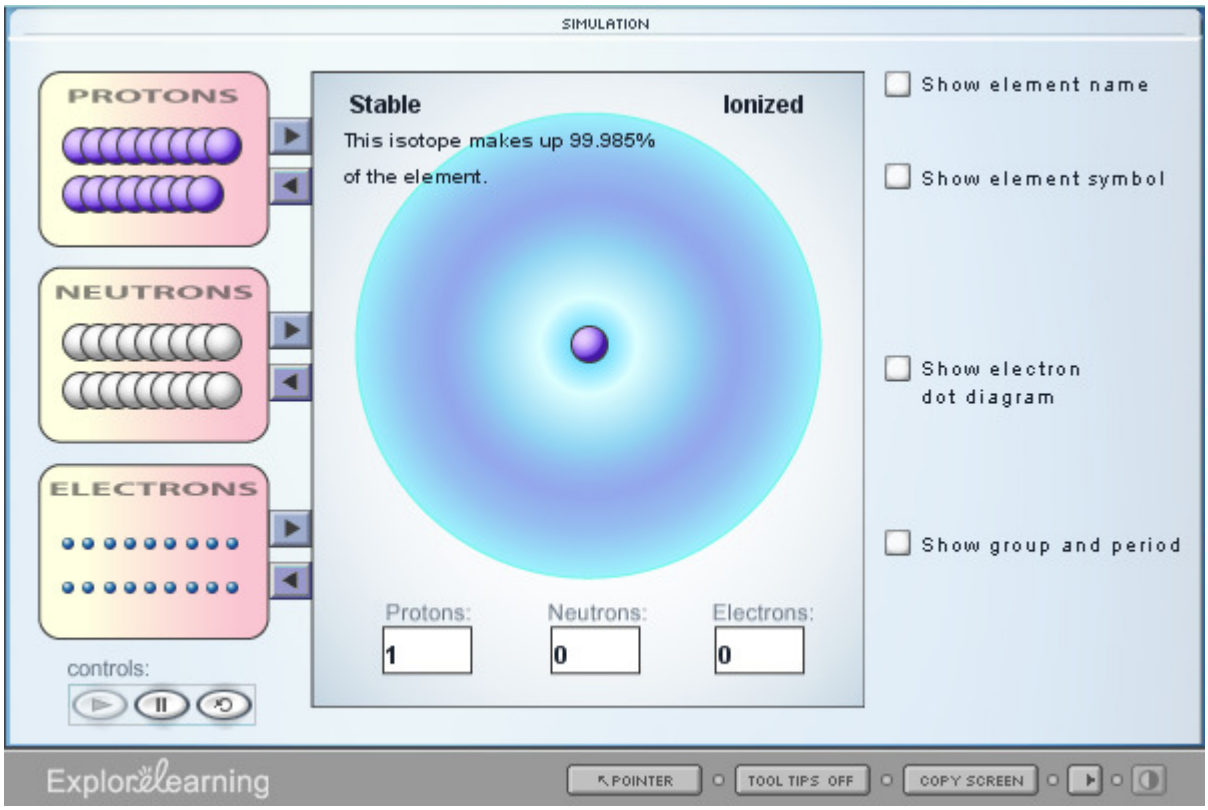

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3		
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Number of electrons	Name of element	Atomic Number from Periodic Table
2		
3		
1		

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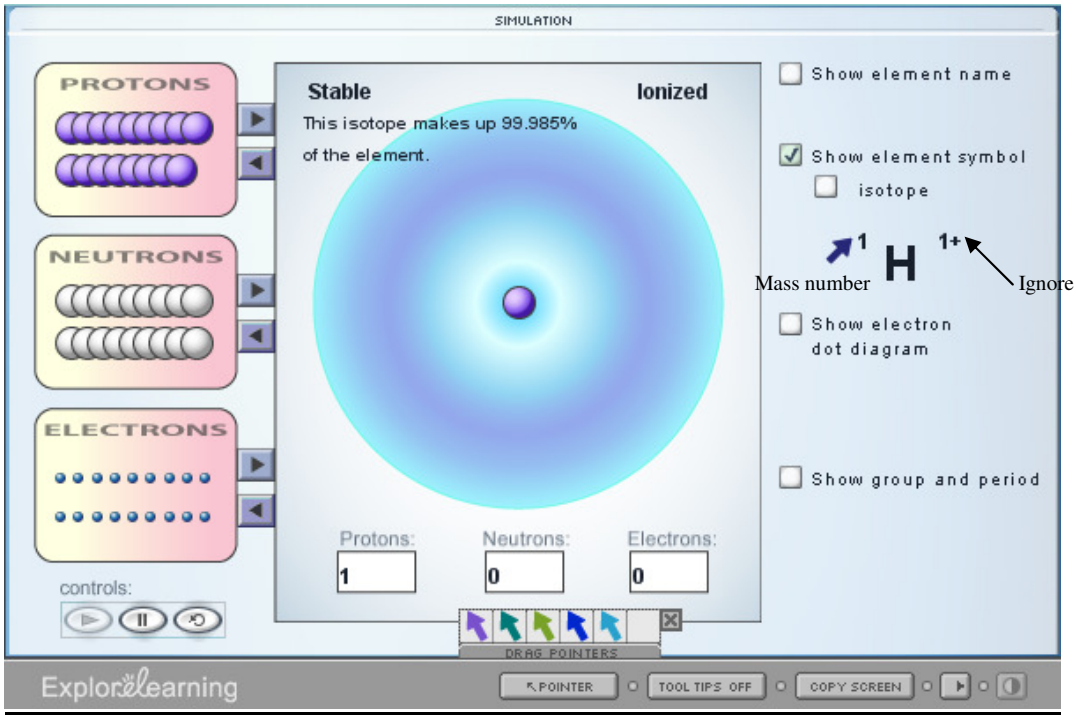

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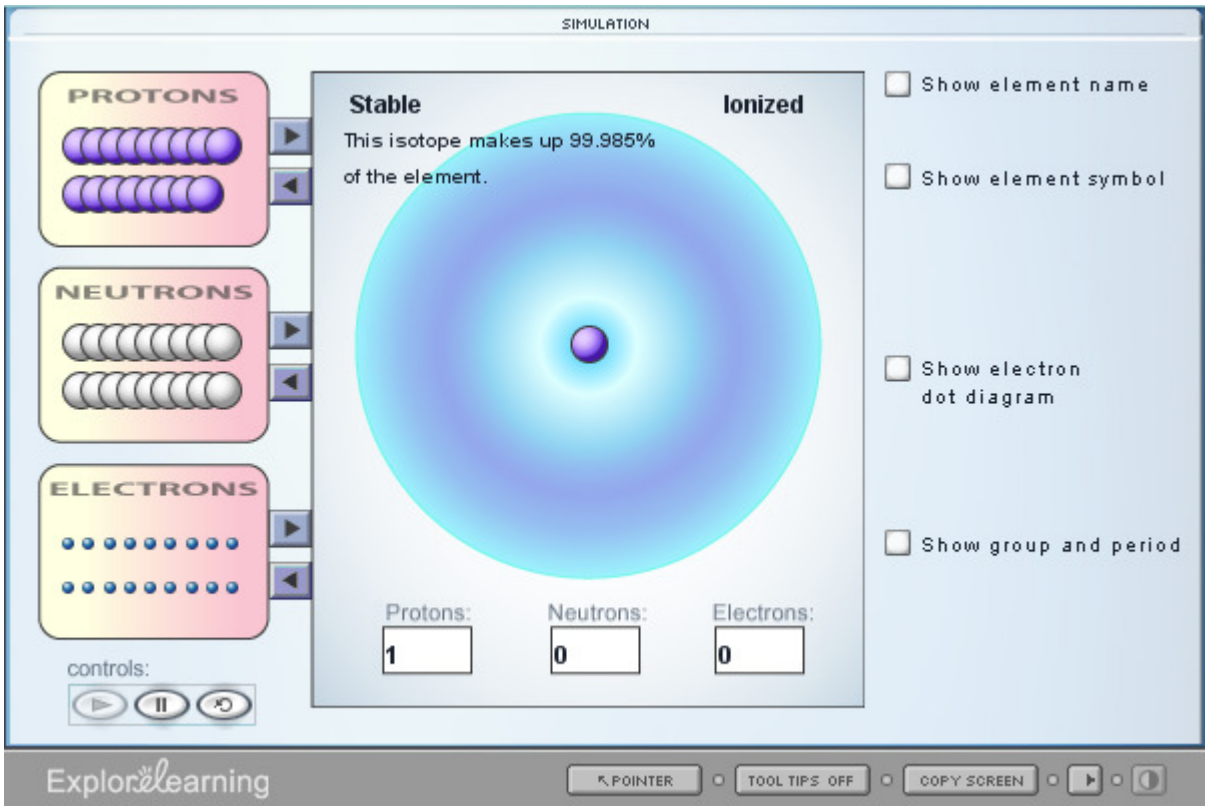

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3		
1		

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Number of electrons	Name of element	Atomic Number from Periodic Table
2		
3		
1		

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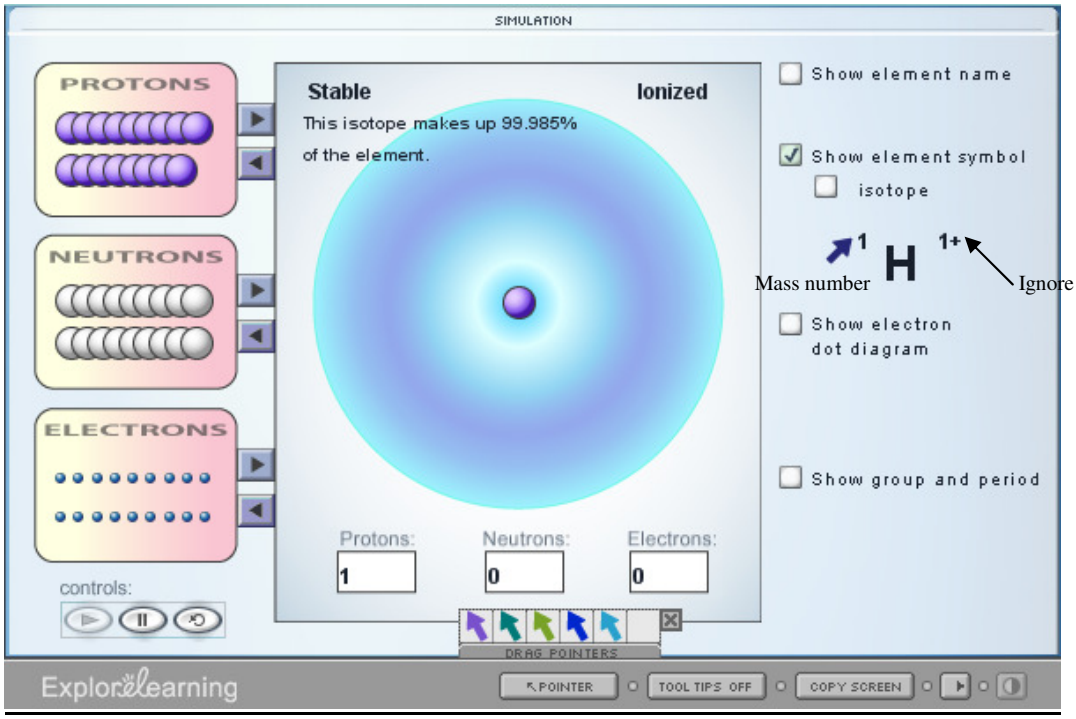

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Subatomic Particle Gizmo Name _____Sci # _____

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Once you log in, find the GIZMO named "Element Builder" Gizmo and select "Launch Gizmo."

Location of Subatomic Particles

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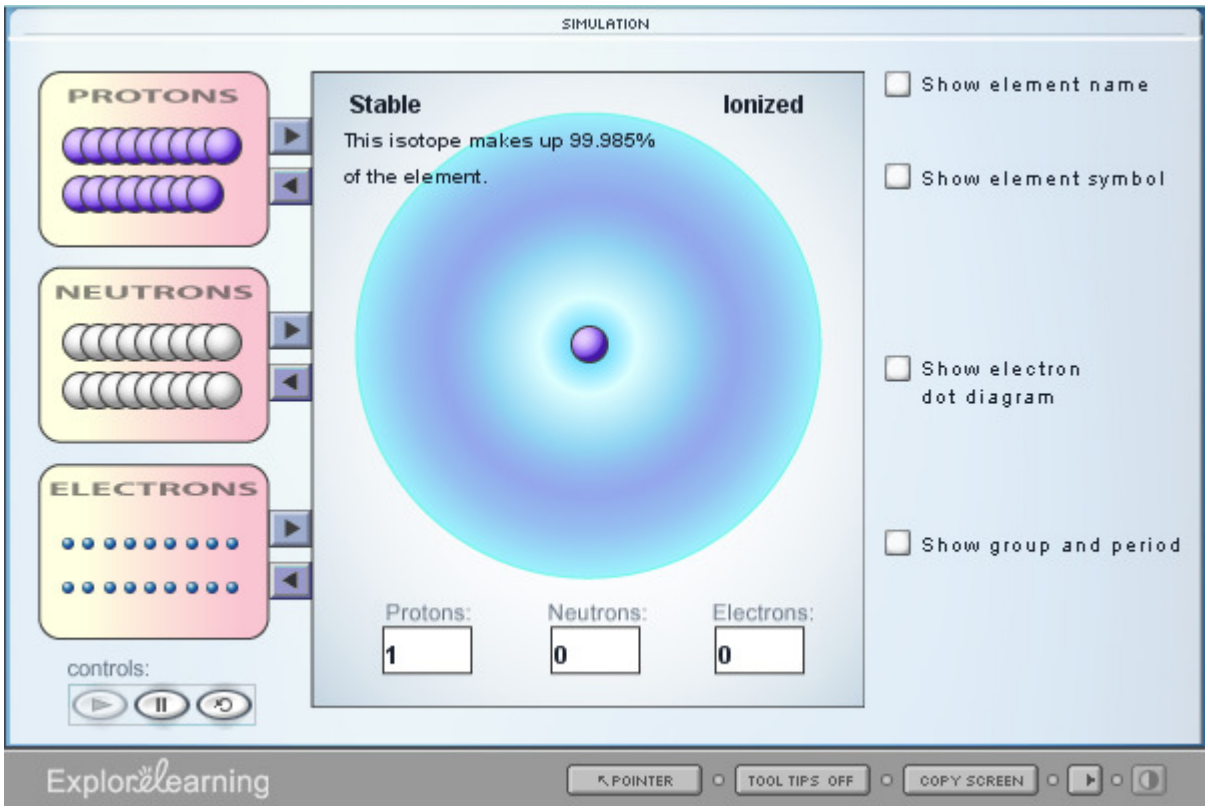

   a. Using the right arrows, add 1 proton, 2 neutrons, and 2 electrons to the atom so that there are 2 of each of the three particles located in the atom. Fill in the following chart.

Particle	Location
Proton	
Neutron	
Electron	

Identity of the Atom

2. Place a check in the "Show element name" box, which is in the top right portion of the gizmo. Manipulate the number of protons to achieve the number of protons in the data table. Do not worry about the number of neutrons or electrons. Experiment with adding one and removing one proton to and from the atom. Fill in the following table. Once you have the identity of the element, look at the periodic table and write down the atomic number for the element, this is the larger number located by the element symbol.

Number of protons	Name of element	Atomic Number from Periodic Table
2		
3		
1		

   a. **Does changing the number of protons change the identity of the element you have built?**

   b. **What is the relationship between the number of protons and the atomic number for an element?**

3. Now you will do the same thing as step 2 except you will be changing the number of neutrons. Make sure that you begin with 2 each for the protons, neutrons, and electrons. Add one neutron to the atom to place 3 neutrons in the atom. Record the name of the element and look at the periodic table to find the atomic number. Next, take 2 neutrons away (a total of 1 should now be in the atom.) Again record the name of the atom and the atomic number from the periodic table.

Number of neutrons	Name of element	Atomic Number from Periodic Table
2		
3		
1		

   a. **Does changing the number of neutrons change the identity of the element you have built?**

   b. **Does changing the number of neutrons change the affect the atomic number?**

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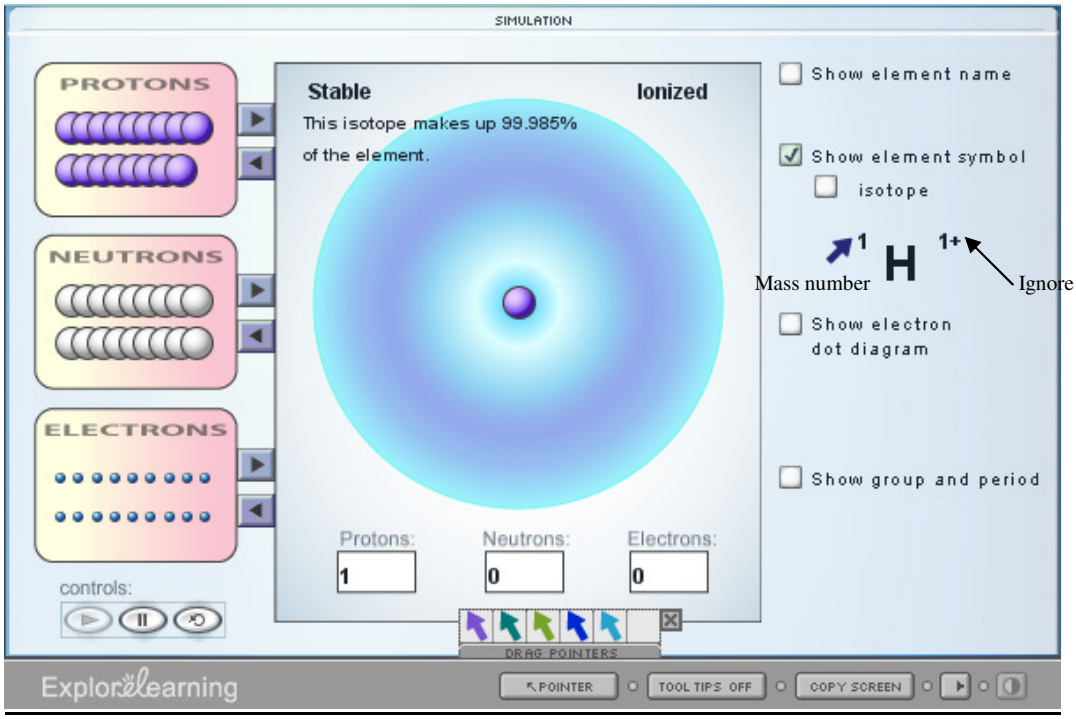
Number of electrons	Name of element	Atomic Number from Periodic Table
2		
3		
1		

a. Does changing the number of electrons change the identity of the element you have built?

KEY FACT: Now looking at questions 2a, 3a, and 4a, which subatomic particle is responsible for the identity of an atom?

Mass of an atom

5. Build an atom again with exactly 2 protons, 2 neutrons, and 2 electrons. Check "Show element symbol." Be sure "isotope" is not selected. Make adjustments to the atom to attain the number of protons, neutrons, and electrons as shown in the data table. Then finish filling in the table. ***The number to the upper left of the symbol indicates the mass of the atom.*** (See where the pointer is pointing in the screen shot.)



Number of protons	Number of neutrons	Number of electrons	Identity of atom (give name)	Mass of atom
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3	2	2		
2	3	2		
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a. Does the proton affect the mass of an atom? You MUST EXPLAIN by referring to an example or data from above .

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d. Looking at the atom in the Gizmo, where is most of the mass of an atom concentrated? Explain.

5. Which 2 subatomic particles affect the mass of an atom?

KEY FACT: Write a mathematical formula to show the relationship between the number of protons, the number of neutrons, and the mass number for an atom.

SUMMARY: Based on this gizmo, the number of protons equals the _____ _____ from the periodic table. The number of protons determines the _____ of an atom. The _____ and _____ determines the mass of an atom. The protons and neutrons are located in the _____ of an atom and electrons are in the _____ _____.

- How many protons are in the nucleus of an atom of Carbon (C)? _____
- What is the formula for finding the mass number of an atom? _____
- If an atom of C has 7 neutrons in the nucleus, then it would have a mass number of _____ (see previous 2 questions).
- How many electrons would be found in the nucleus? _____

Subatomic Particle Gizmo Name _____Sci # _____

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Location of Subatomic Particles

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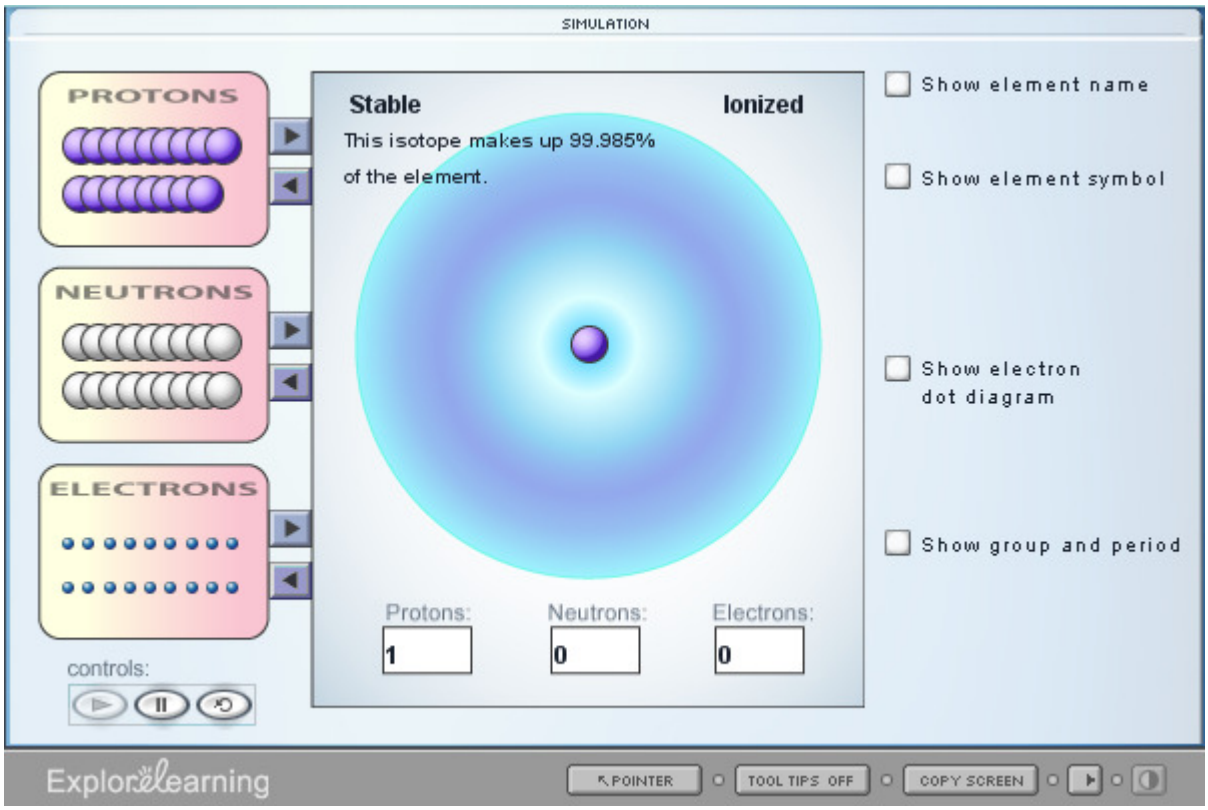

   a. Using the right arrows, add 1 proton, 2 neutrons, and 2 electrons to the atom so that there are 2 of each of the three particles located in the atom. Fill in the following chart.

Particle	Location
Proton	
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Identity of the Atom

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Number of neutrons	Name of element	Atomic Number from Periodic Table
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3		
1		

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Number of electrons	Name of element	Atomic Number from Periodic Table
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3		
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a. Does changing the number of electrons change the identity of the element you have built?

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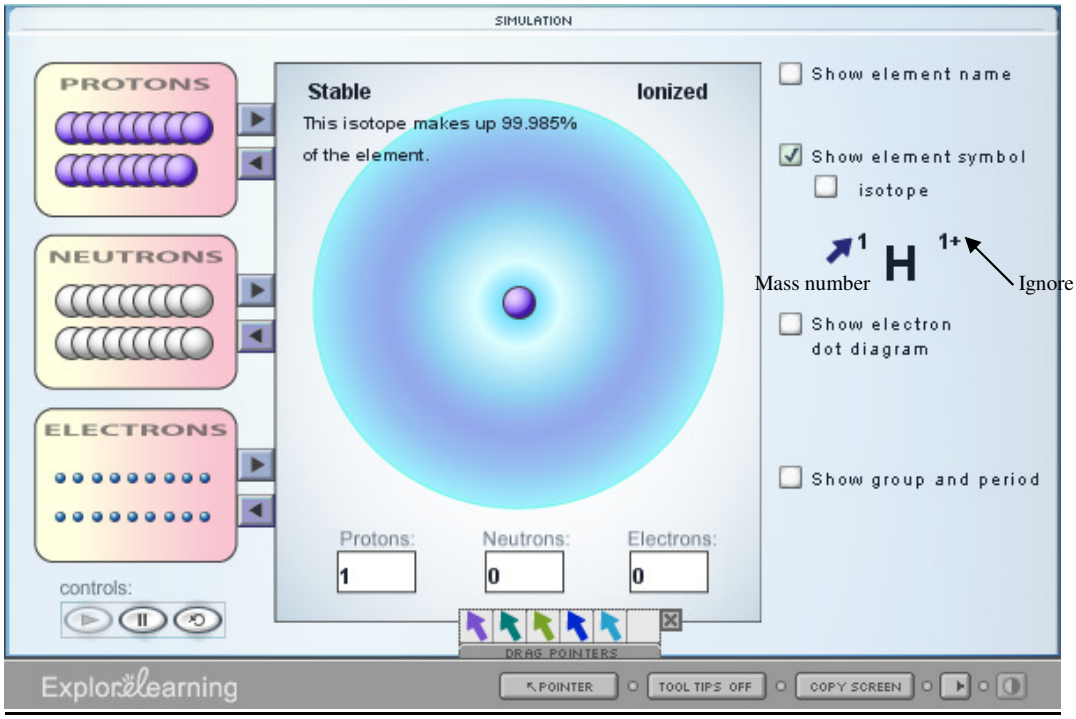
5. Build an atom again with exactly 2 protons, 2 neutrons, and 2 electrons. Check "Show element symbol." Be sure "isotope" is not selected. Make adjustments to the atom to attain the number of protons, neutrons, and electrons as shown in the data table. Then finish filling in the table. ***The number to the upper left of the symbol indicates the mass of the atom.*** (See where the pointer is pointing in the screen shot.)



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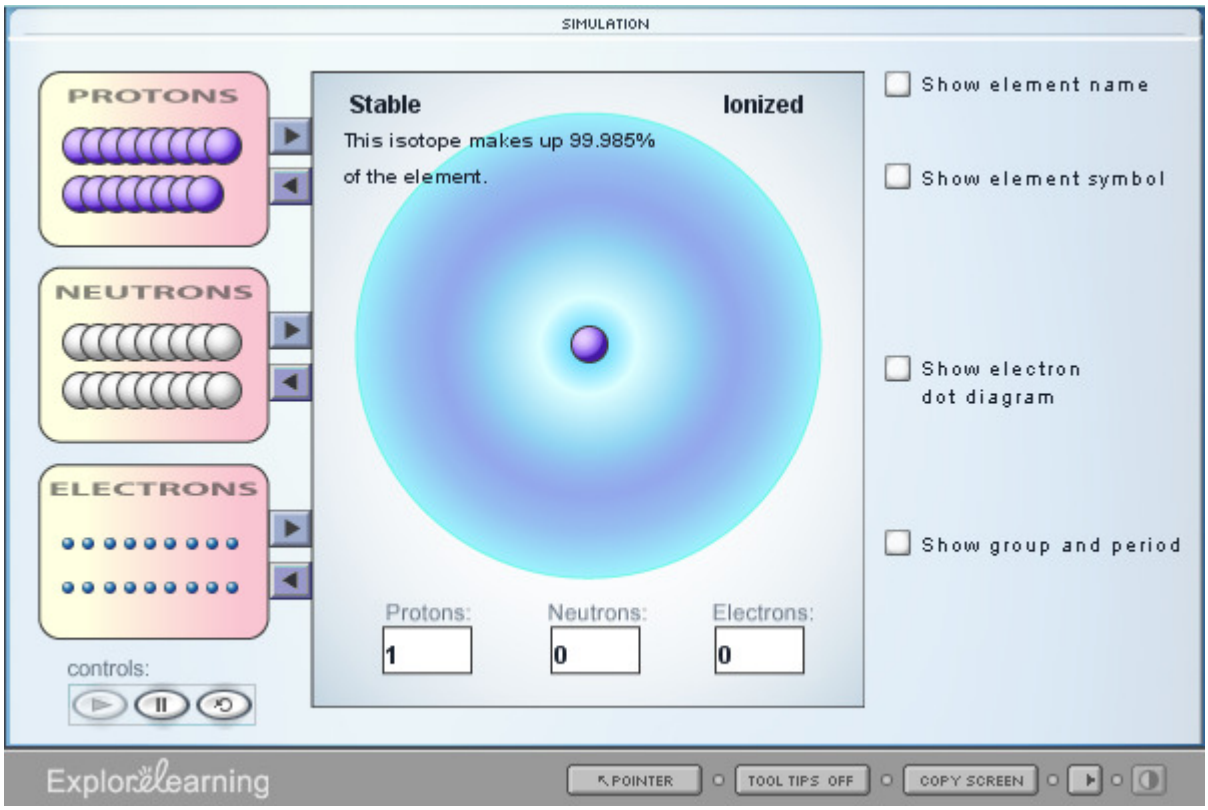

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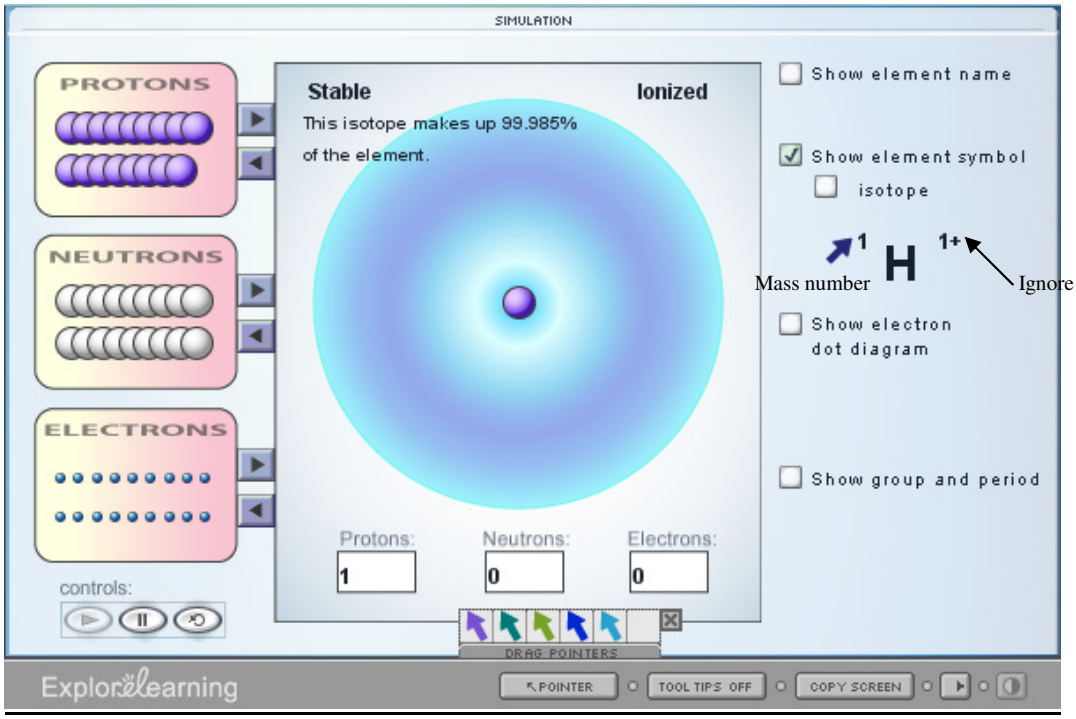

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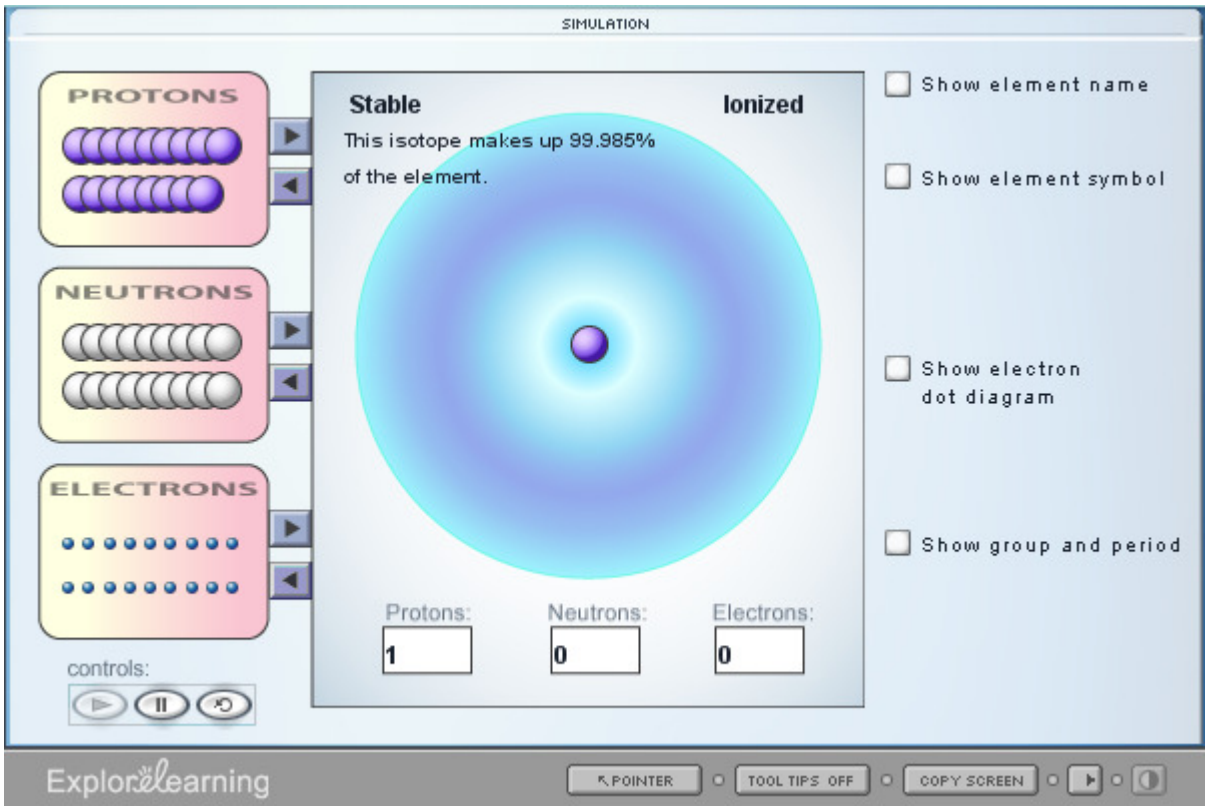

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Number of electrons	Name of element	Atomic Number from Periodic Table
2		
3		
1		

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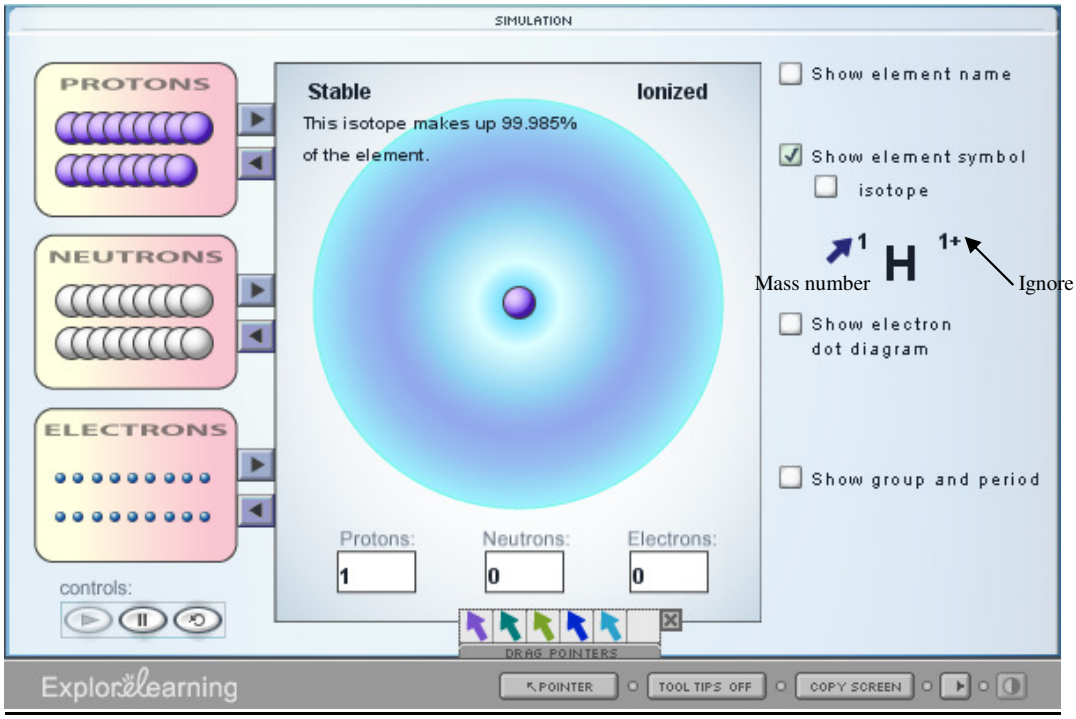

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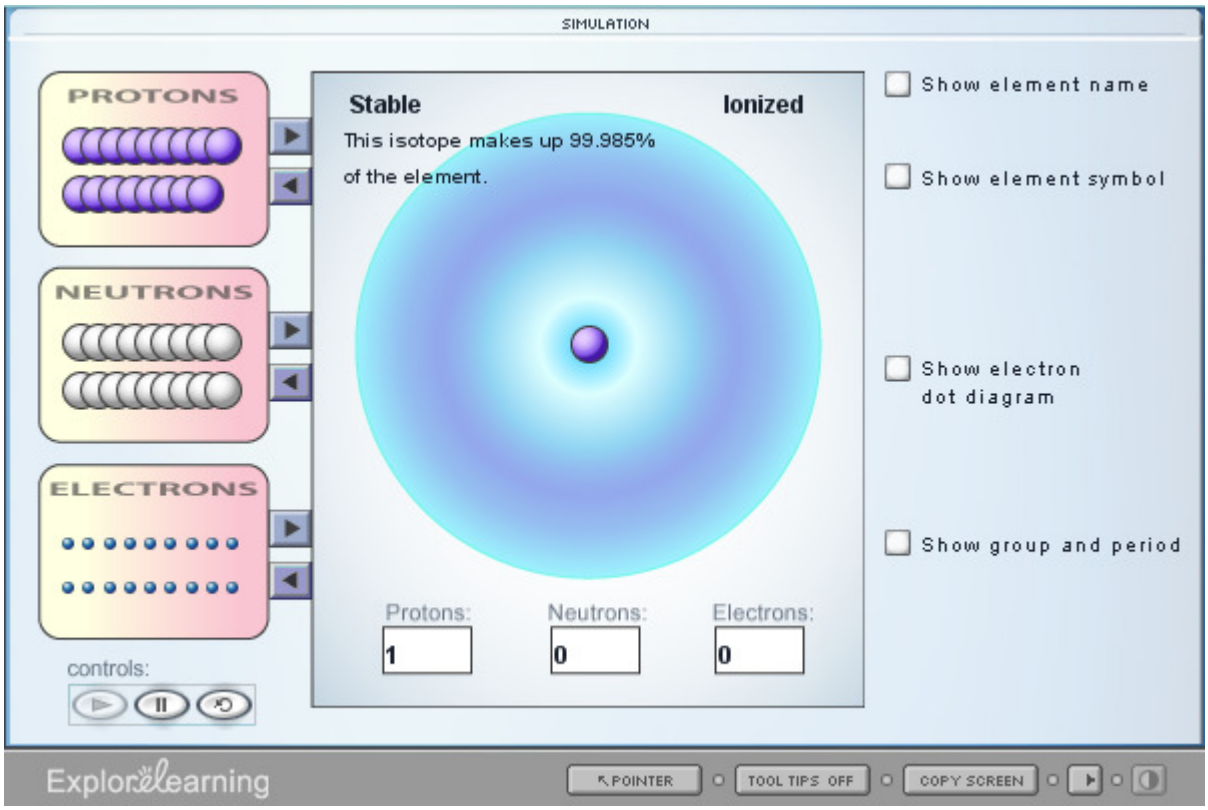

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2		
3		
1		

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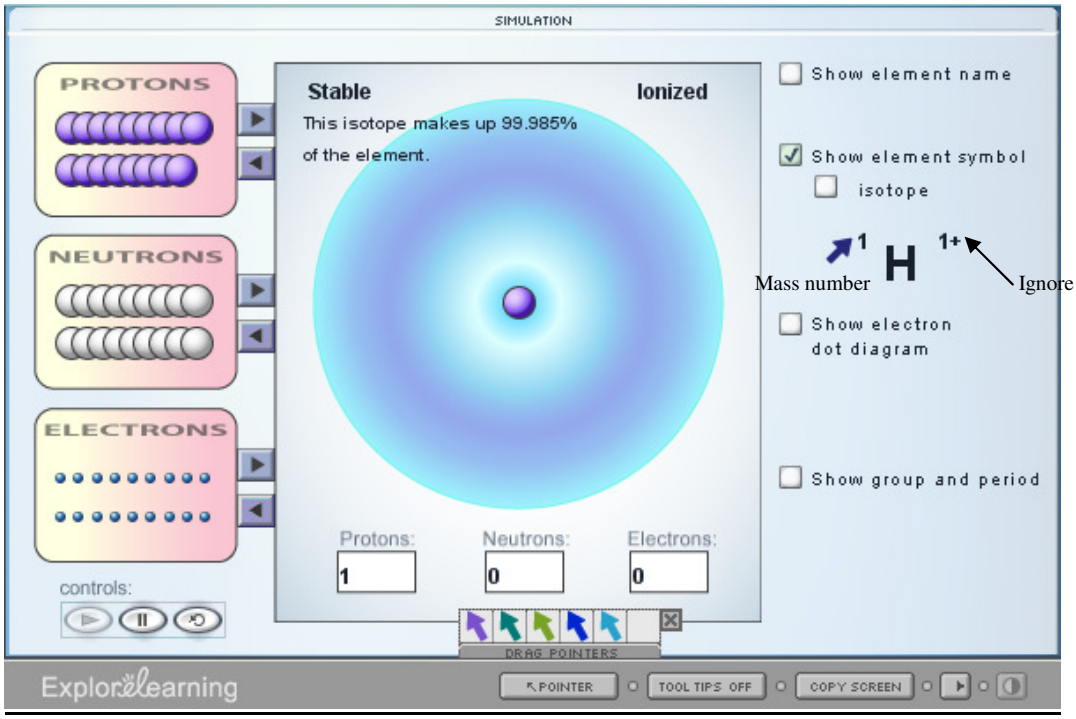

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Subatomic Particle Gizmo Name _____Sci # _____

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Once you log in, find the GIZMO named "Element Builder" Gizmo and select "Launch Gizmo."

Location of Subatomic Particles

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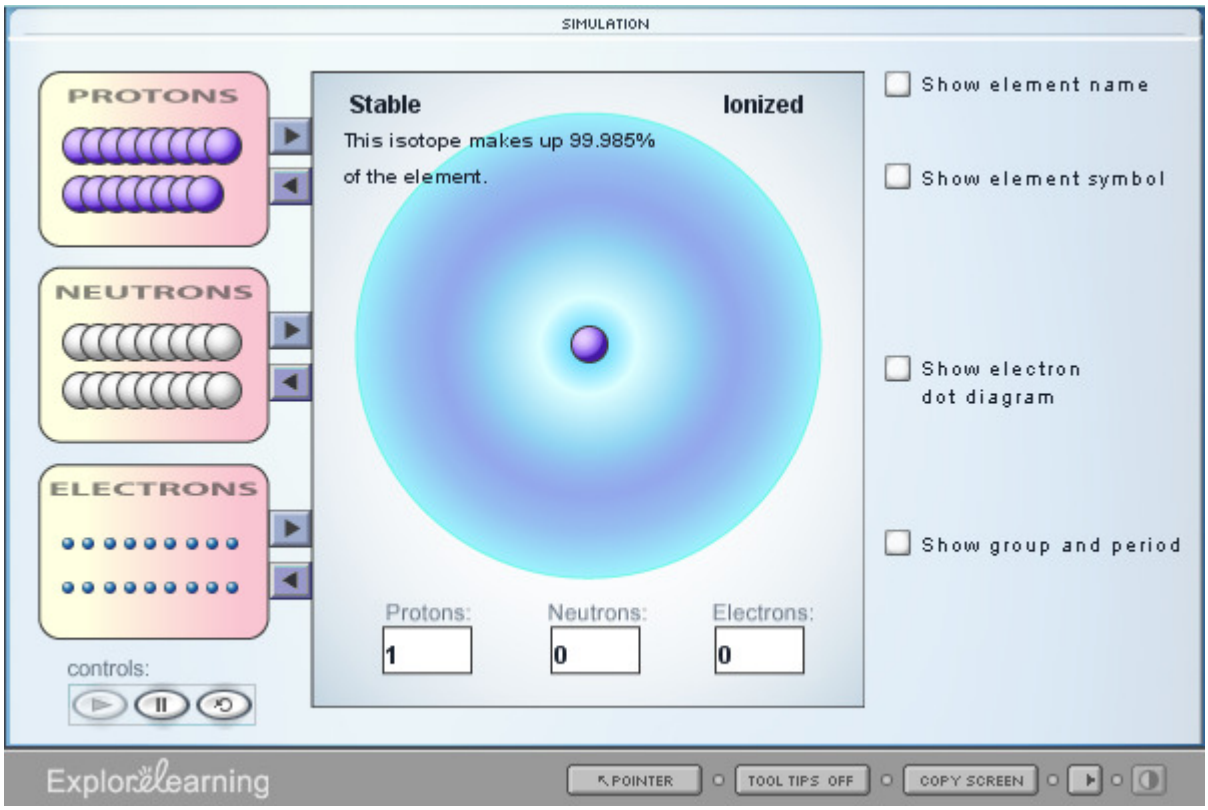

   a. Using the right arrows, add 1 proton, 2 neutrons, and 2 electrons to the atom so that there are 2 of each of the three particles located in the atom. Fill in the following chart.

Particle	Location
Proton	
Neutron	
Electron	

Identity of the Atom

2. Place a check in the "Show element name" box, which is in the top right portion of the gizmo. Manipulate the number of protons to achieve the number of protons in the data table. Do not worry about the number of neutrons or electrons. Experiment with adding one and removing one proton to and from the atom. Fill in the following table. Once you have the identity of the element, look at the periodic table and write down the atomic number for the element, this is the larger number located by the element symbol.

Number of protons	Name of element	Atomic Number from Periodic Table
2		
3		
1		

   a. **Does changing the number of protons change the identity of the element you have built?**

   b. **What is the relationship between the number of protons and the atomic number for an element?**

3. Now you will do the same thing as step 2 except you will be changing the number of neutrons. Make sure that you begin with 2 each for the protons, neutrons, and electrons. Add one neutron to the atom to place 3 neutrons in the atom. Record the name of the element and look at the periodic table to find the atomic number. Next, take 2 neutrons away (a total of 1 should now be in the atom.) Again record the name of the atom and the atomic number from the periodic table.

Number of neutrons	Name of element	Atomic Number from Periodic Table
2		
3		
1		

   a. **Does changing the number of neutrons change the identity of the element you have built?**

   b. **Does changing the number of neutrons change the affect the atomic number?**

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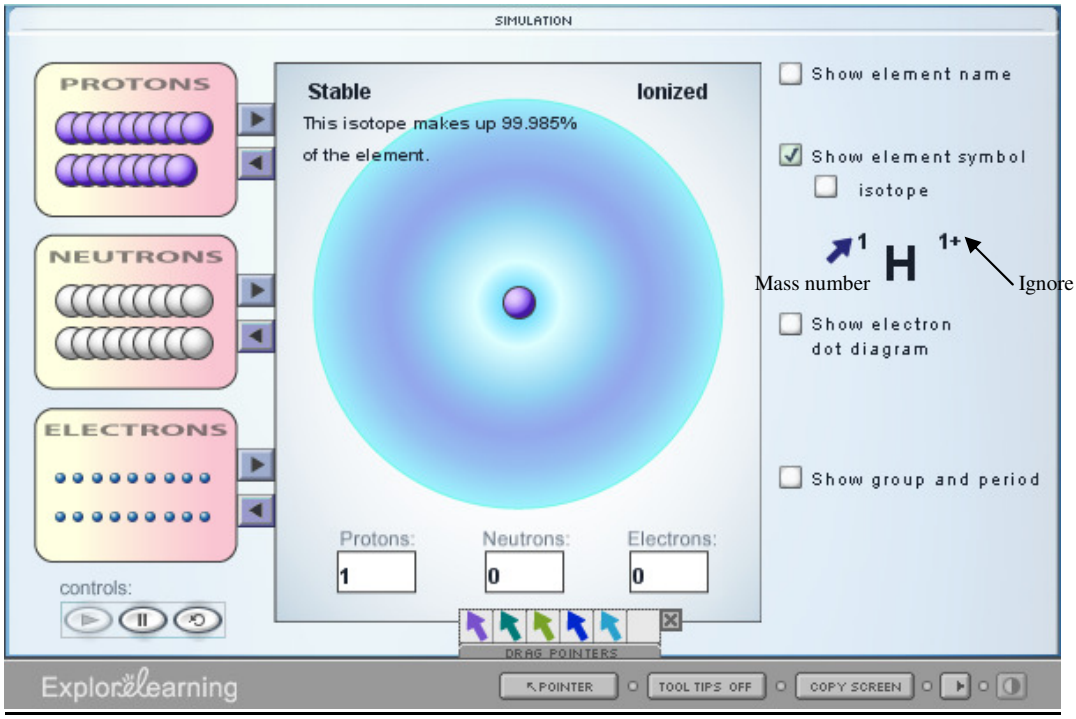
Number of electrons	Name of element	Atomic Number from Periodic Table
2		
3		
1		

a. Does changing the number of electrons change the identity of the element you have built?

KEY FACT: Now looking at questions 2a, 3a, and 4a, which subatomic particle is responsible for the identity of an atom?

Mass of an atom

5. Build an atom again with exactly 2 protons, 2 neutrons, and 2 electrons. Check "Show element symbol." Be sure "isotope" is not selected. Make adjustments to the atom to attain the number of protons, neutrons, and electrons as shown in the data table. Then finish filling in the table. ***The number to the upper left of the symbol indicates the mass of the atom.*** (See where the pointer is pointing in the screen shot.)



Number of protons	Number of neutrons	Number of electrons	Identity of atom (give name)	Mass of atom
2	2	2		
3	2	2		
2	3	2		
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a. Does the proton affect the mass of an atom? You MUST EXPLAIN by referring to an example or data from above .

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d. Looking at the atom in the Gizmo, where is most of the mass of an atom concentrated? Explain.

5. Which 2 subatomic particles affect the mass of an atom?

KEY FACT: Write a mathematical formula to show the relationship between the number of protons, the number of neutrons, and the mass number for an atom.

SUMMARY: Based on this gizmo, the number of protons equals the _____ _____ from the periodic table. The number of protons determines the _____ of an atom. The _____ and _____ determines the mass of an atom. The protons and neutrons are located in the _____ of an atom and electrons are in the _____ _____.

- How many protons are in the nucleus of an atom of Carbon (C)? _____
- What is the formula for finding the mass number of an atom? _____
- If an atom of C has 7 neutrons in the nucleus, then it would have a mass number of _____ (see previous 2 questions).
- How many electrons would be found in the nucleus? _____

Subatomic Particle Gizmo Name _____Sci # _____

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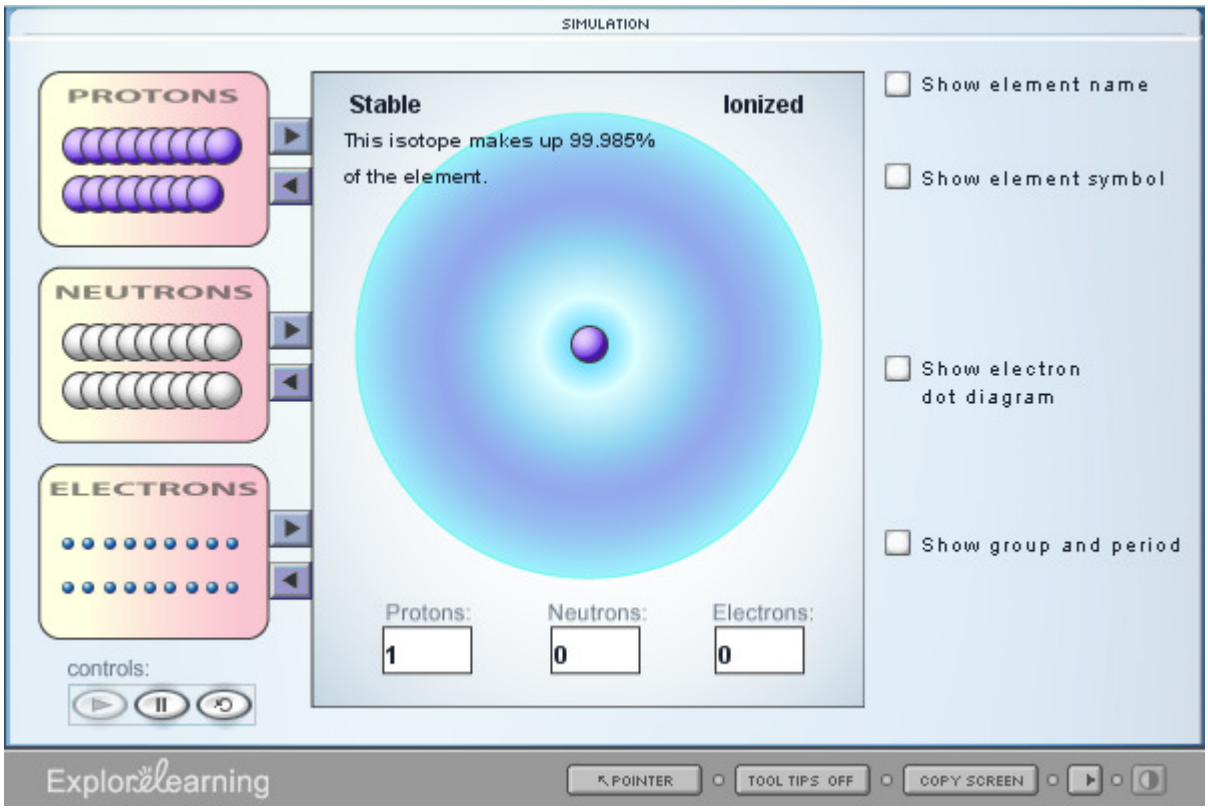

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Particle	Location
Proton	
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Electron	

Identity of the Atom

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3		
1		

   a. **Does changing the number of neutrons change the identity of the element you have built?**

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3		
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a. Does changing the number of electrons change the identity of the element you have built?

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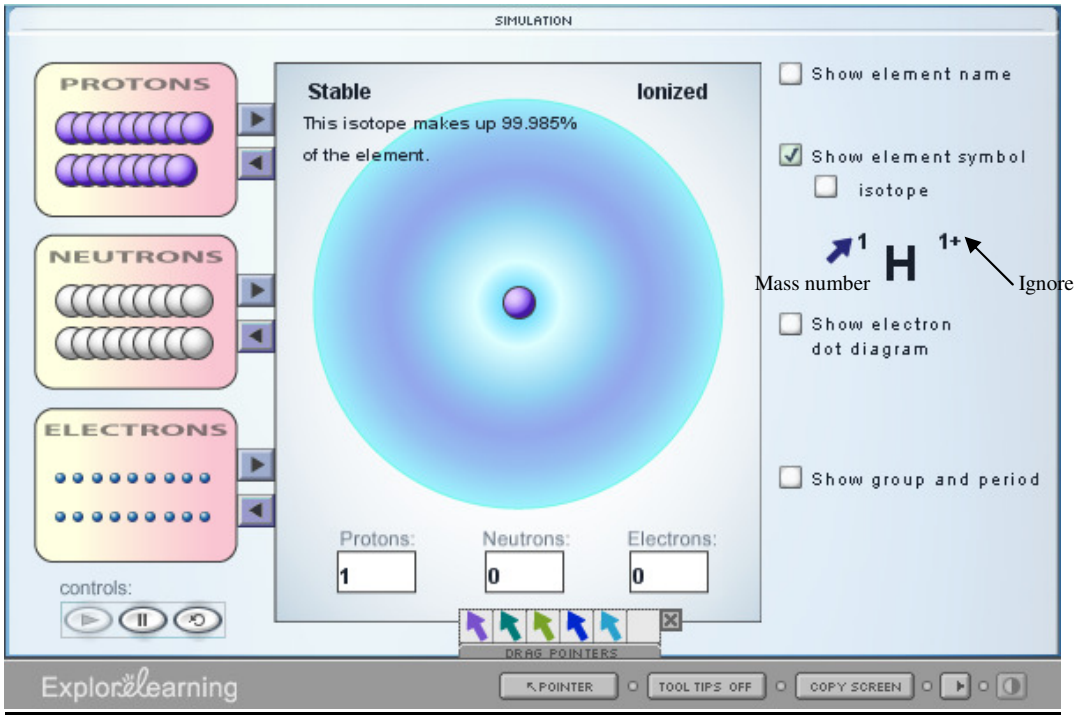

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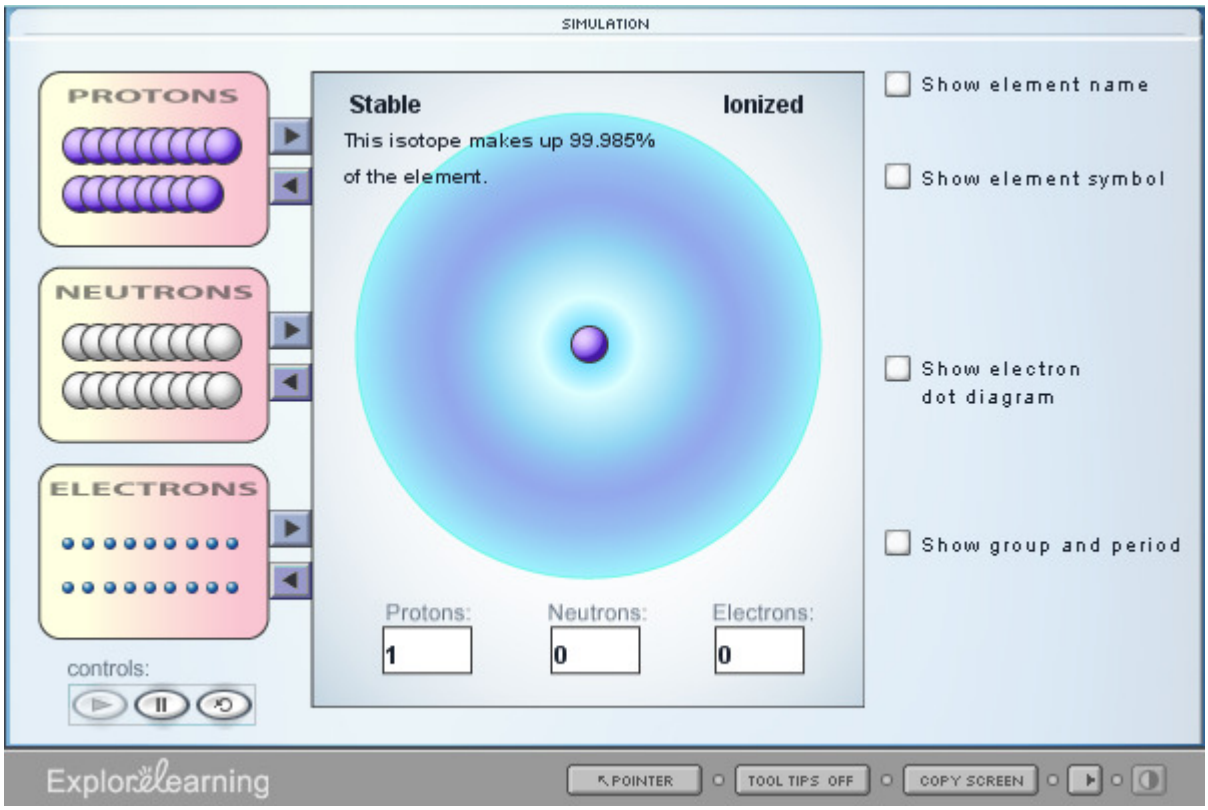

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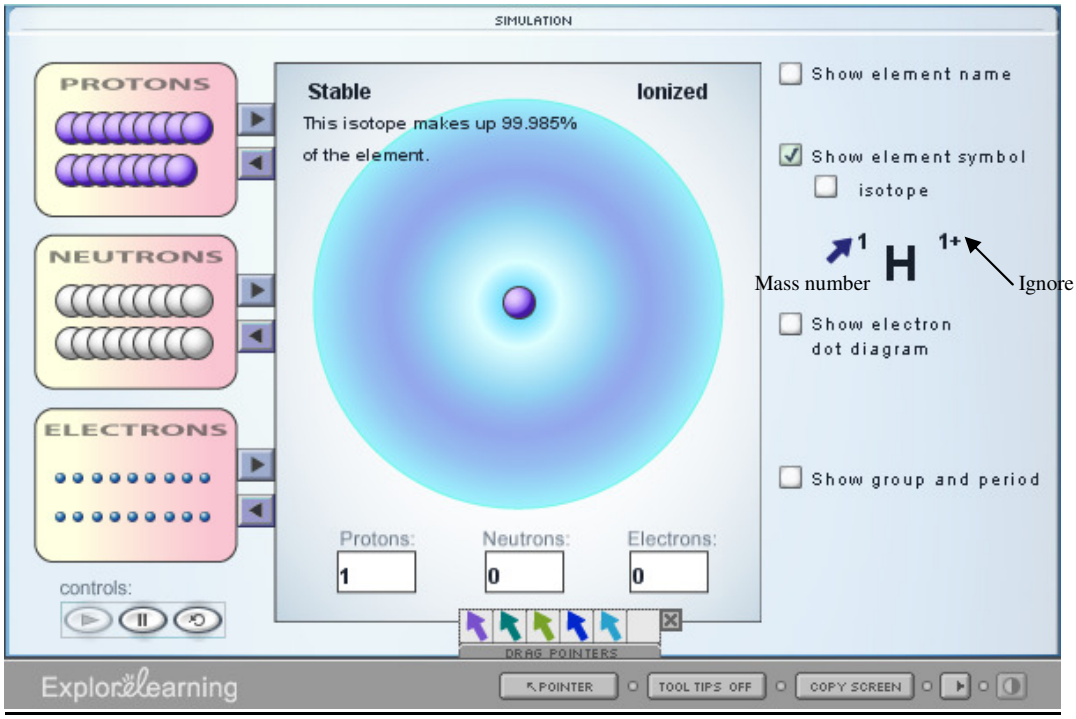

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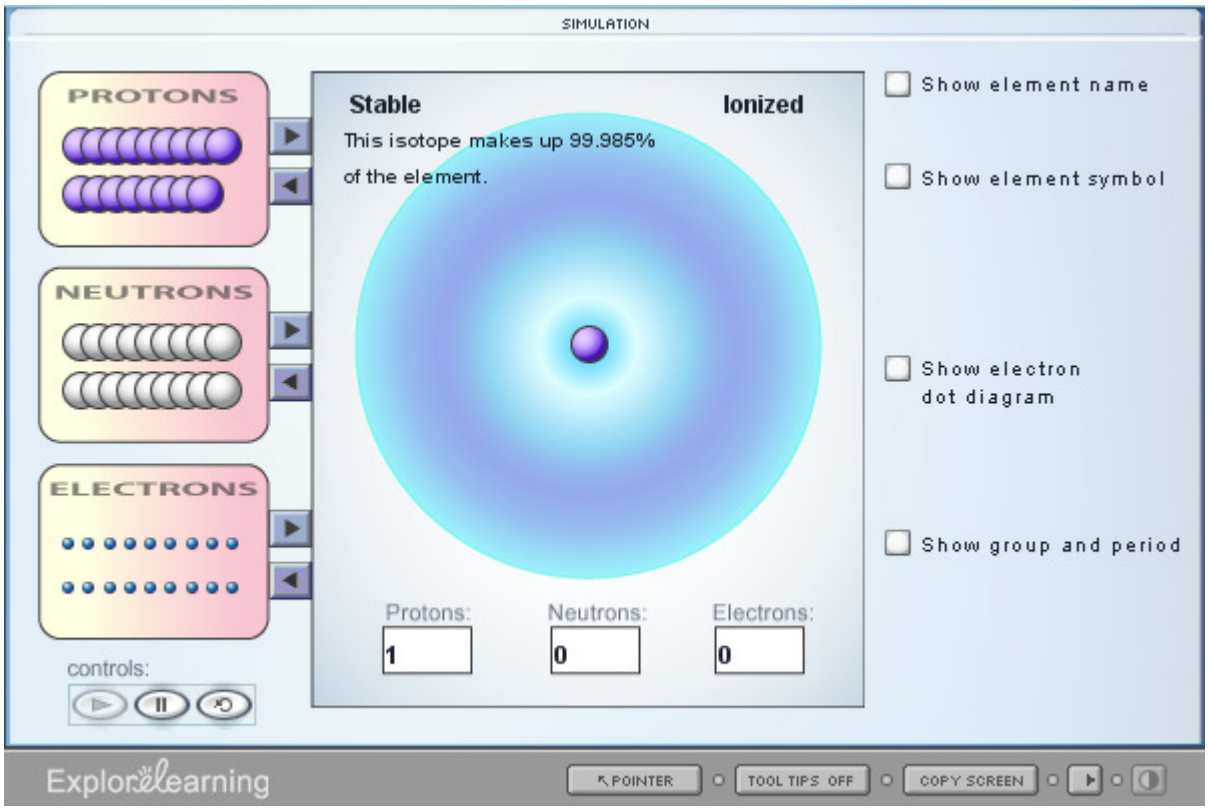

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3		
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Number of electrons	Name of element	Atomic Number from Periodic Table
2		
3		
1		

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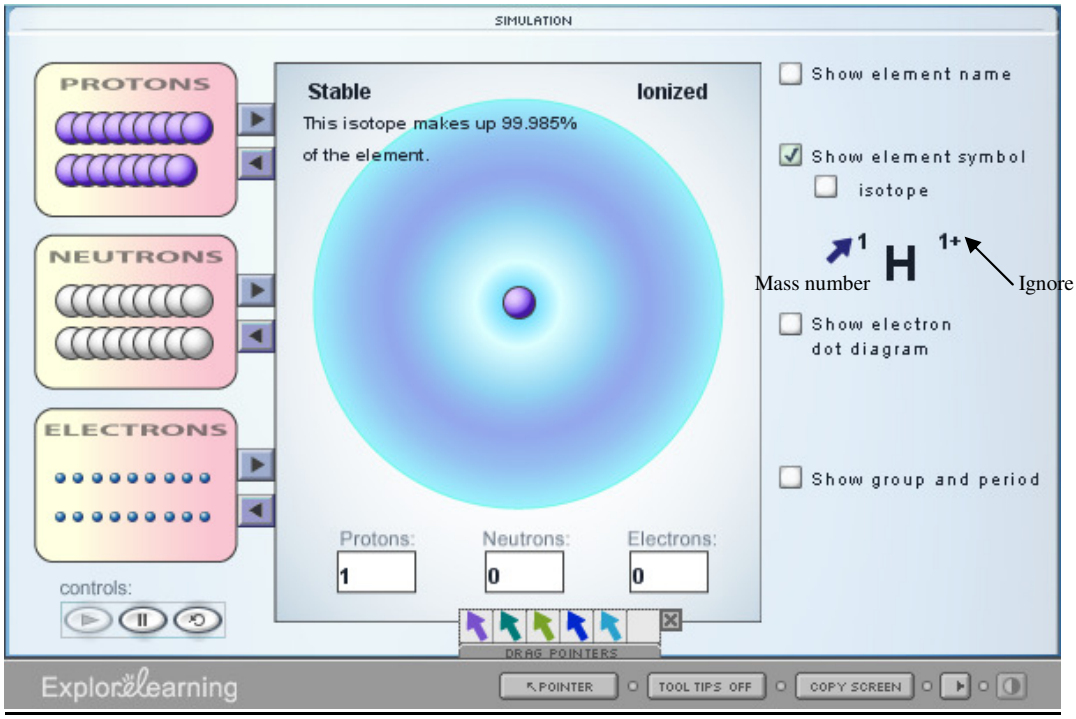

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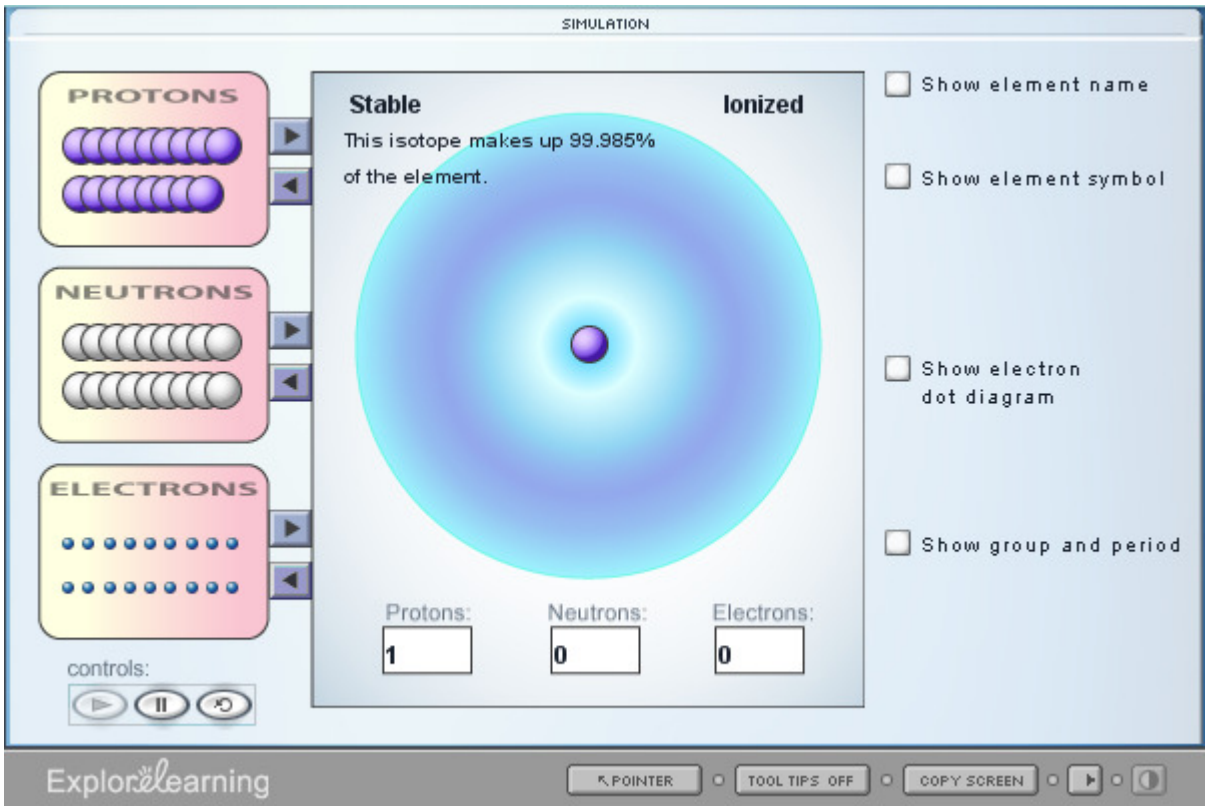

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3		
1		

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Number of electrons	Name of element	Atomic Number from Periodic Table
2		
3		
1		

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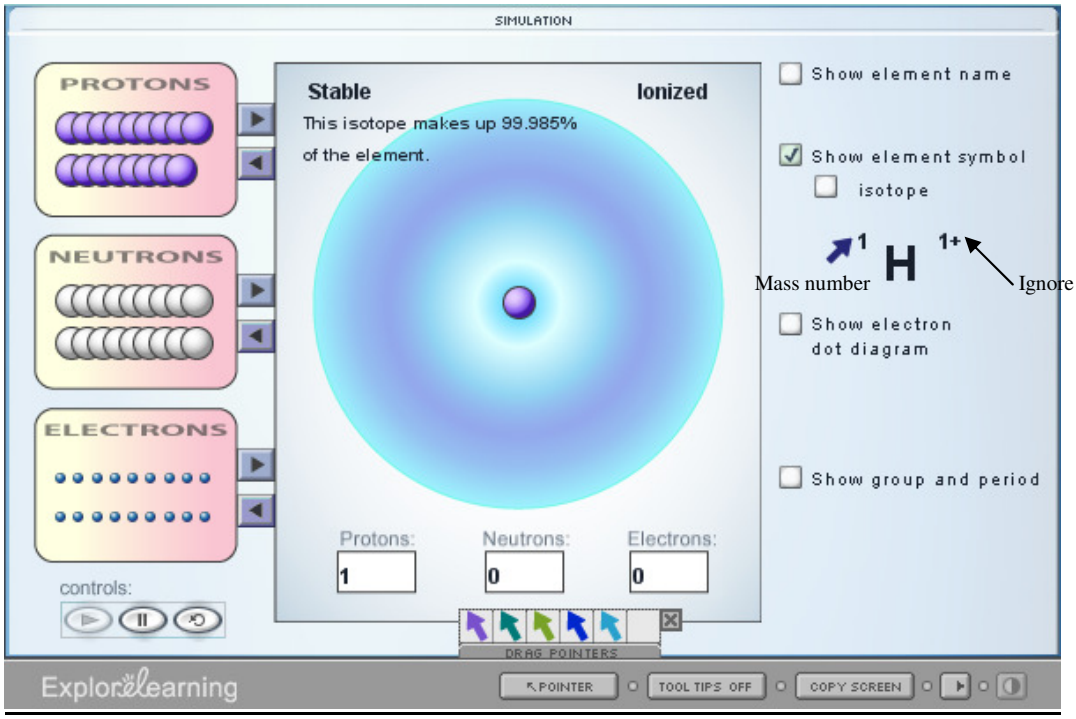

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Subatomic Particle Gizmo Name _____Sci # _____

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Once you log in, find the GIZMO named "Element Builder" Gizmo and select "Launch Gizmo."

Location of Subatomic Particles

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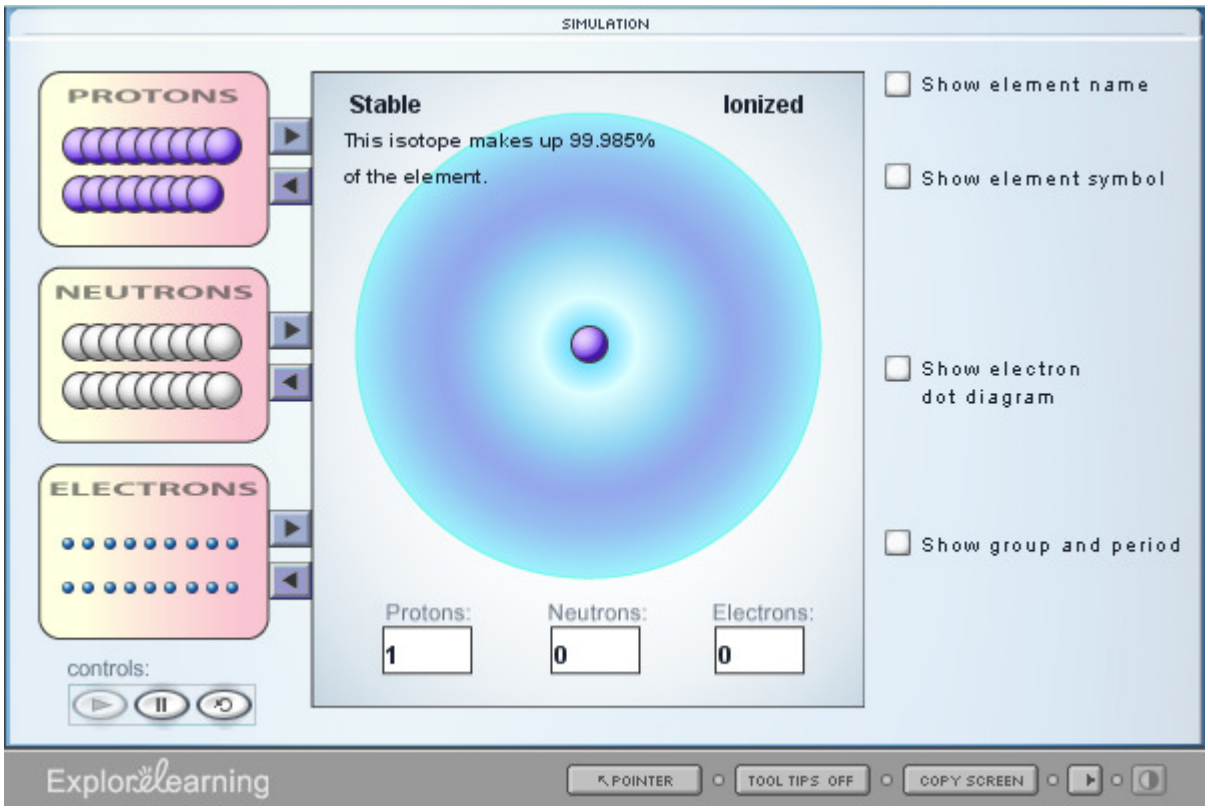


   a. Using the right arrows, add 1 proton, 2 neutrons, and 2 electrons to the atom so that there are 2 of each of the three particles located in the atom. Fill in the following chart.

Particle	Location
Proton	
Neutron	
Electron	

Identity of the Atom

2. Place a check in the "Show element name" box, which is in the top right portion of the gizmo. Manipulate the number of protons to achieve the number of protons in the data table. Do not worry about the number of neutrons or electrons. Experiment with adding one and removing one proton to and from the atom. Fill in the following table. Once you have the identity of the element, look at the periodic table and write down the atomic number for the element, this is the larger number located by the element symbol.

Number of protons	Name of element	Atomic Number from Periodic Table
2		
3		
1		

   a. **Does changing the number of protons change the identity of the element you have built?**

   b. **What is the relationship between the number of protons and the atomic number for an element?**

3. Now you will do the same thing as step 2 except you will be changing the number of neutrons. Make sure that you begin with 2 each for the protons, neutrons, and electrons. Add one neutron to the atom to place 3 neutrons in the atom. Record the name of the element and look at the periodic table to find the atomic number. Next, take 2 neutrons away (a total of 1 should now be in the atom.) Again record the name of the atom and the atomic number from the periodic table.

Number of neutrons	Name of element	Atomic Number from Periodic Table
2		
3		
1		

   a. **Does changing the number of neutrons change the identity of the element you have built?**

   b. **Does changing the number of neutrons change the affect the atomic number?**

4. Make sure that you have 2 each for the protons, neutrons, and electrons. Add one electron to the atom to place 3 electrons in the atom. Record the name of the element and look at the periodic table to find the atomic number. Next, take 2 electrons away (a total of 1 should now be in the atom.) Again record the name of the atom and the atomic number from the periodic table.

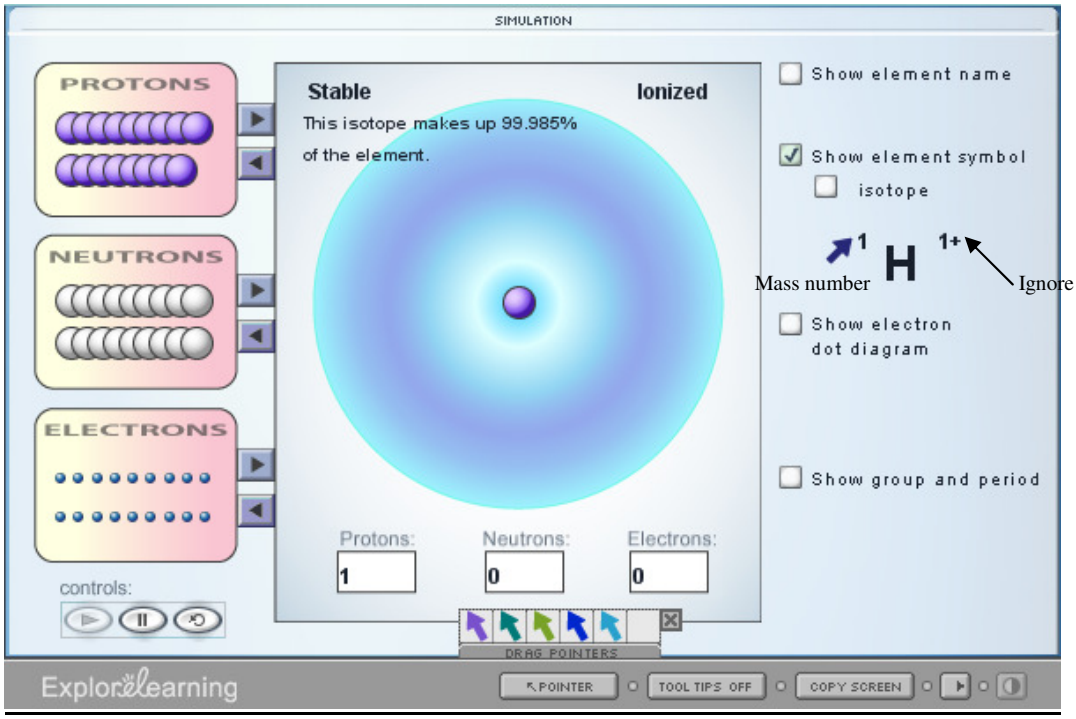
Number of electrons	Name of element	Atomic Number from Periodic Table
2		
3		
1		

a. Does changing the number of electrons change the identity of the element you have built?

KEY FACT: Now looking at questions 2a, 3a, and 4a, which subatomic particle is responsible for the identity of an atom?

Mass of an atom

5. Build an atom again with exactly 2 protons, 2 neutrons, and 2 electrons. Check "Show element symbol." Be sure "isotope" is not selected. Make adjustments to the atom to attain the number of protons, neutrons, and electrons as shown in the data table. Then finish filling in the table. ***The number to the upper left of the symbol indicates the mass of the atom.*** (See where the pointer is pointing in the screen shot.)



Number of protons	Number of neutrons	Number of electrons	Identity of atom (give name)	Mass of atom
2	2	2		
3	2	2		
2	3	2		
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a. Does the proton affect the mass of an atom? You MUST EXPLAIN by referring to an example or data from above .

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d. Looking at the atom in the Gizmo, where is most of the mass of an atom concentrated? Explain.

5. Which 2 subatomic particles affect the mass of an atom?

KEY FACT: Write a mathematical formula to show the relationship between the number of protons, the number of neutrons, and the mass number for an atom.

SUMMARY: Based on this gizmo, the number of protons equals the _____ _____ from the periodic table. The number of protons determines the _____ of an atom. The _____ and _____ determines the mass of an atom. The protons and neutrons are located in the _____ of an atom and electrons are in the _____ _____.

- How many protons are in the nucleus of an atom of Carbon (C)? _____
- What is the formula for finding the mass number of an atom? _____
- If an atom of C has 7 neutrons in the nucleus, then it would have a mass number of _____ (see previous 2 questions).
- How many electrons would be found in the nucleus? _____

Subatomic Particle Gizmo Name _____Sci # _____

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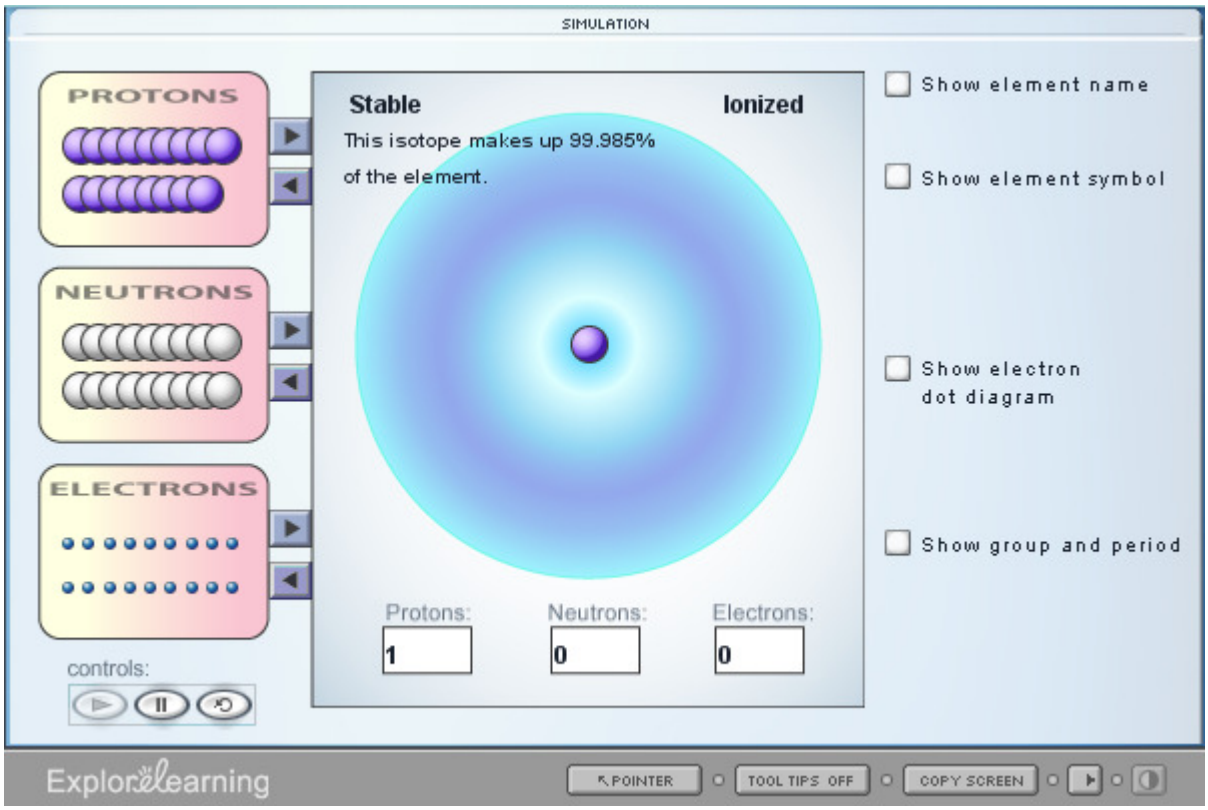

   a. Using the right arrows, add 1 proton, 2 neutrons, and 2 electrons to the atom so that there are 2 of each of the three particles located in the atom. Fill in the following chart.

Particle	Location
Proton	
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Electron	

Identity of the Atom

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3		
1		

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3		
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a. Does changing the number of electrons change the identity of the element you have built?

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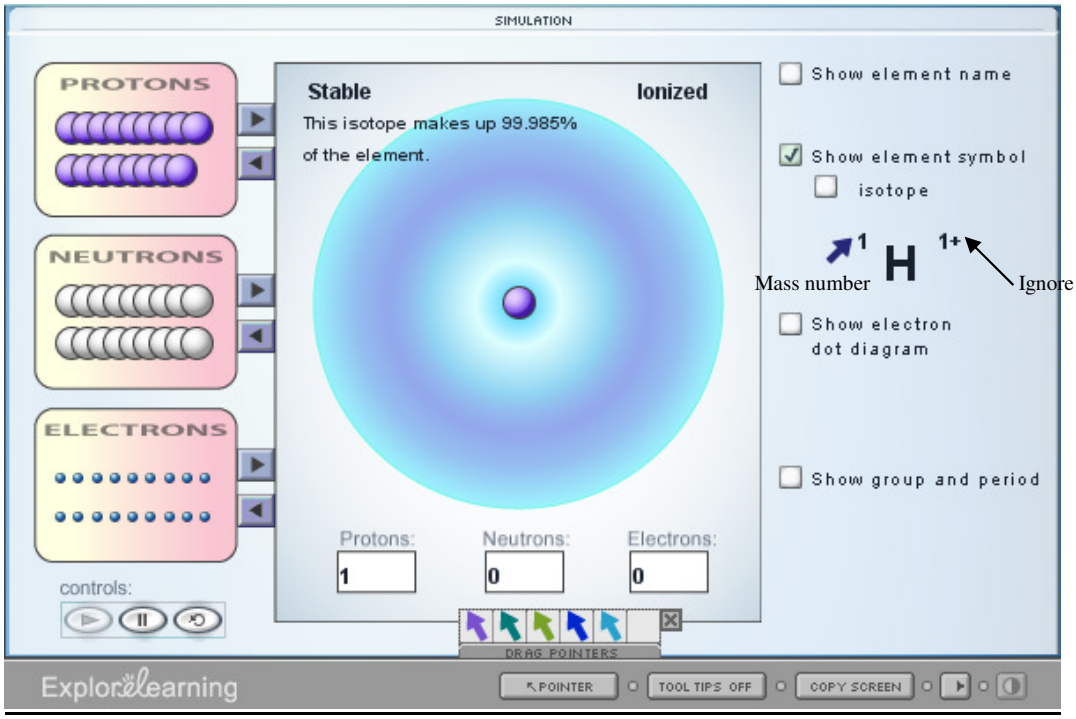

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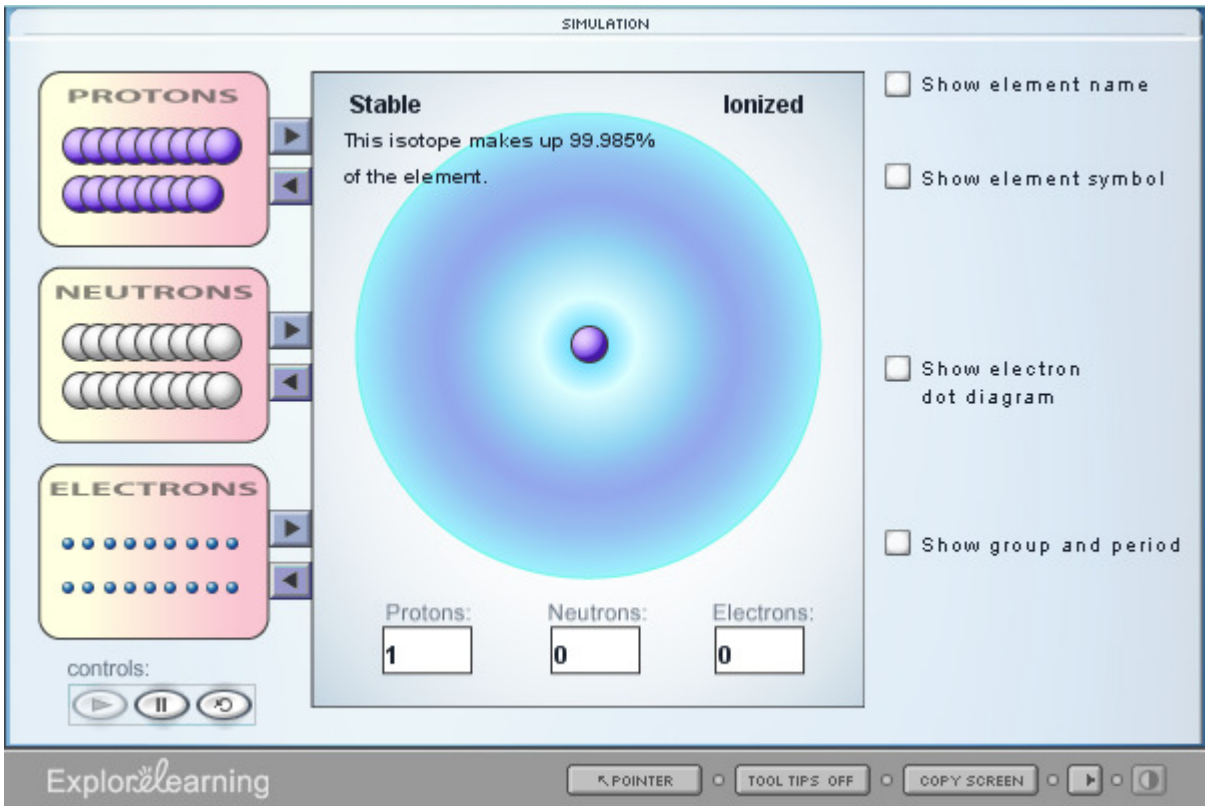

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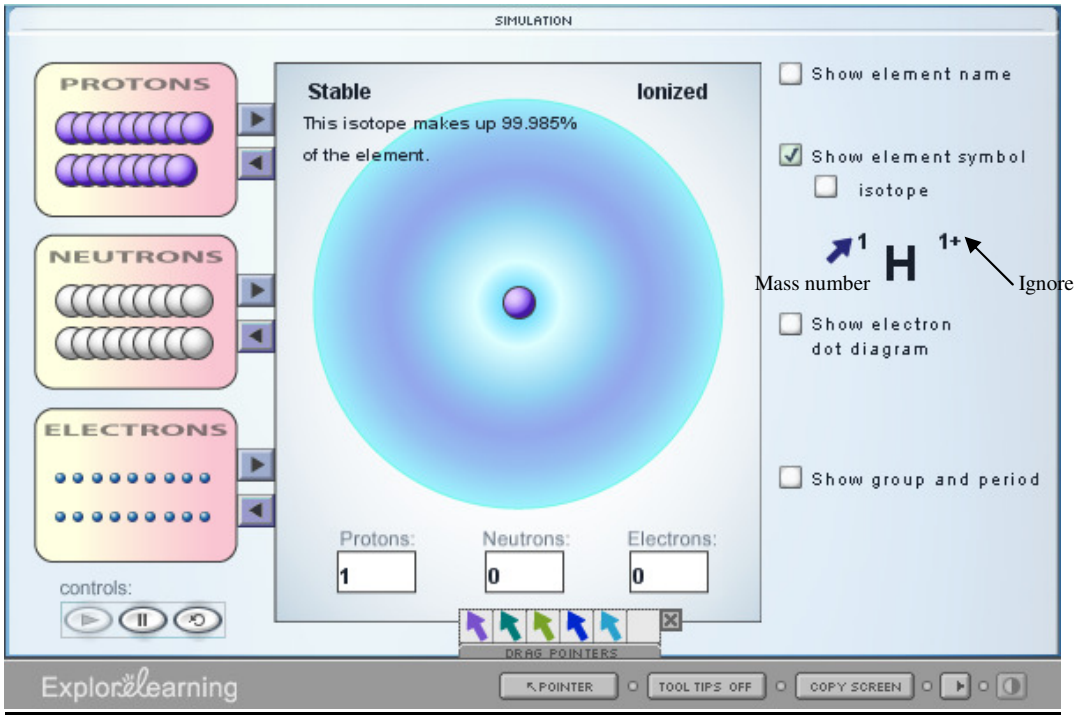

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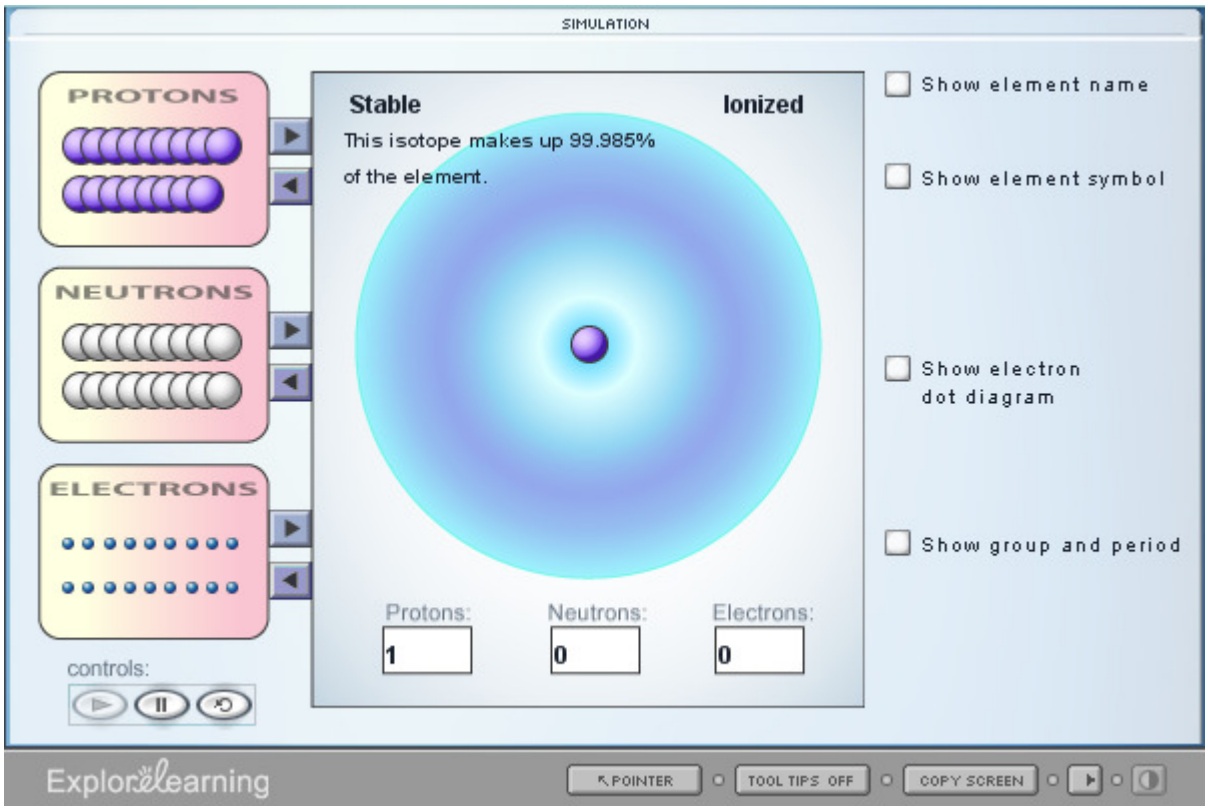

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Number of electrons	Name of element	Atomic Number from Periodic Table
2		
3		
1		

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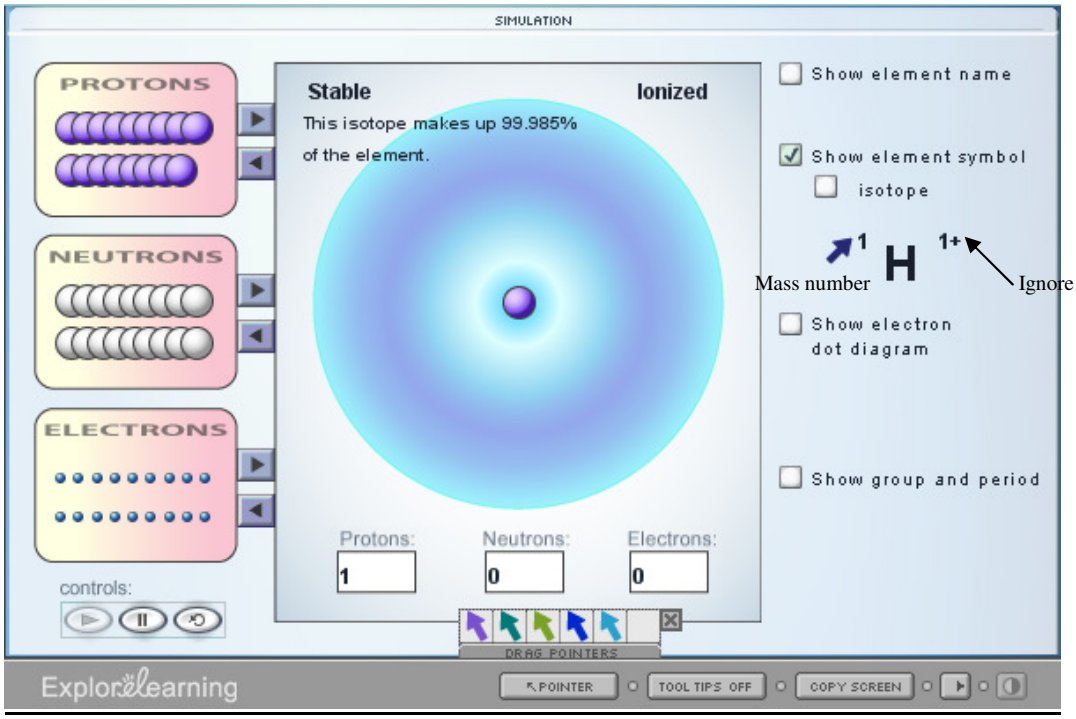

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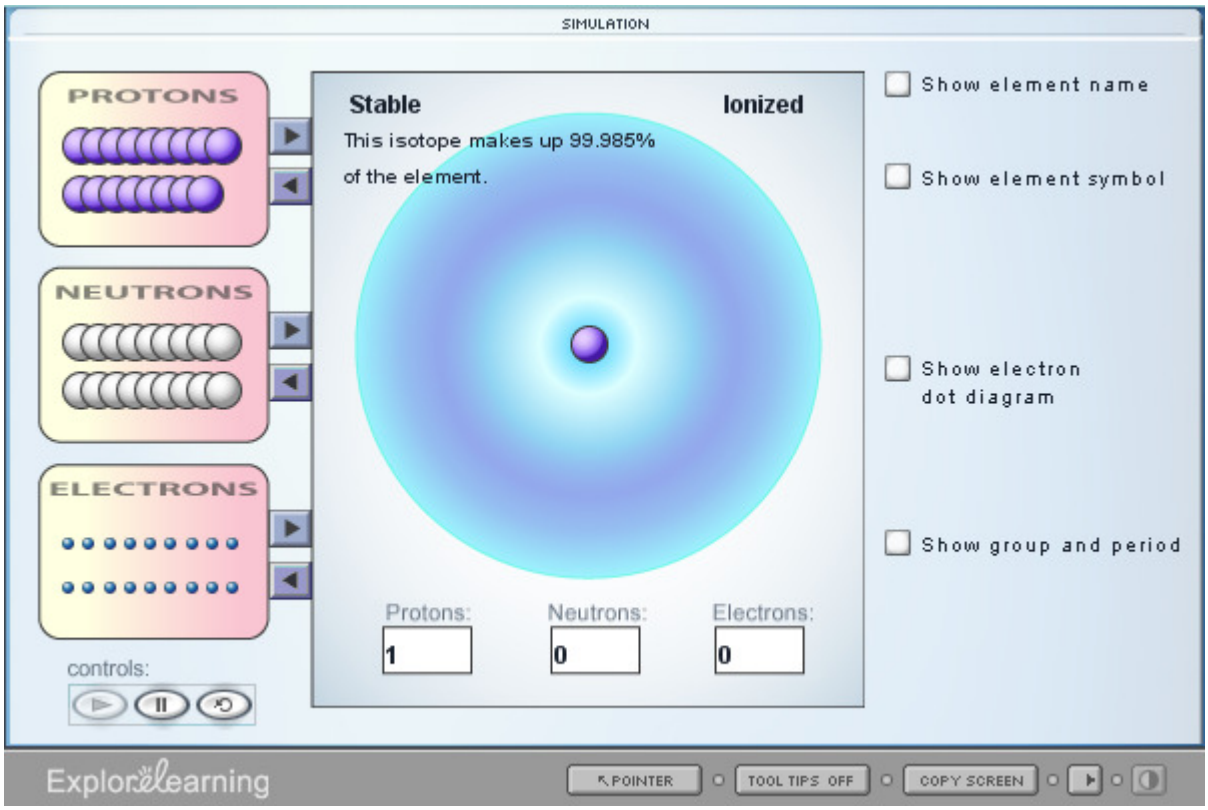

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Number of electrons	Name of element	Atomic Number from Periodic Table
2		
3		
1		

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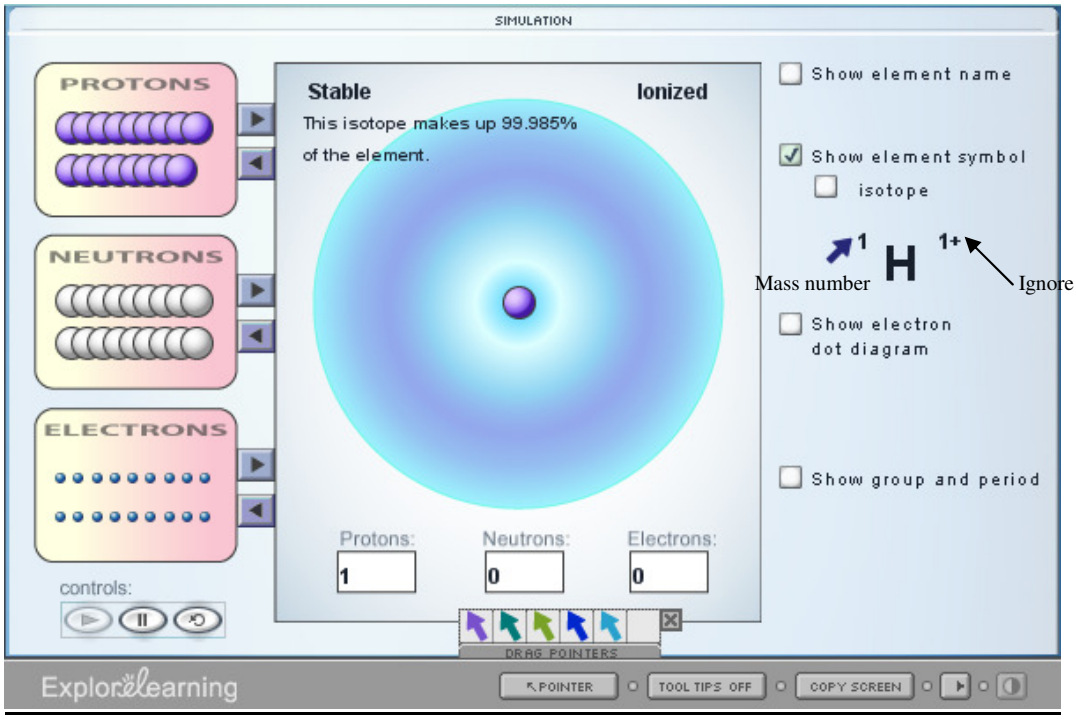

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Subatomic Particle Gizmo Name _____Sci # _____

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Once you log in, find the GIZMO named "Element Builder" Gizmo and select "Launch Gizmo."

Location of Subatomic Particles

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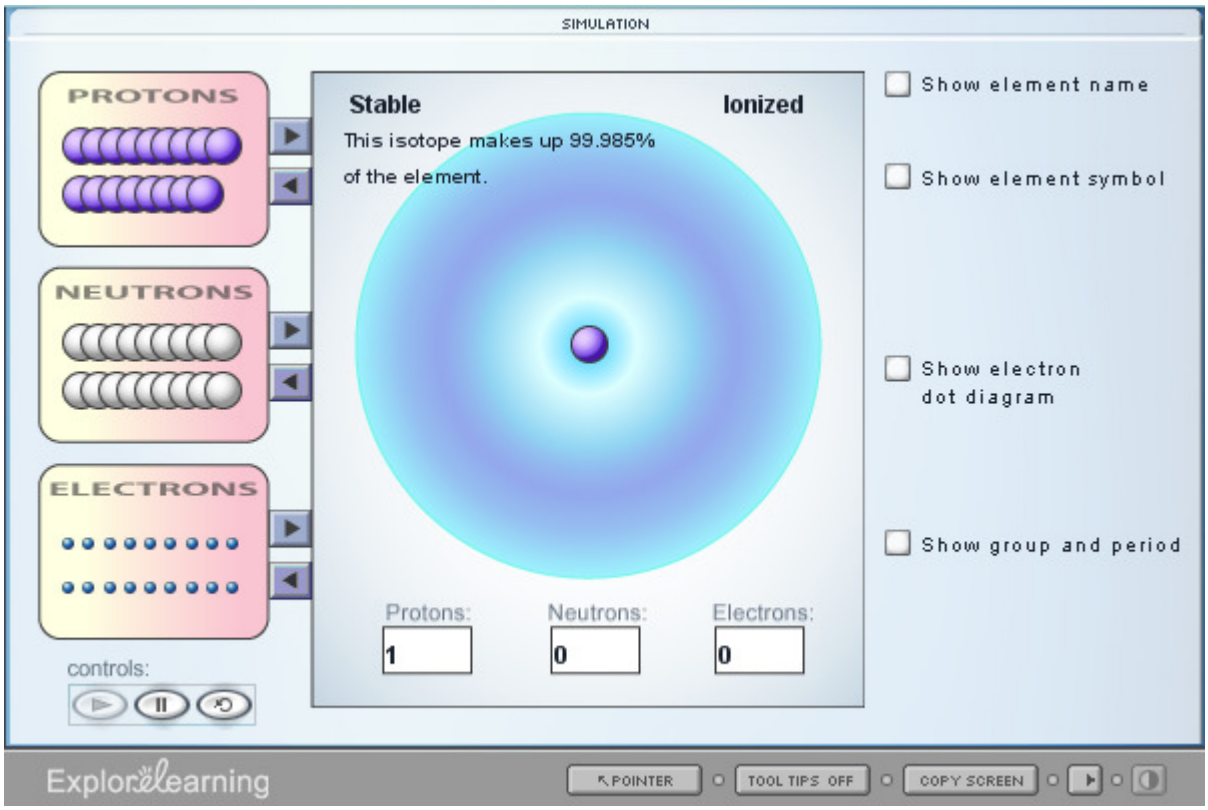


   a. Using the right arrows, add 1 proton, 2 neutrons, and 2 electrons to the atom so that there are 2 of each of the three particles located in the atom. Fill in the following chart.

Particle	Location
Proton	
Neutron	
Electron	

Identity of the Atom

2. Place a check in the "Show element name" box, which is in the top right portion of the gizmo. Manipulate the number of protons to achieve the number of protons in the data table. Do not worry about the number of neutrons or electrons. Experiment with adding one and removing one proton to and from the atom. Fill in the following table. Once you have the identity of the element, look at the periodic table and write down the atomic number for the element, this is the larger number located by the element symbol.

Number of protons	Name of element	Atomic Number from Periodic Table
2		
3		
1		

   a. **Does changing the number of protons change the identity of the element you have built?**

   b. **What is the relationship between the number of protons and the atomic number for an element?**

3. Now you will do the same thing as step 2 except you will be changing the number of neutrons. Make sure that you begin with 2 each for the protons, neutrons, and electrons. Add one neutron to the atom to place 3 neutrons in the atom. Record the name of the element and look at the periodic table to find the atomic number. Next, take 2 neutrons away (a total of 1 should now be in the atom.) Again record the name of the atom and the atomic number from the periodic table.

Number of neutrons	Name of element	Atomic Number from Periodic Table
2		
3		
1		

   a. **Does changing the number of neutrons change the identity of the element you have built?**

   b. **Does changing the number of neutrons change the affect the atomic number?**

4. Make sure that you have 2 each for the protons, neutrons, and electrons. Add one electron to the atom to place 3 electrons in the atom. Record the name of the element and look at the periodic table to find the atomic number. Next, take 2 electrons away (a total of 1 should now be in the atom.) Again record the name of the atom and the atomic number from the periodic table.

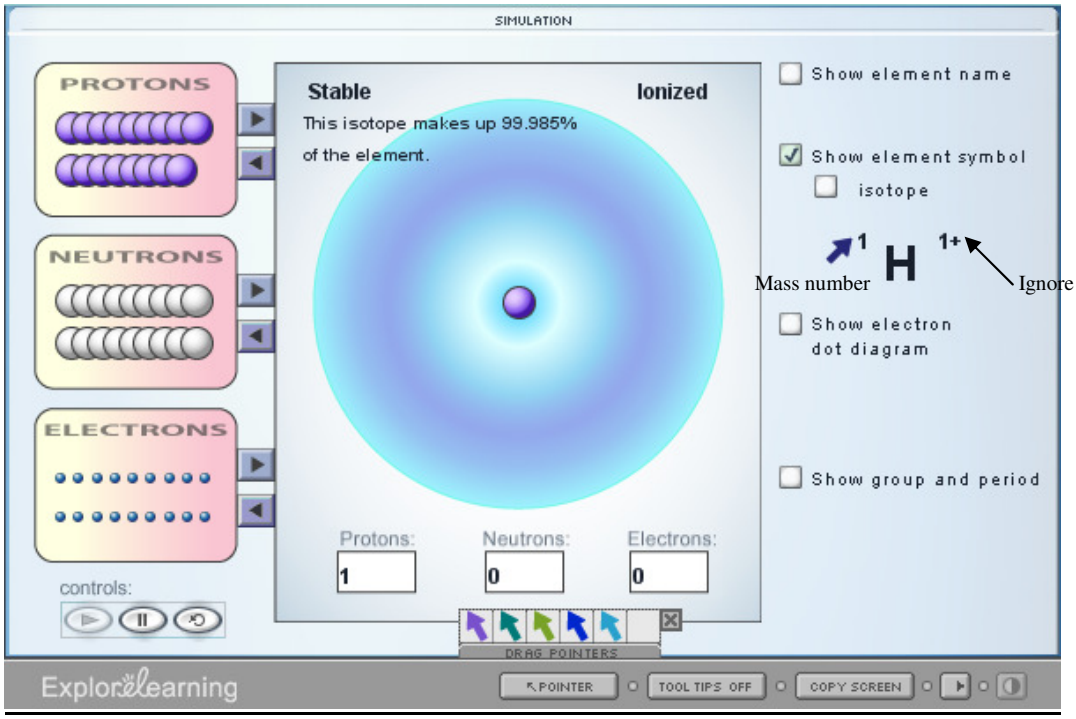
Number of electrons	Name of element	Atomic Number from Periodic Table
2		
3		
1		

a. Does changing the number of electrons change the identity of the element you have built?

KEY FACT: Now looking at questions 2a, 3a, and 4a, which subatomic particle is responsible for the identity of an atom?

Mass of an atom

5. Build an atom again with exactly 2 protons, 2 neutrons, and 2 electrons. Check "Show element symbol." Be sure "isotope" is not selected. Make adjustments to the atom to attain the number of protons, neutrons, and electrons as shown in the data table. Then finish filling in the table. ***The number to the upper left of the symbol indicates the mass of the atom.*** (See where the pointer is pointing in the screen shot.)



Number of protons	Number of neutrons	Number of electrons	Identity of atom (give name)	Mass of atom
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3	2	2		
2	3	2		
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a. Does the proton affect the mass of an atom? You MUST EXPLAIN by referring to an example or data from above .

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d. Looking at the atom in the Gizmo, where is most of the mass of an atom concentrated? Explain.

5. Which 2 subatomic particles affect the mass of an atom?

KEY FACT: Write a mathematical formula to show the relationship between the number of protons, the number of neutrons, and the mass number for an atom.

SUMMARY: Based on this gizmo, the number of protons equals the _____ _____ from the periodic table. The number of protons determines the _____ of an atom. The _____ and _____ determines the mass of an atom. The protons and neutrons are located in the _____ of an atom and electrons are in the _____ _____.

- How many protons are in the nucleus of an atom of Carbon (C)? _____
- What is the formula for finding the mass number of an atom? _____
- If an atom of C has 7 neutrons in the nucleus, then it would have a mass number of _____ (see previous 2 questions).
- How many electrons would be found in the nucleus? _____

Subatomic Particle Gizmo Name _____Sci # _____

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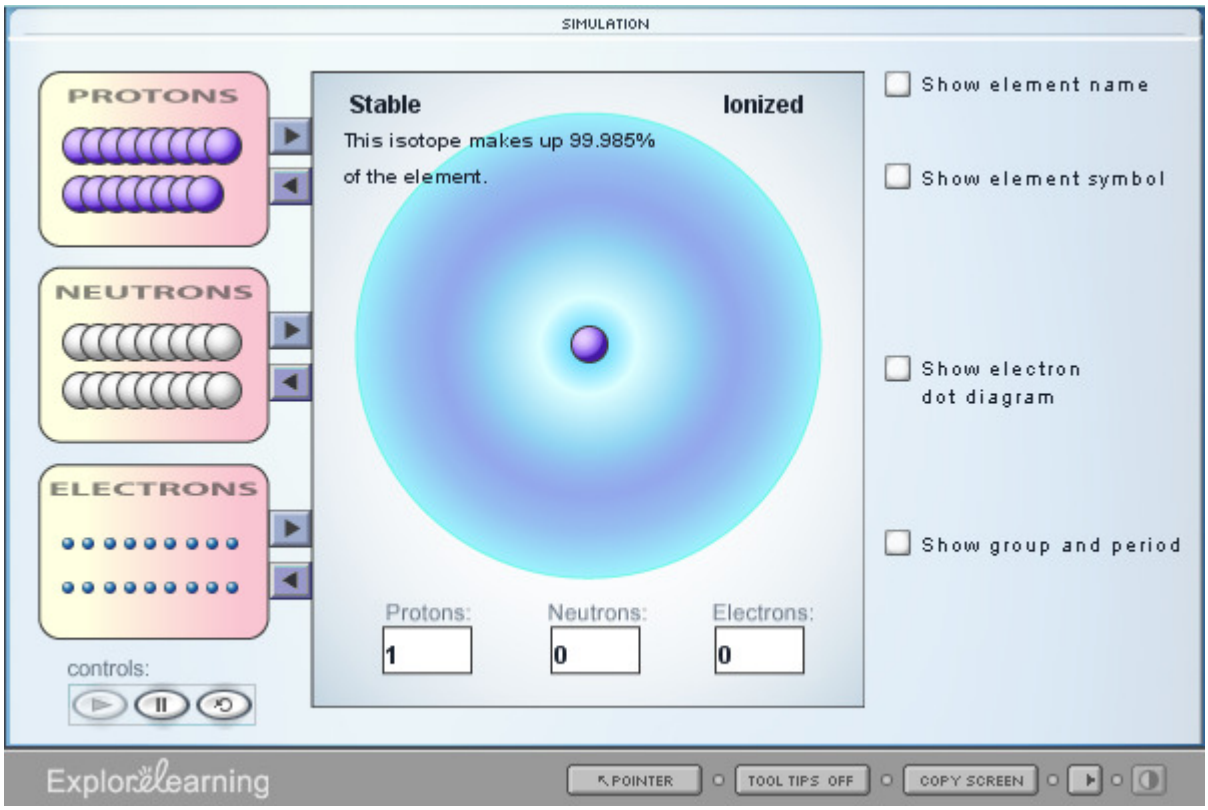

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Particle	Location
Proton	
Neutron	
Electron	

Identity of the Atom

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3		
1		

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3		
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a. Does changing the number of electrons change the identity of the element you have built?

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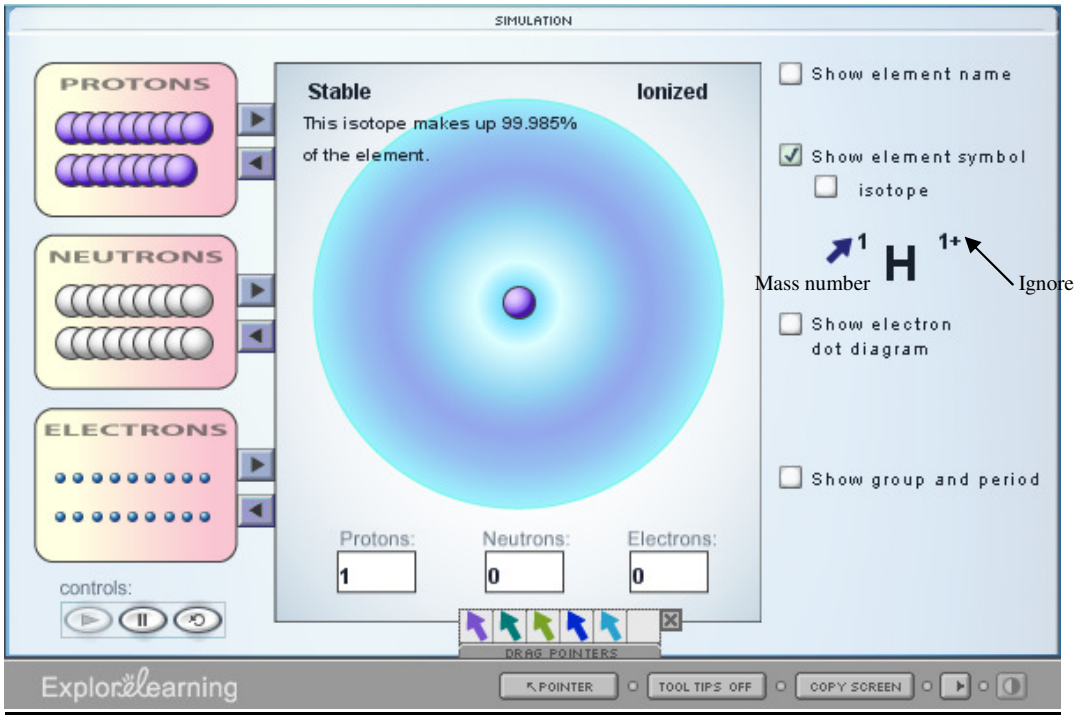
5. Build an atom again with exactly 2 protons, 2 neutrons, and 2 electrons. Check "Show element symbol." Be sure "isotope" is not selected. Make adjustments to the atom to attain the number of protons, neutrons, and electrons as shown in the data table. Then finish filling in the table. ***The number to the upper left of the symbol indicates the mass of the atom.*** (See where the pointer is pointing in the screen shot.)



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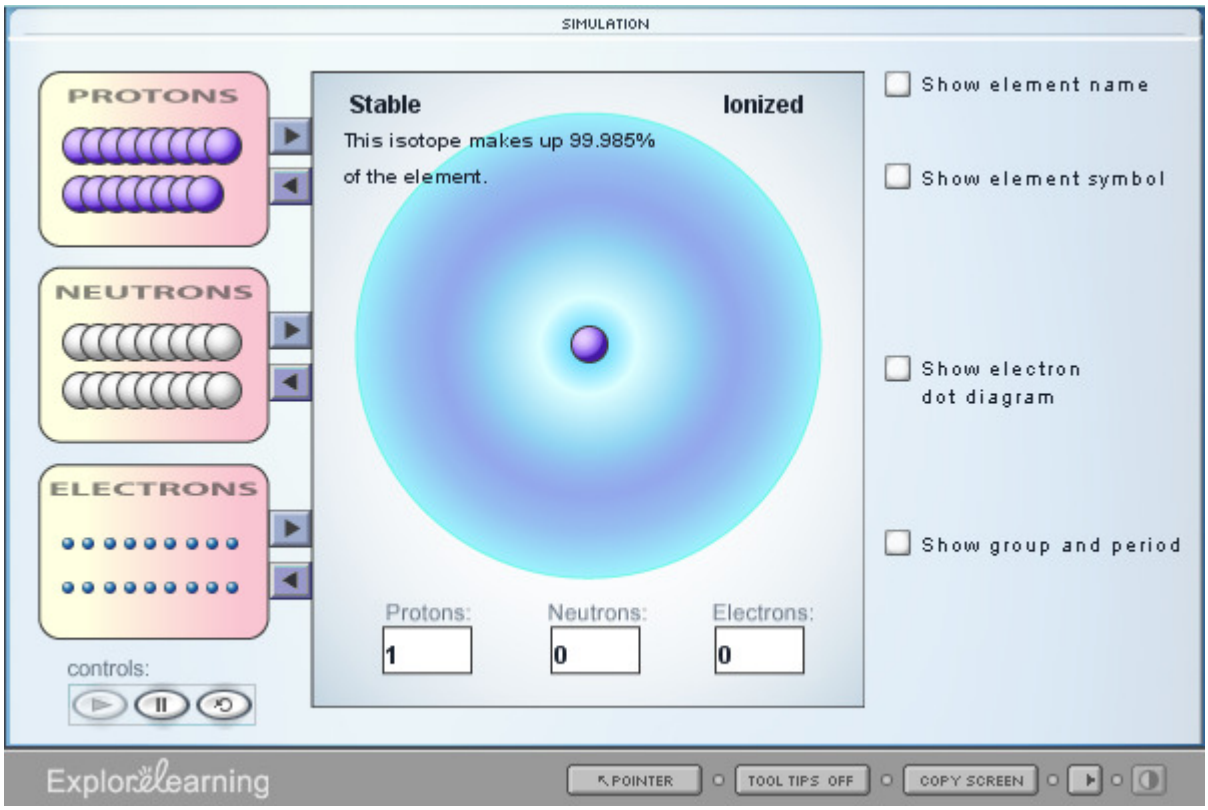

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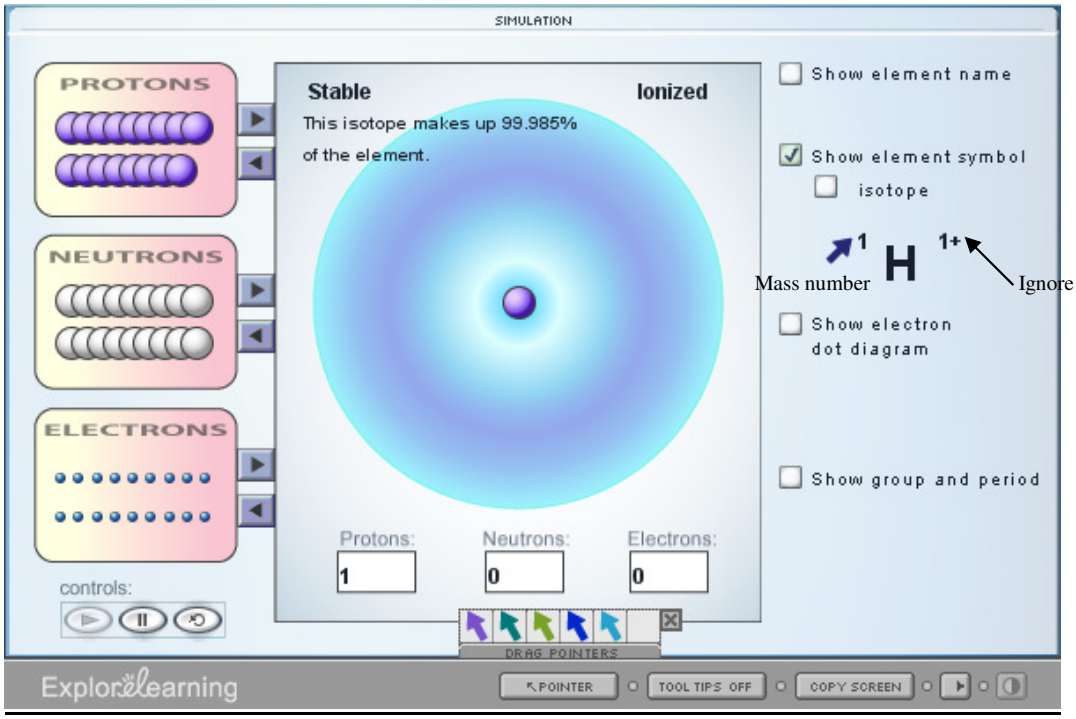

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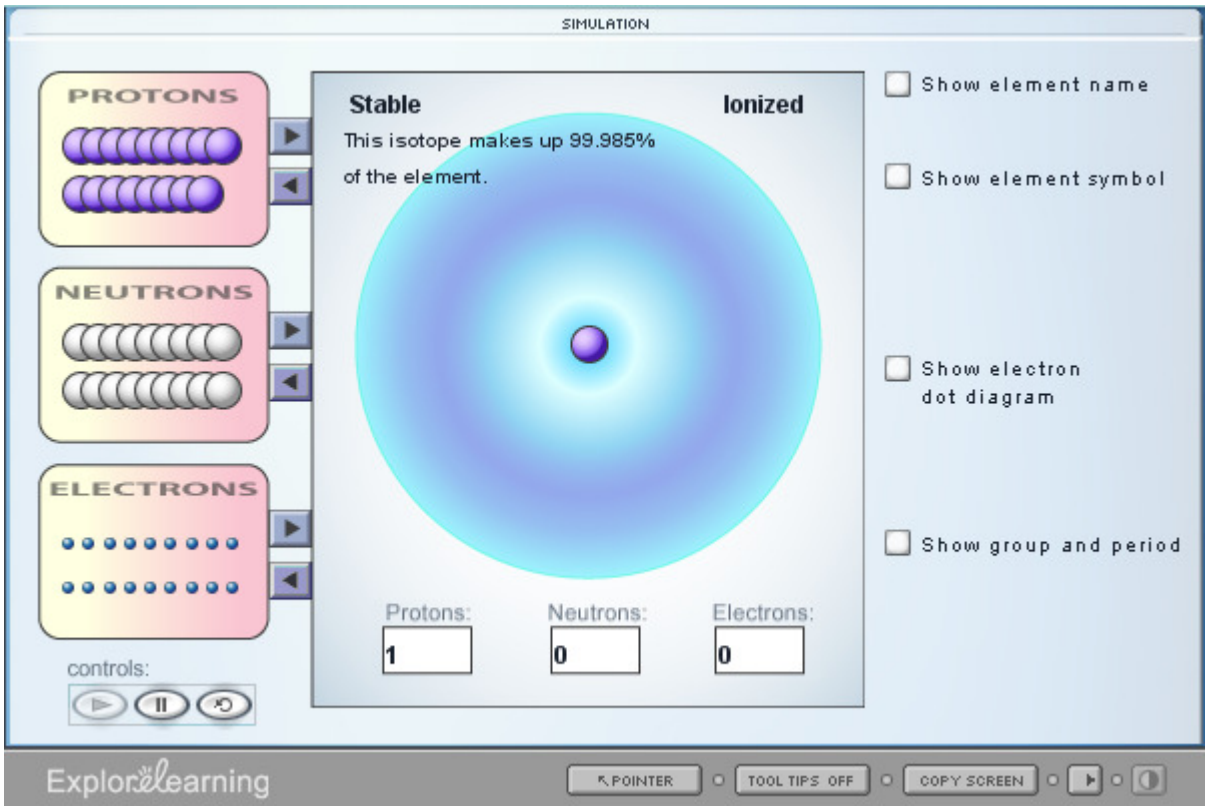

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3		
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Number of electrons	Name of element	Atomic Number from Periodic Table
2		
3		
1		

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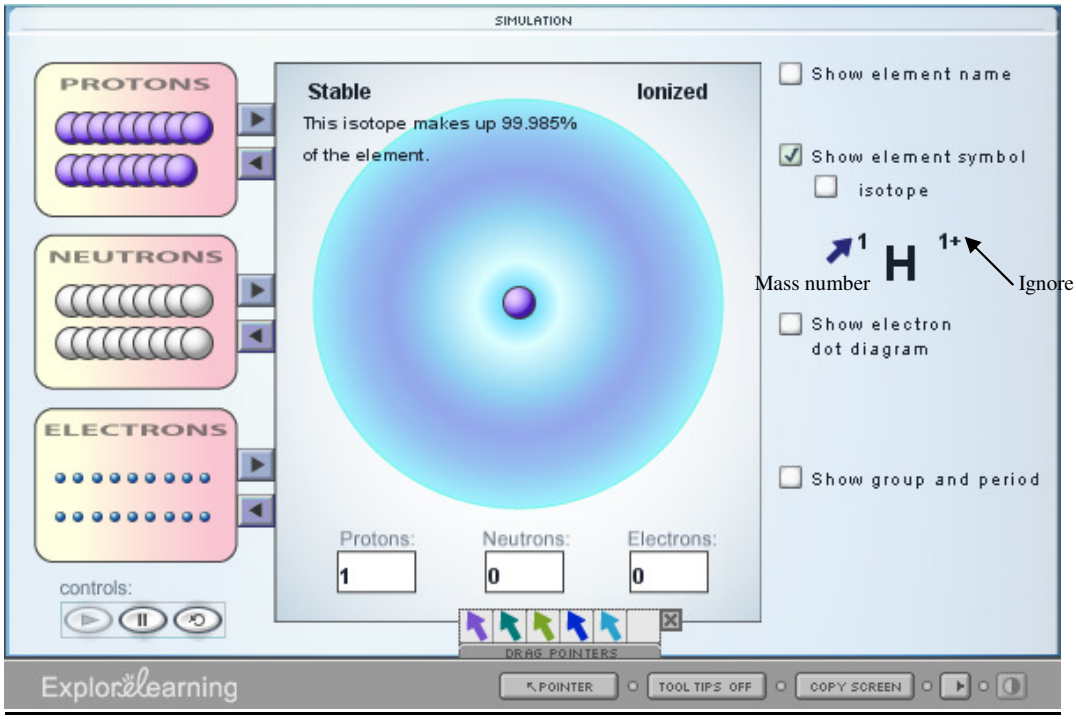

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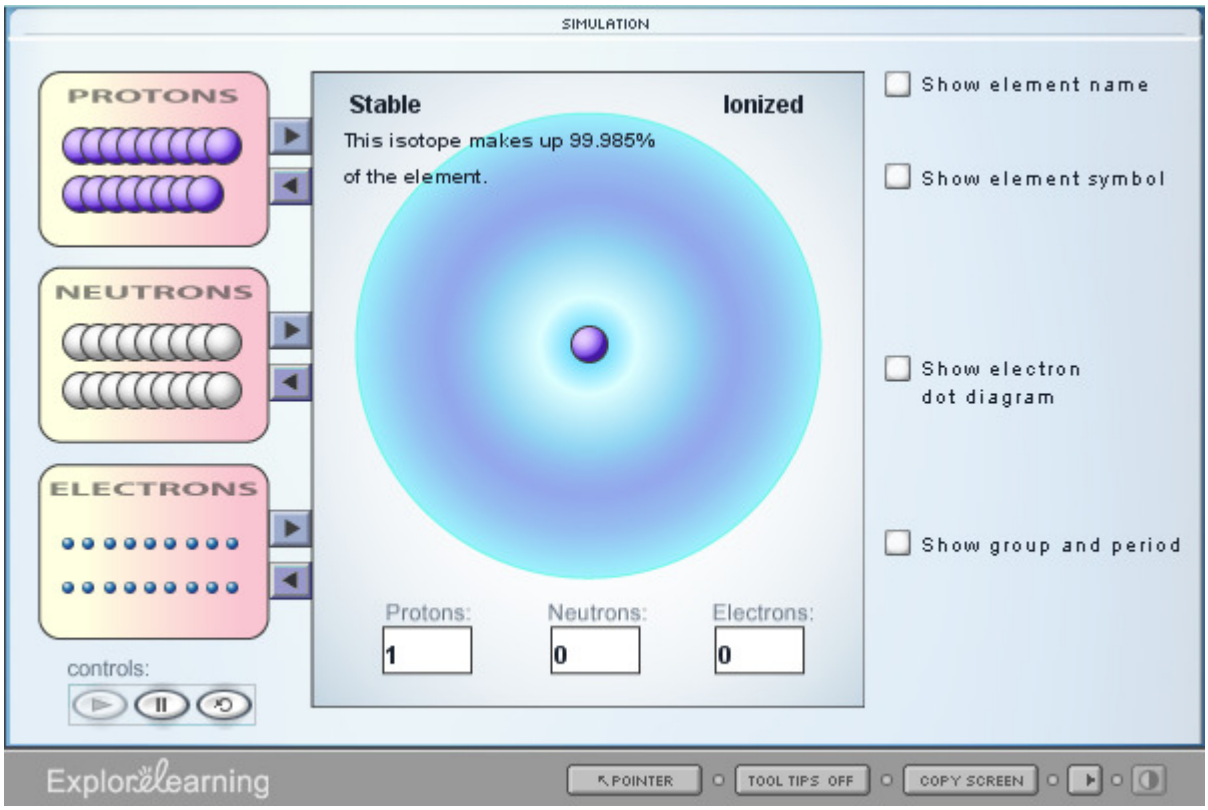

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3		
1		

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2		
3		
1		

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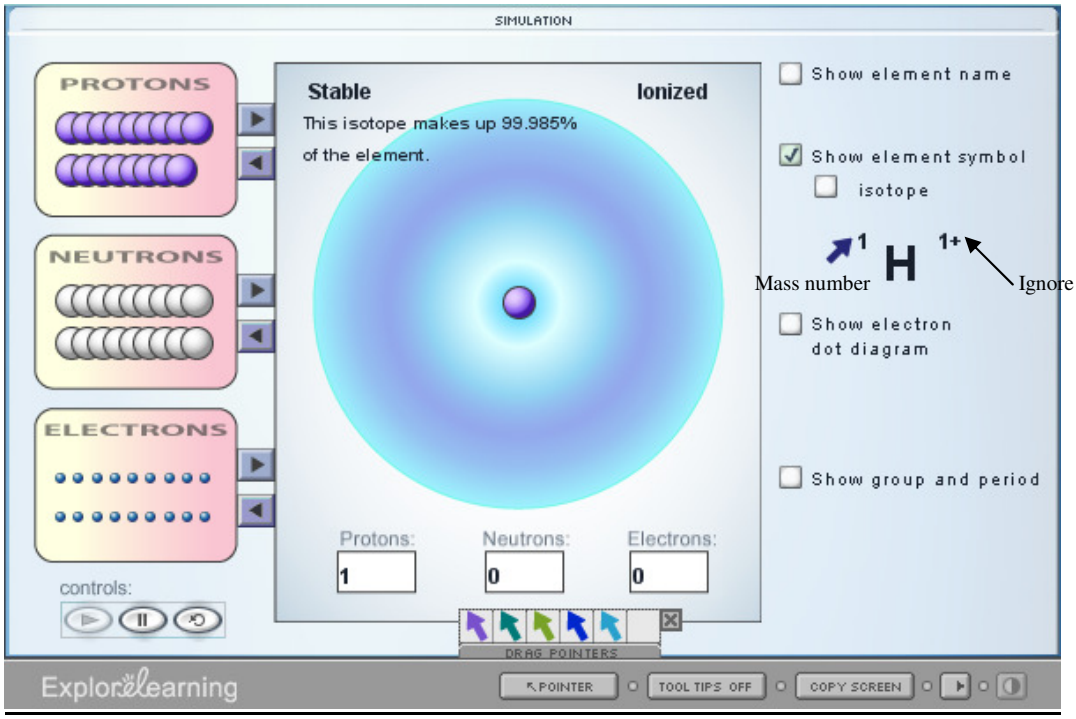

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Subatomic Particle Gizmo Name _____Sci # _____

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Once you log in, find the GIZMO named "Element Builder" Gizmo and select "Launch Gizmo."

Location of Subatomic Particles

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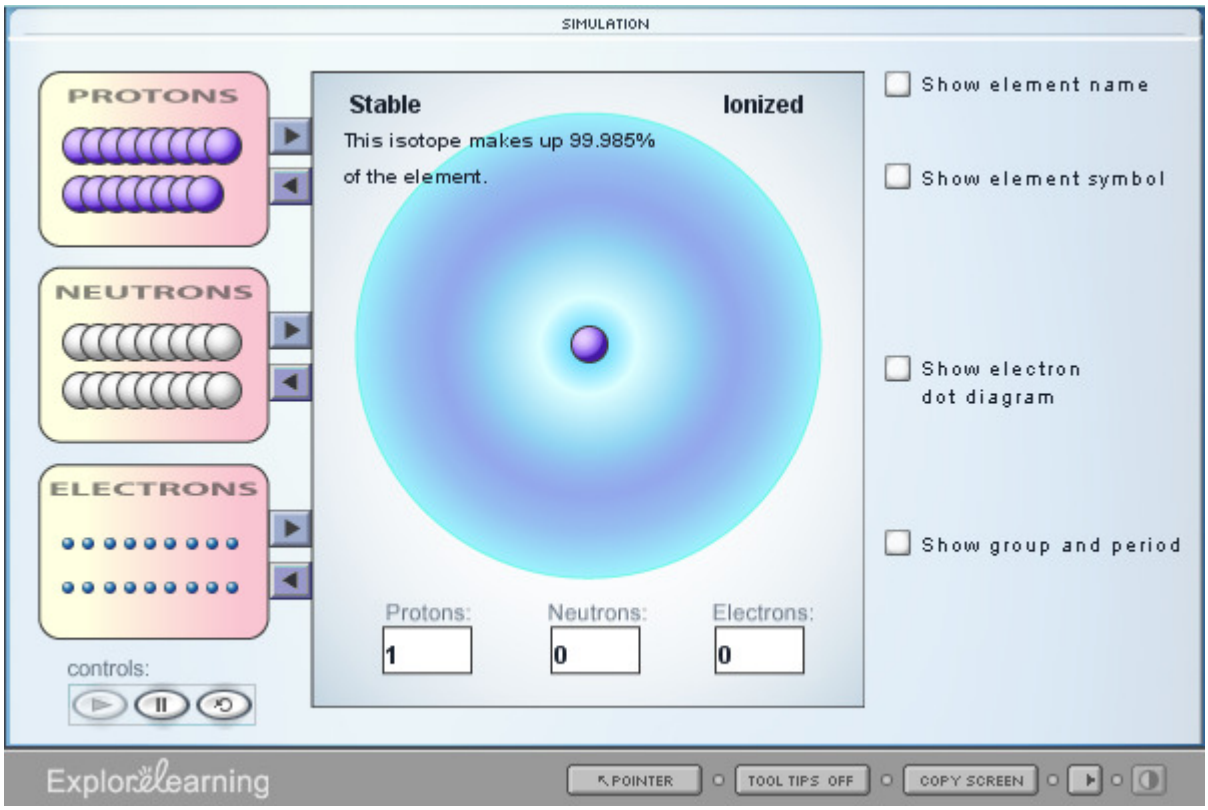

   a. Using the right arrows, add 1 proton, 2 neutrons, and 2 electrons to the atom so that there are 2 of each of the three particles located in the atom. Fill in the following chart.

Particle	Location
Proton	
Neutron	
Electron	

Identity of the Atom

2. Place a check in the "Show element name" box, which is in the top right portion of the gizmo. Manipulate the number of protons to achieve the number of protons in the data table. Do not worry about the number of neutrons or electrons. Experiment with adding one and removing one proton to and from the atom. Fill in the following table. Once you have the identity of the element, look at the periodic table and write down the atomic number for the element, this is the larger number located by the element symbol.

Number of protons	Name of element	Atomic Number from Periodic Table
2		
3		
1		

   a. **Does changing the number of protons change the identity of the element you have built?**

   b. **What is the relationship between the number of protons and the atomic number for an element?**

3. Now you will do the same thing as step 2 except you will be changing the number of neutrons. Make sure that you begin with 2 each for the protons, neutrons, and electrons. Add one neutron to the atom to place 3 neutrons in the atom. Record the name of the element and look at the periodic table to find the atomic number. Next, take 2 neutrons away (a total of 1 should now be in the atom.) Again record the name of the atom and the atomic number from the periodic table.

Number of neutrons	Name of element	Atomic Number from Periodic Table
2		
3		
1		

   a. **Does changing the number of neutrons change the identity of the element you have built?**

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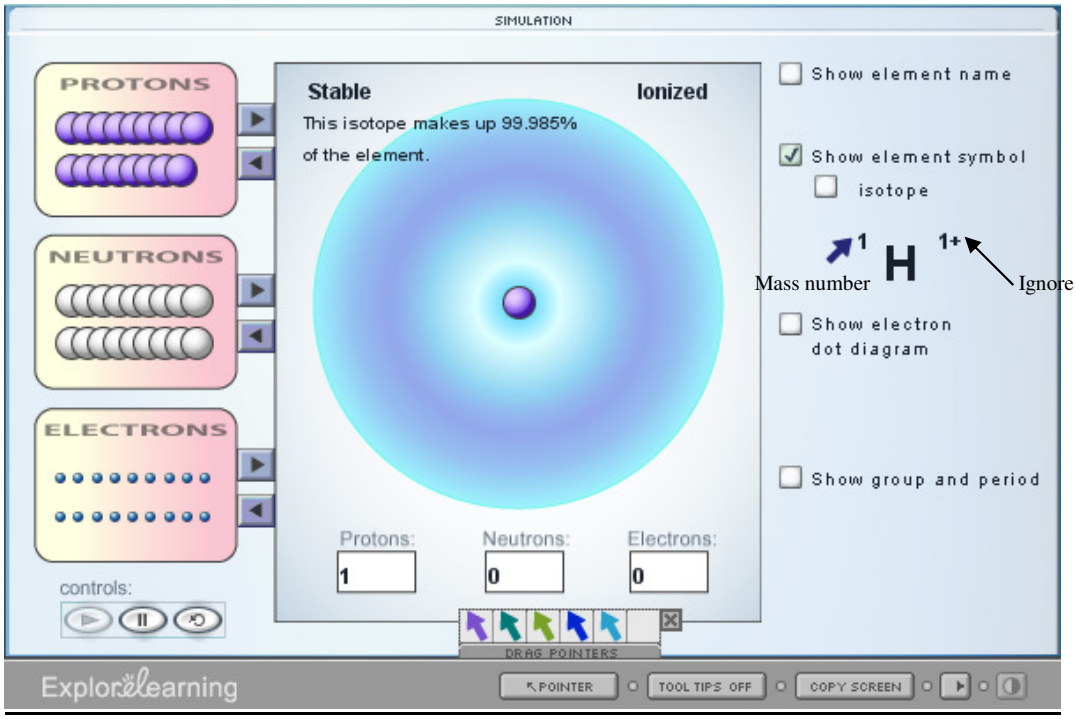
Number of electrons	Name of element	Atomic Number from Periodic Table
2		
3		
1		

a. Does changing the number of electrons change the identity of the element you have built?

KEY FACT: Now looking at questions 2a, 3a, and 4a, which subatomic particle is responsible for the identity of an atom?

Mass of an atom

5. Build an atom again with exactly 2 protons, 2 neutrons, and 2 electrons. Check "Show element symbol." Be sure "isotope" is not selected. Make adjustments to the atom to attain the number of protons, neutrons, and electrons as shown in the data table. Then finish filling in the table. ***The number to the upper left of the symbol indicates the mass of the atom.*** (See where the pointer is pointing in the screen shot.)



Number of protons	Number of neutrons	Number of electrons	Identity of atom (give name)	Mass of atom
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3	2	2		
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a. Does the proton affect the mass of an atom? You MUST EXPLAIN by referring to an example or data from above .

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5. Which 2 subatomic particles affect the mass of an atom?

KEY FACT: Write a mathematical formula to show the relationship between the number of protons, the number of neutrons, and the mass number for an atom.

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- How many protons are in the nucleus of an atom of Carbon (C)? _____
- What is the formula for finding the mass number of an atom? _____
- If an atom of C has 7 neutrons in the nucleus, then it would have a mass number of _____ (see previous 2 questions).
- How many electrons would be found in the nucleus? _____

Subatomic Particle Gizmo Name _____Sci # _____

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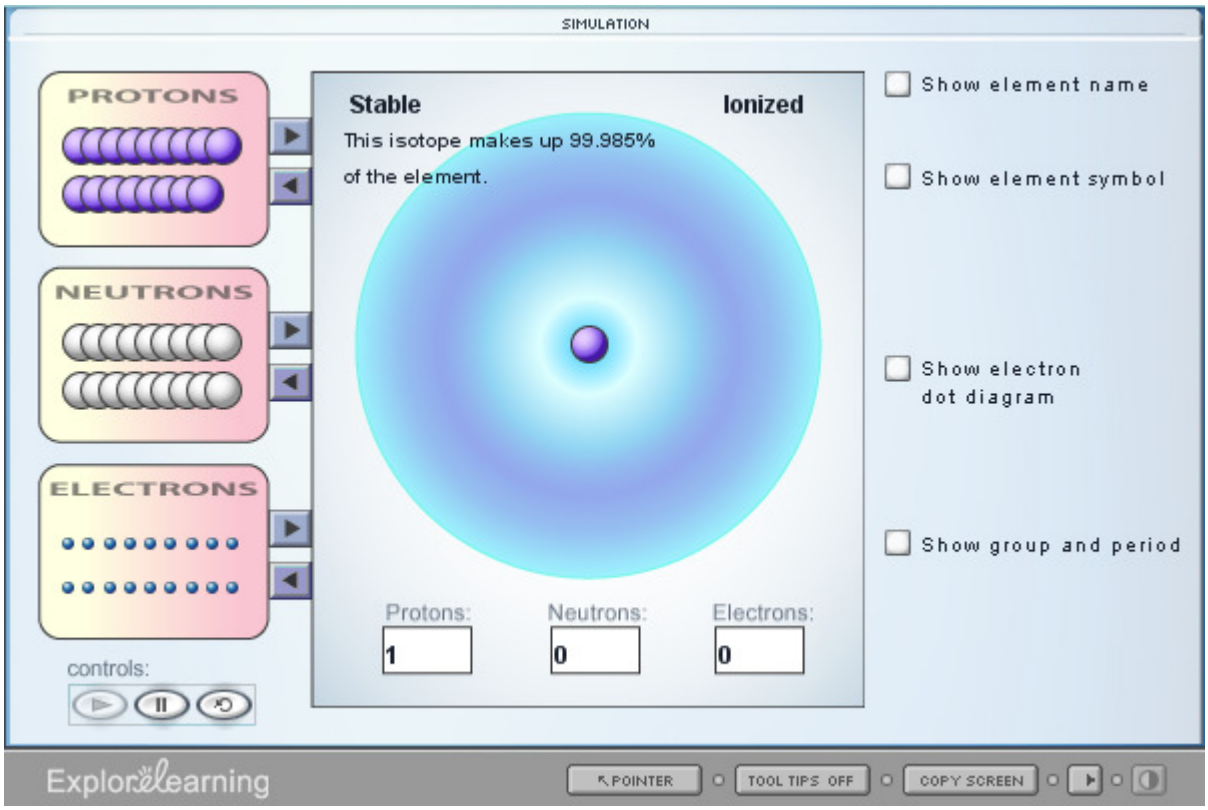

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Particle	Location
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Identity of the Atom

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3		
1		

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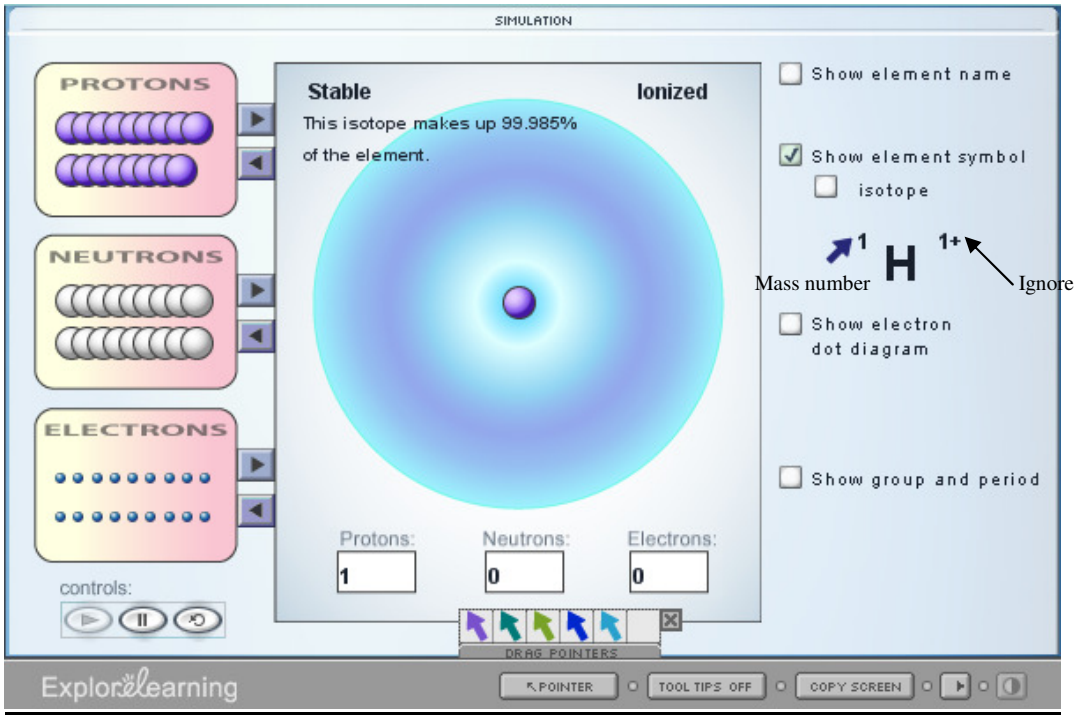

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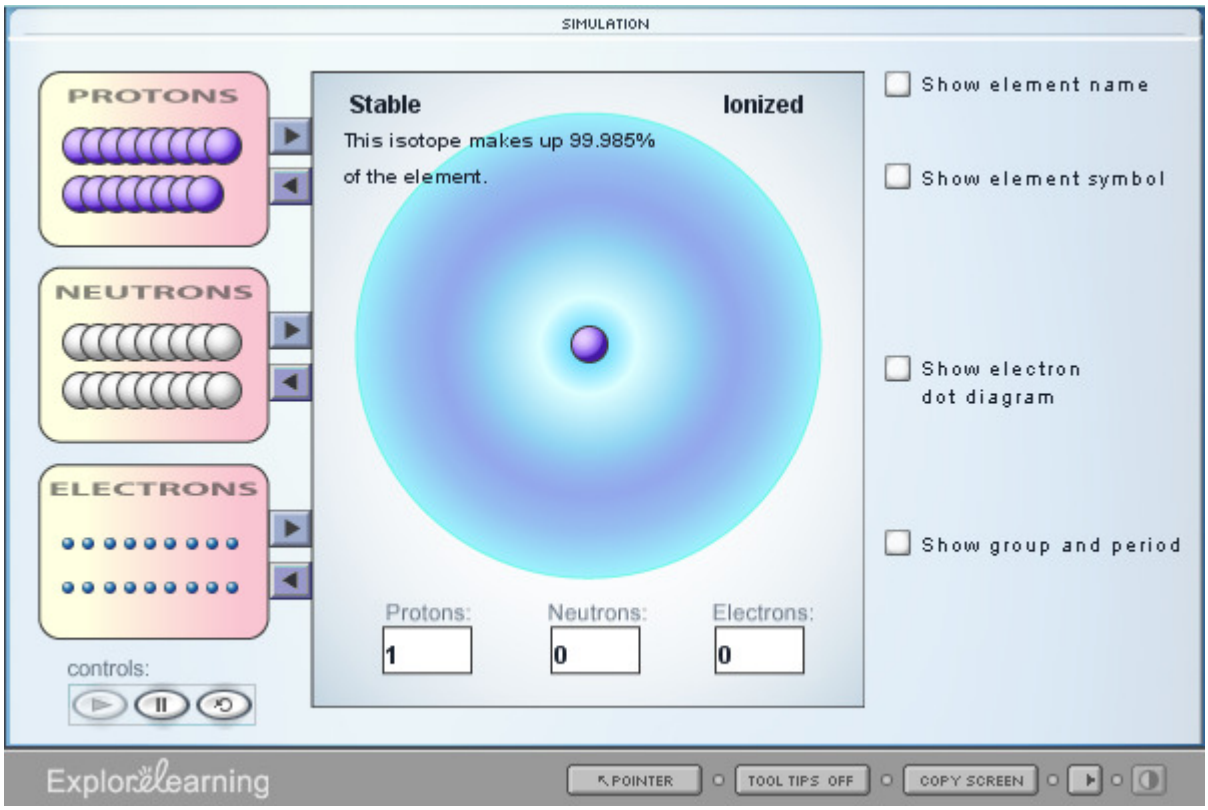

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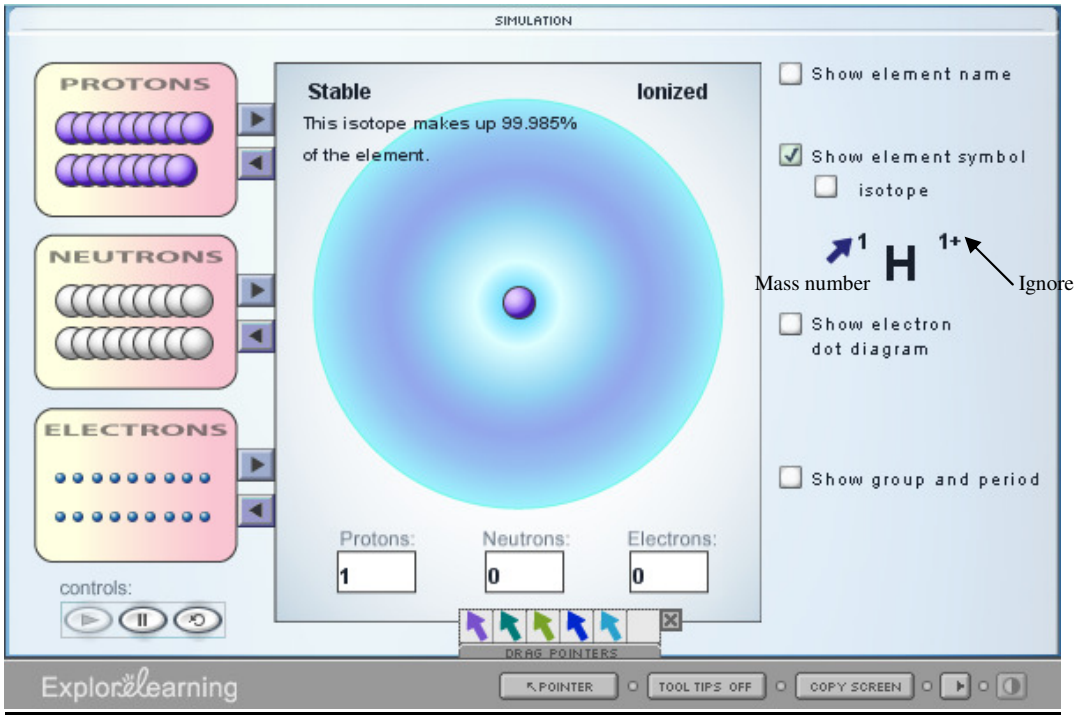

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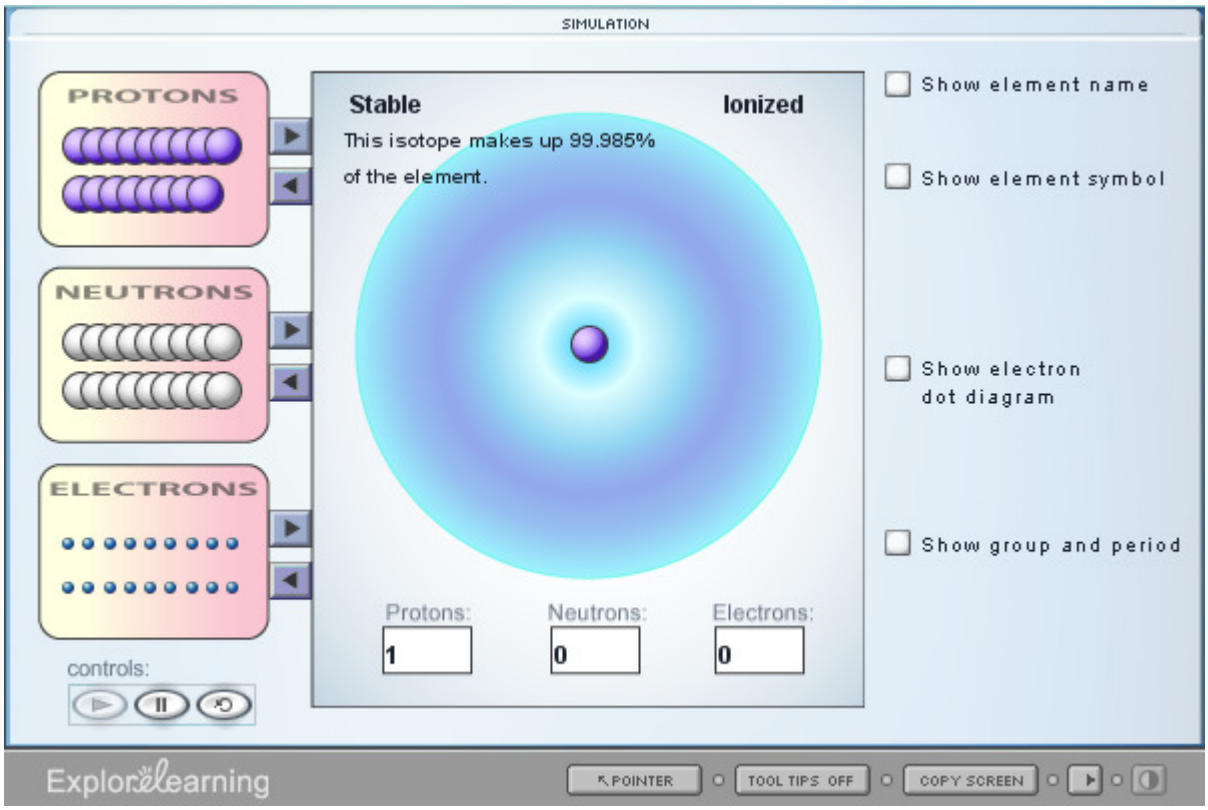

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Number of electrons	Name of element	Atomic Number from Periodic Table
2		
3		
1		

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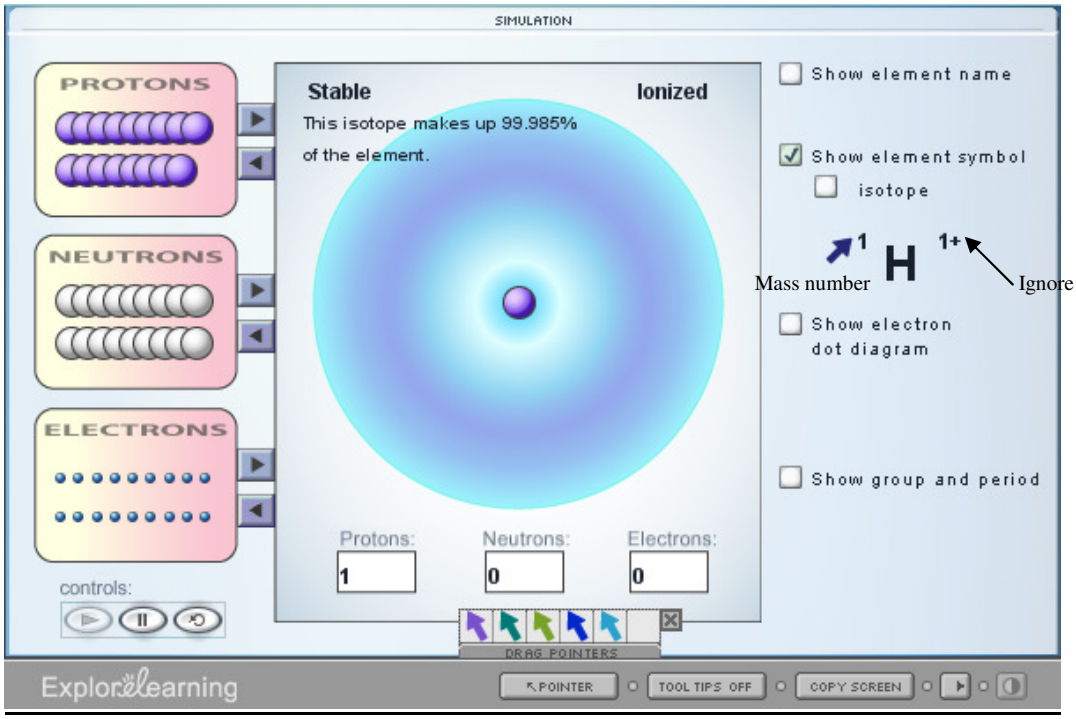

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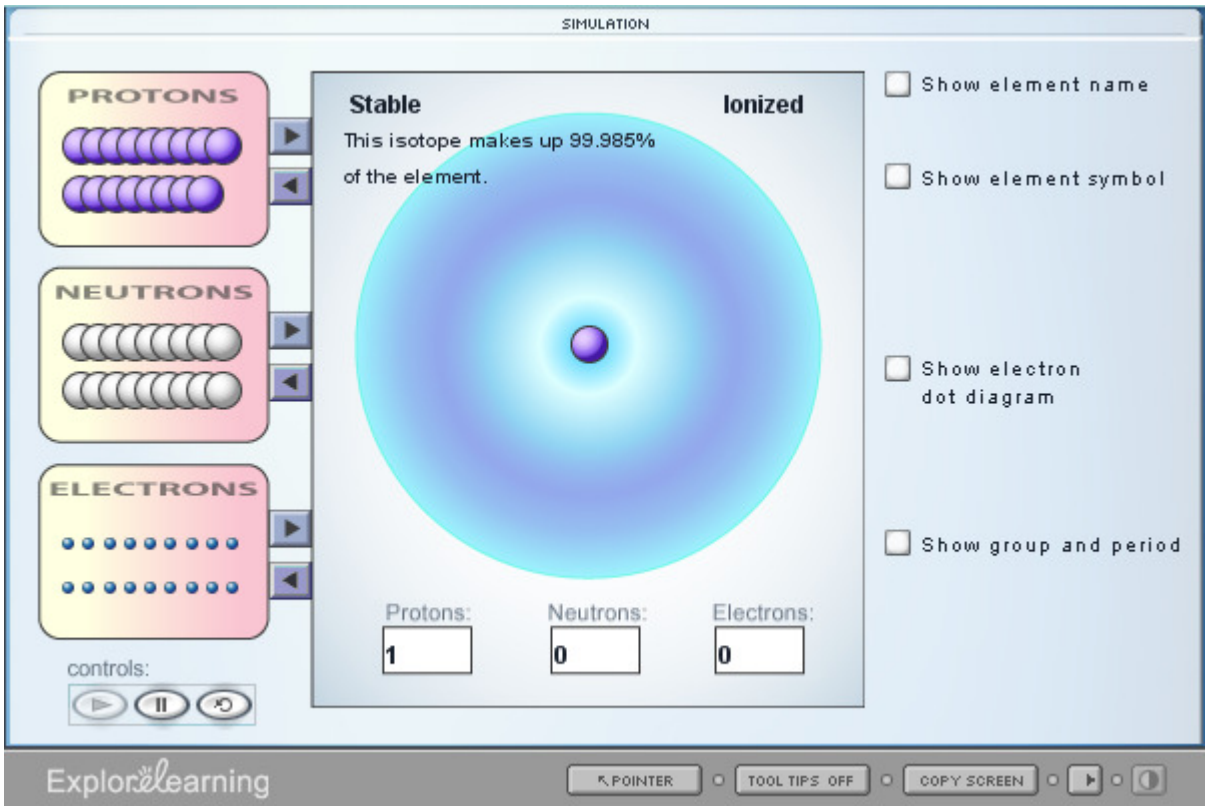

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2		
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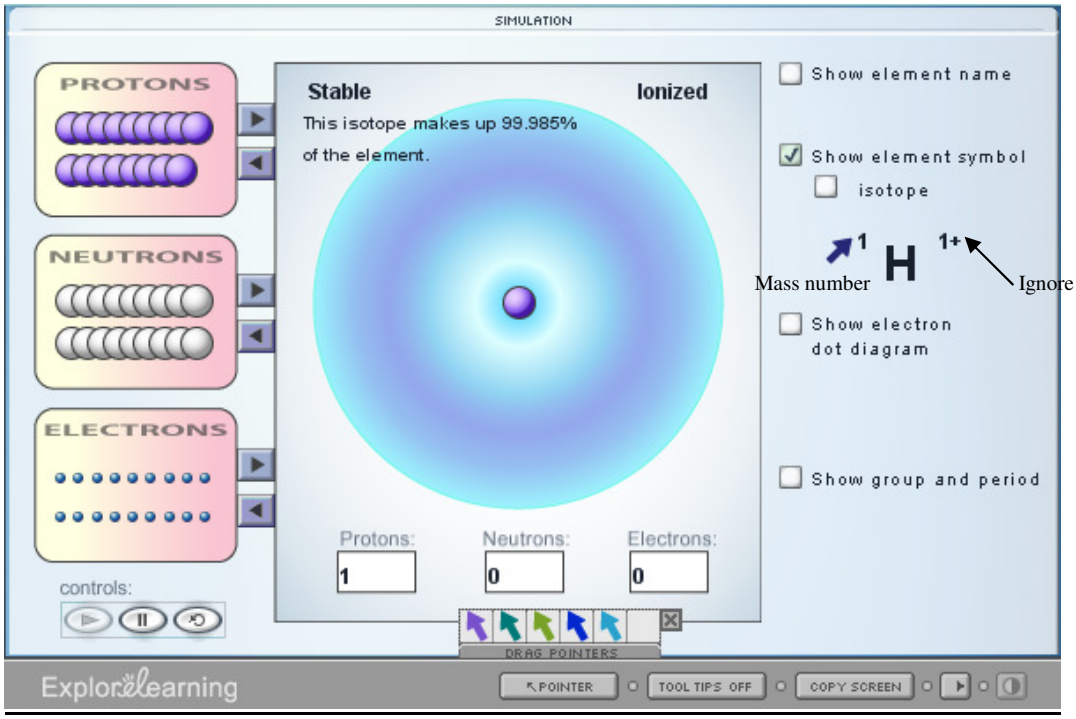

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Subatomic Particle Gizmo Name _____Sci # _____

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Once you log in, find the GIZMO named "Element Builder" Gizmo and select "Launch Gizmo."

Location of Subatomic Particles

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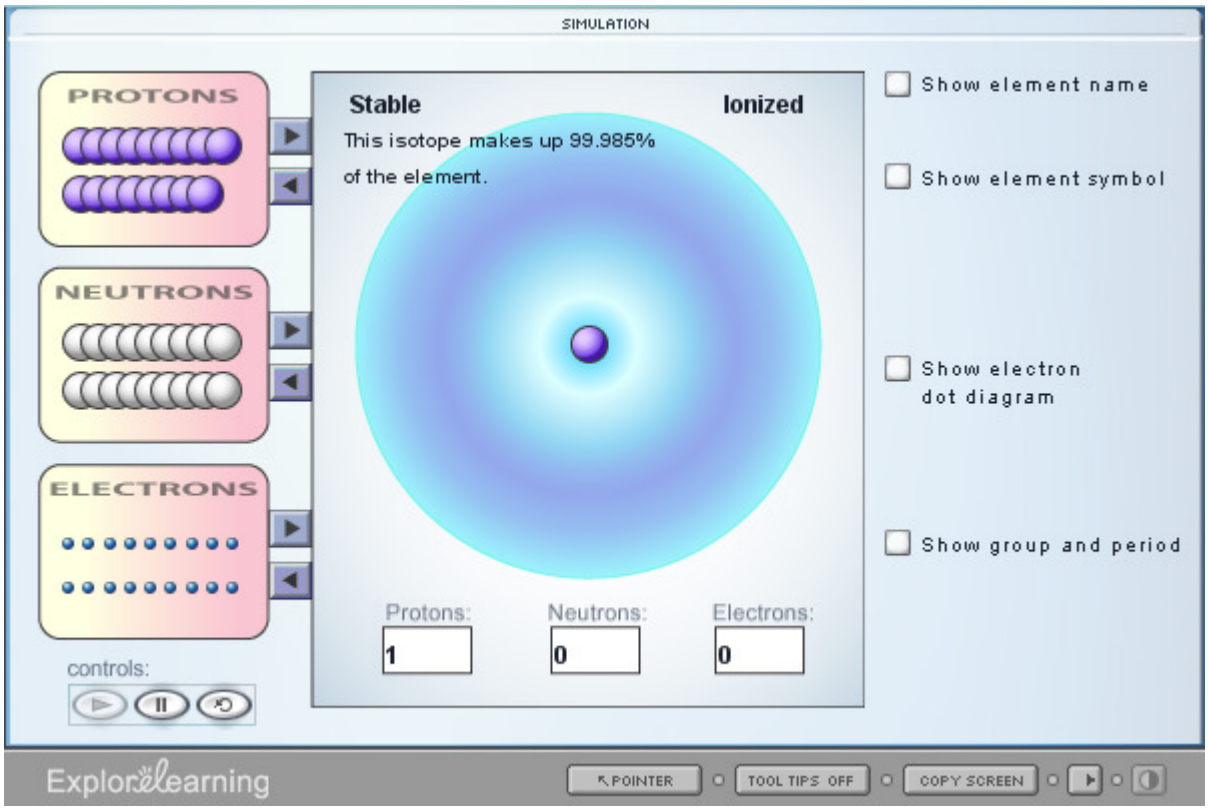


   a. Using the right arrows, add 1 proton, 2 neutrons, and 2 electrons to the atom so that there are 2 of each of the three particles located in the atom. Fill in the following chart.

Particle	Location
Proton	
Neutron	
Electron	

Identity of the Atom

2. Place a check in the "Show element name" box, which is in the top right portion of the gizmo. Manipulate the number of protons to achieve the number of protons in the data table. Do not worry about the number of neutrons or electrons. Experiment with adding one and removing one proton to and from the atom. Fill in the following table. Once you have the identity of the element, look at the periodic table and write down the atomic number for the element, this is the larger number located by the element symbol.

Number of protons	Name of element	Atomic Number from Periodic Table
2		
3		
1		

   a. **Does changing the number of protons change the identity of the element you have built?**

   b. **What is the relationship between the number of protons and the atomic number for an element?**

3. Now you will do the same thing as step 2 except you will be changing the number of neutrons. Make sure that you begin with 2 each for the protons, neutrons, and electrons. Add one neutron to the atom to place 3 neutrons in the atom. Record the name of the element and look at the periodic table to find the atomic number. Next, take 2 neutrons away (a total of 1 should now be in the atom.) Again record the name of the atom and the atomic number from the periodic table.

Number of neutrons	Name of element	Atomic Number from Periodic Table
2		
3		
1		

   a. **Does changing the number of neutrons change the identity of the element you have built?**

   b. **Does changing the number of neutrons change the affect the atomic number?**

4. Make sure that you have 2 each for the protons, neutrons, and electrons. Add one electron to the atom to place 3 electrons in the atom. Record the name of the element and look at the periodic table to find the atomic number. Next, take 2 electrons away (a total of 1 should now be in the atom.) Again record the name of the atom and the atomic number from the periodic table.

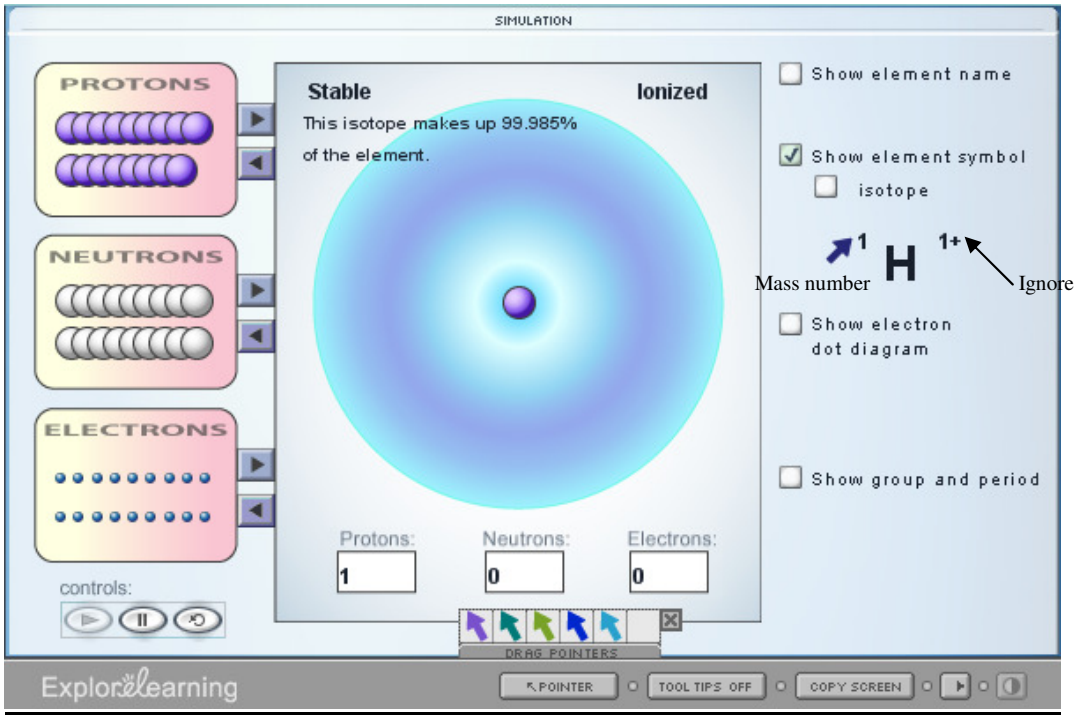
Number of electrons	Name of element	Atomic Number from Periodic Table
2		
3		
1		

a. Does changing the number of electrons change the identity of the element you have built?

KEY FACT: Now looking at questions 2a, 3a, and 4a, which subatomic particle is responsible for the identity of an atom?

Mass of an atom

5. Build an atom again with exactly 2 protons, 2 neutrons, and 2 electrons. Check "Show element symbol." Be sure "isotope" is not selected. Make adjustments to the atom to attain the number of protons, neutrons, and electrons as shown in the data table. Then finish filling in the table. ***The number to the upper left of the symbol indicates the mass of the atom.*** (See where the pointer is pointing in the screen shot.)



Number of protons	Number of neutrons	Number of electrons	Identity of atom (give name)	Mass of atom
2	2	2		
3	2	2		
2	3	2		
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a. Does the proton affect the mass of an atom? You MUST EXPLAIN by referring to an example or data from above .

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d. Looking at the atom in the Gizmo, where is most of the mass of an atom concentrated? Explain.

5. Which 2 subatomic particles affect the mass of an atom?

KEY FACT: Write a mathematical formula to show the relationship between the number of protons, the number of neutrons, and the mass number for an atom.

SUMMARY: Based on this gizmo, the number of protons equals the _____ _____ from the periodic table. The number of protons determines the _____ of an atom. The _____ and _____ determines the mass of an atom. The protons and neutrons are located in the _____ of an atom and electrons are in the _____ _____.

- How many protons are in the nucleus of an atom of Carbon (C)? _____
- What is the formula for finding the mass number of an atom? _____
- If an atom of C has 7 neutrons in the nucleus, then it would have a mass number of _____ (see previous 2 questions).
- How many electrons would be found in the nucleus? _____

Subatomic Particle Gizmo Name _____Sci # _____

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Location of Subatomic Particles

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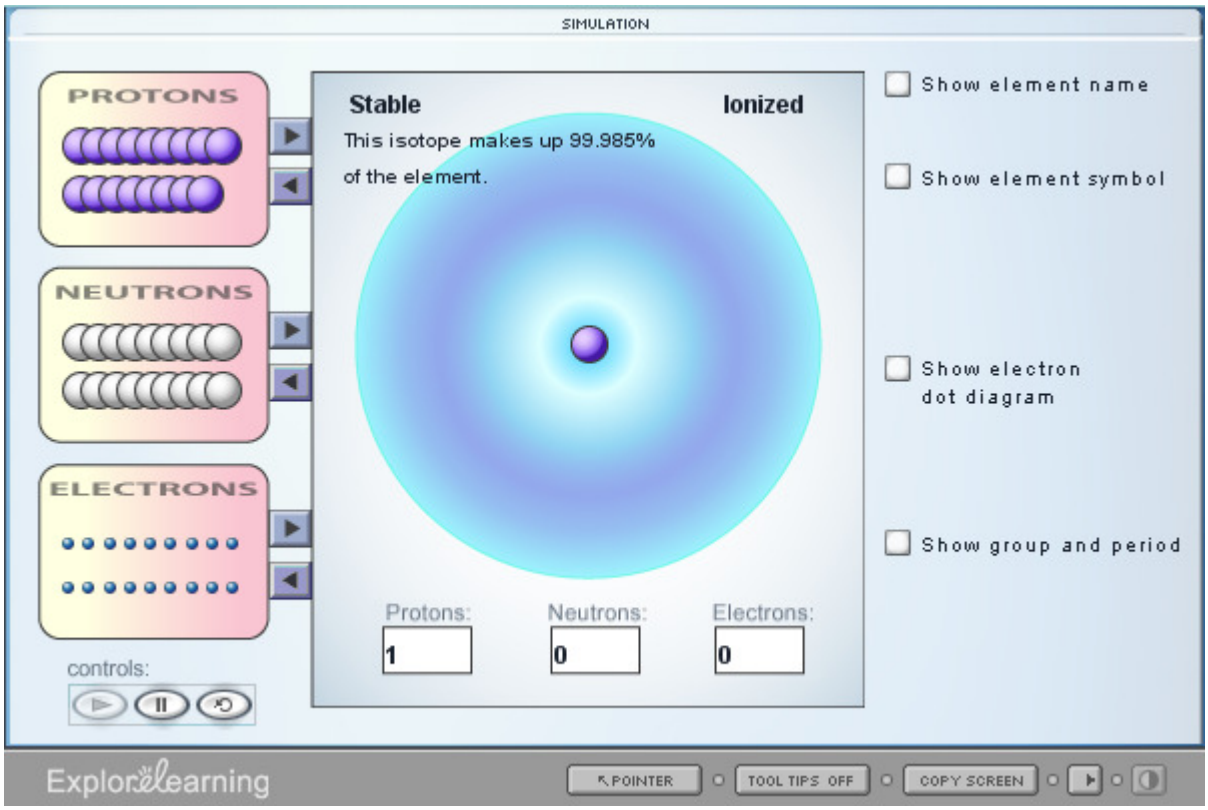

   a. Using the right arrows, add 1 proton, 2 neutrons, and 2 electrons to the atom so that there are 2 of each of the three particles located in the atom. Fill in the following chart.

Particle	Location
Proton	
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Identity of the Atom

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Number of neutrons	Name of element	Atomic Number from Periodic Table
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3		
1		

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Number of electrons	Name of element	Atomic Number from Periodic Table
2		
3		
1		

a. Does changing the number of electrons change the identity of the element you have built?

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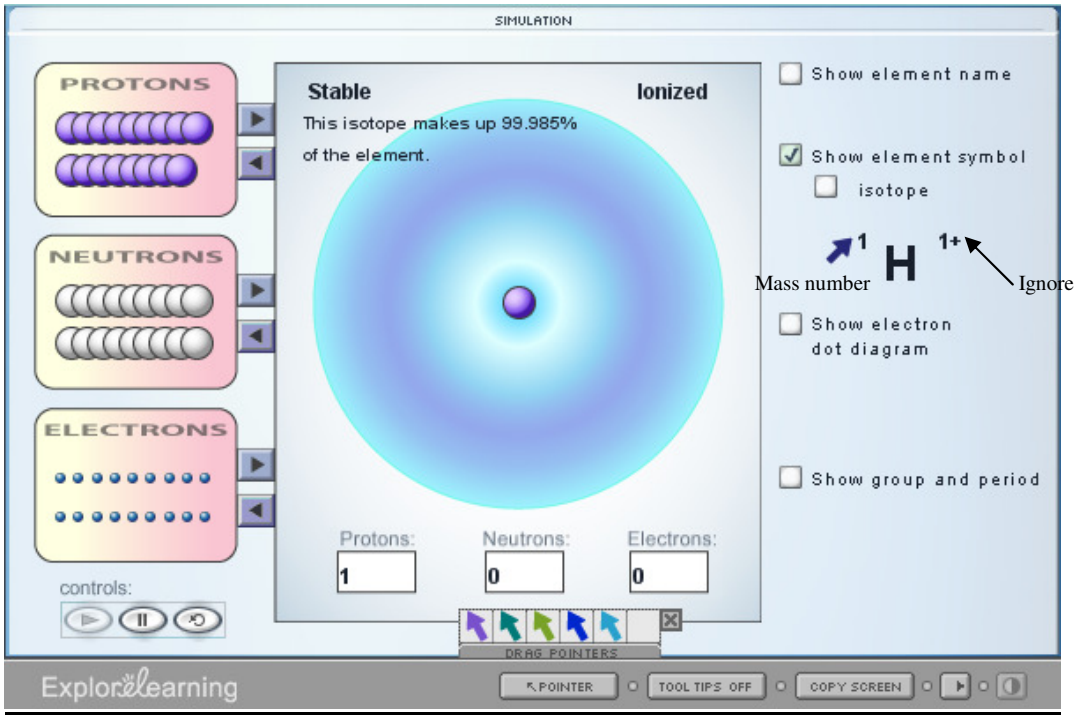
5. Build an atom again with exactly 2 protons, 2 neutrons, and 2 electrons. Check "Show element symbol." Be sure "isotope" is not selected. Make adjustments to the atom to attain the number of protons, neutrons, and electrons as shown in the data table. Then finish filling in the table. ***The number to the upper left of the symbol indicates the mass of the atom.*** (See where the pointer is pointing in the screen shot.)



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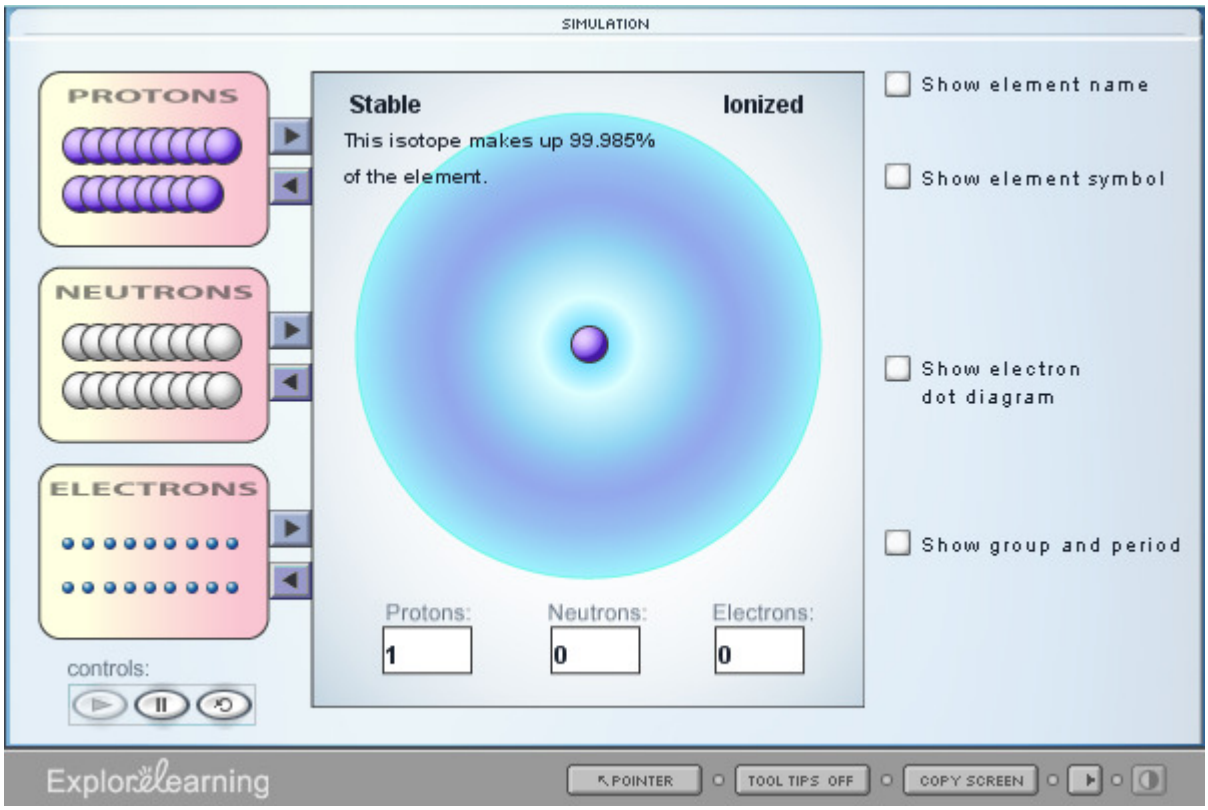

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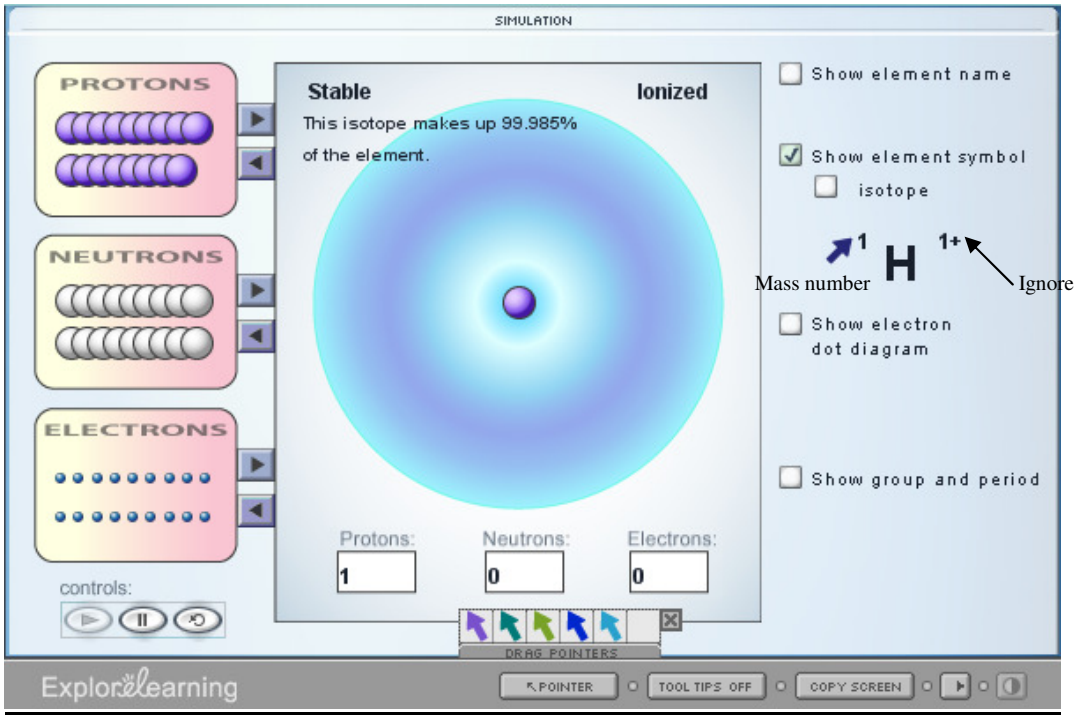

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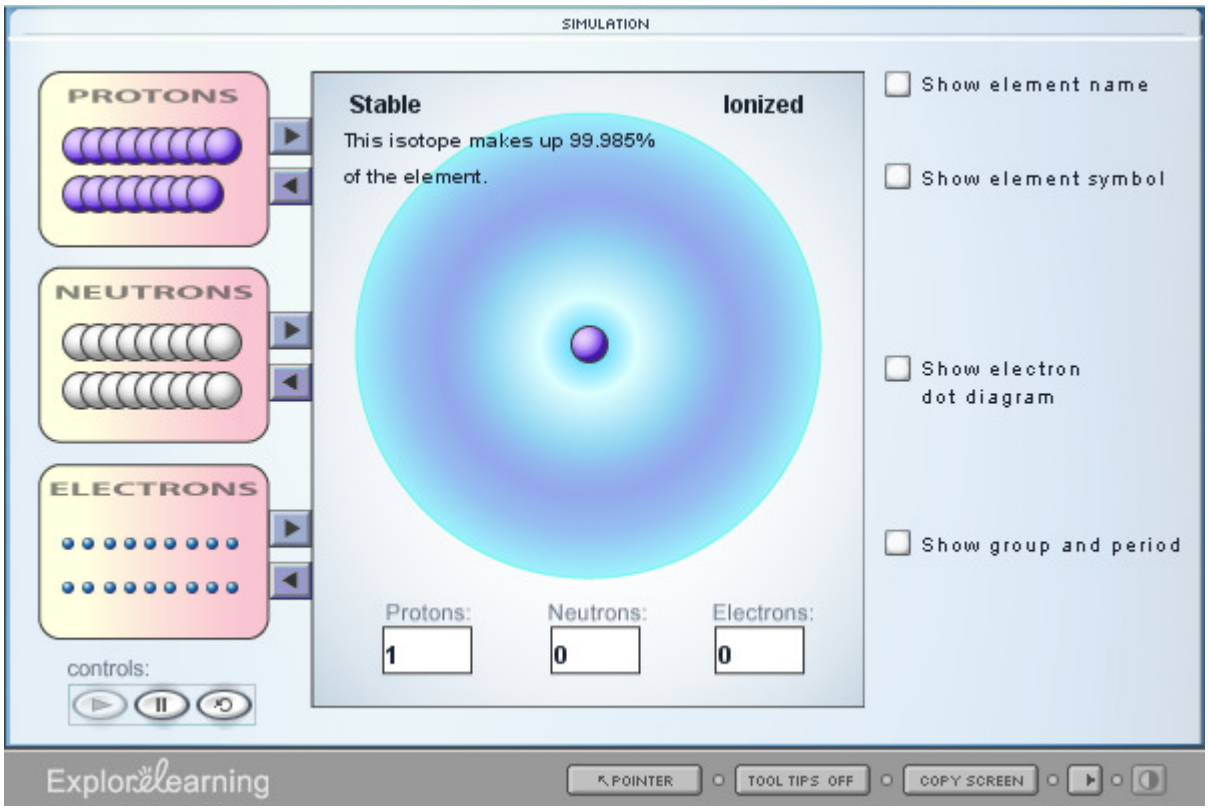

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Number of electrons	Name of element	Atomic Number from Periodic Table
2		
3		
1		

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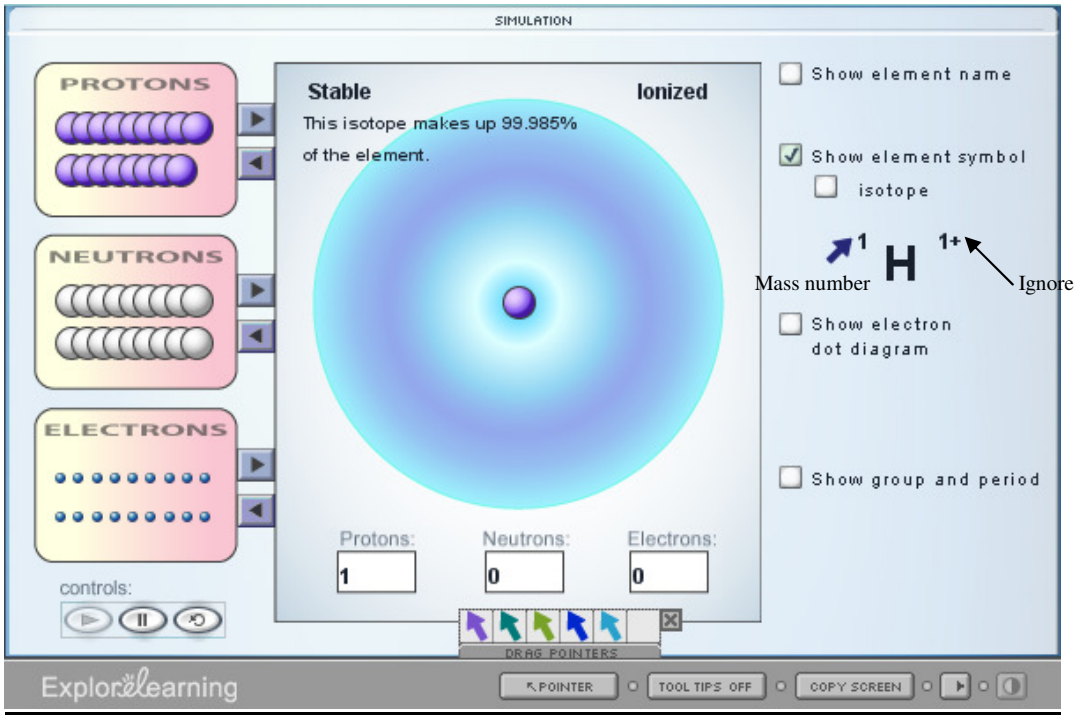

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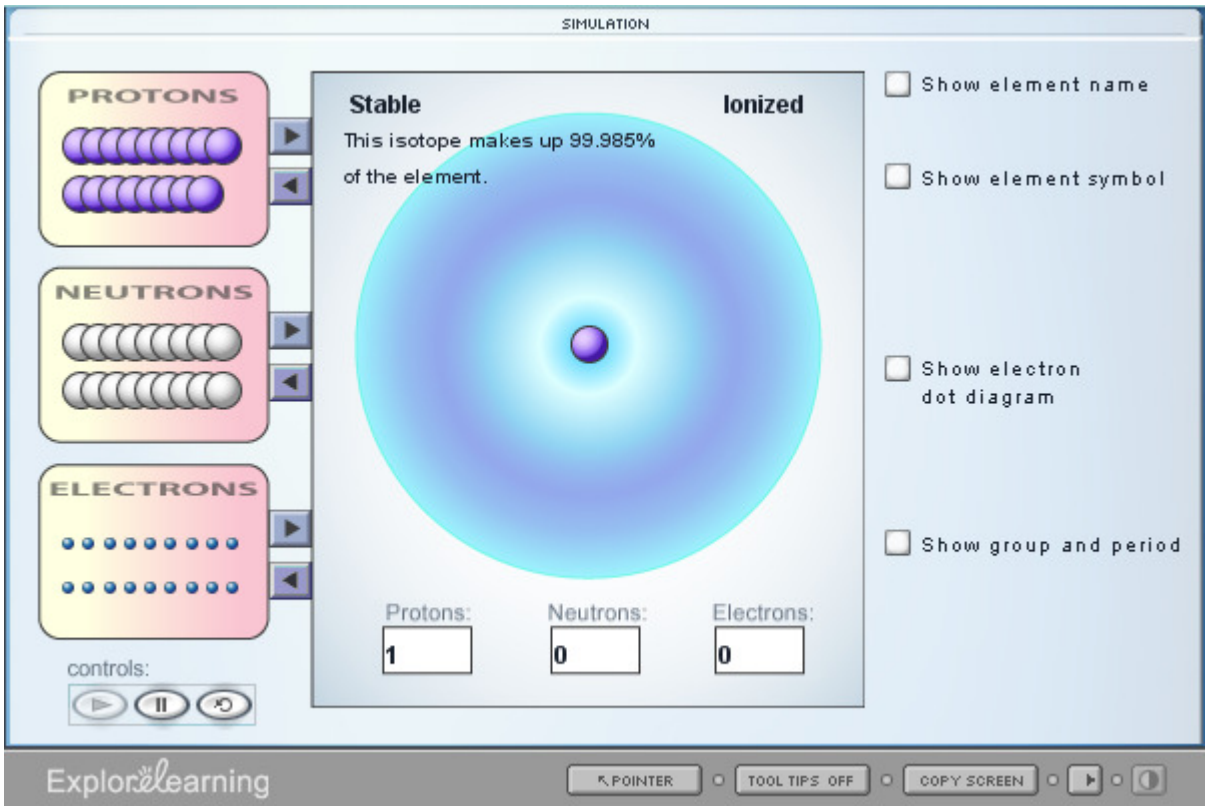

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3		
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Number of electrons	Name of element	Atomic Number from Periodic Table
2		
3		
1		

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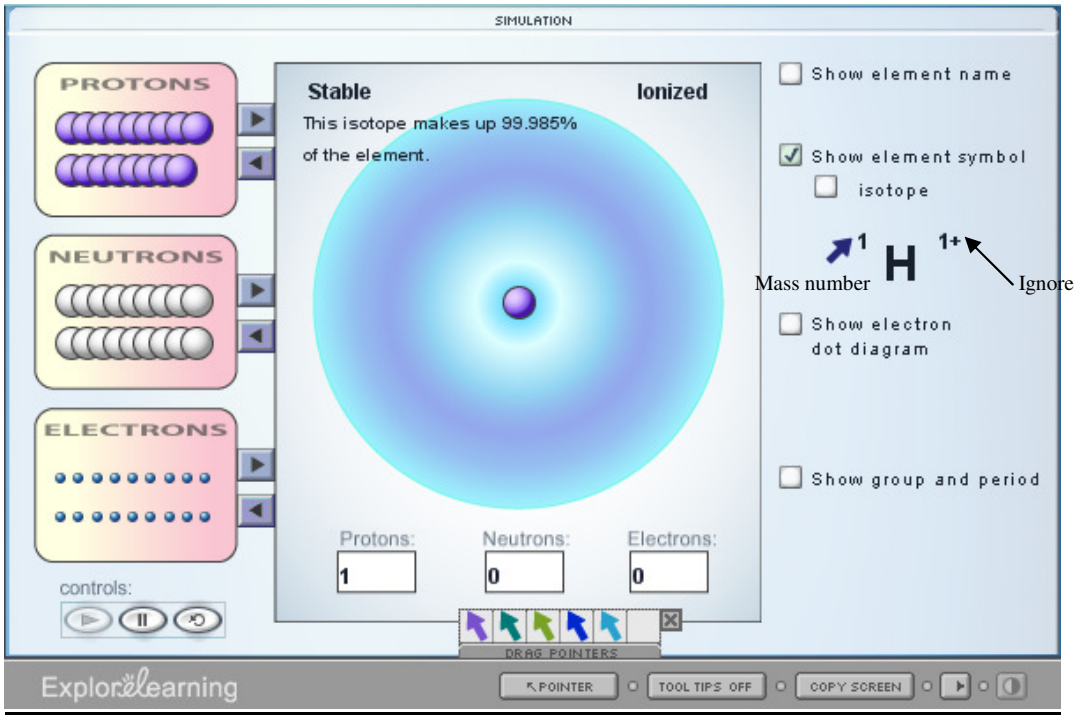

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Subatomic Particle Gizmo Name _____Sci # _____

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Once you log in, find the GIZMO named "Element Builder" Gizmo and select "Launch Gizmo."

Location of Subatomic Particles

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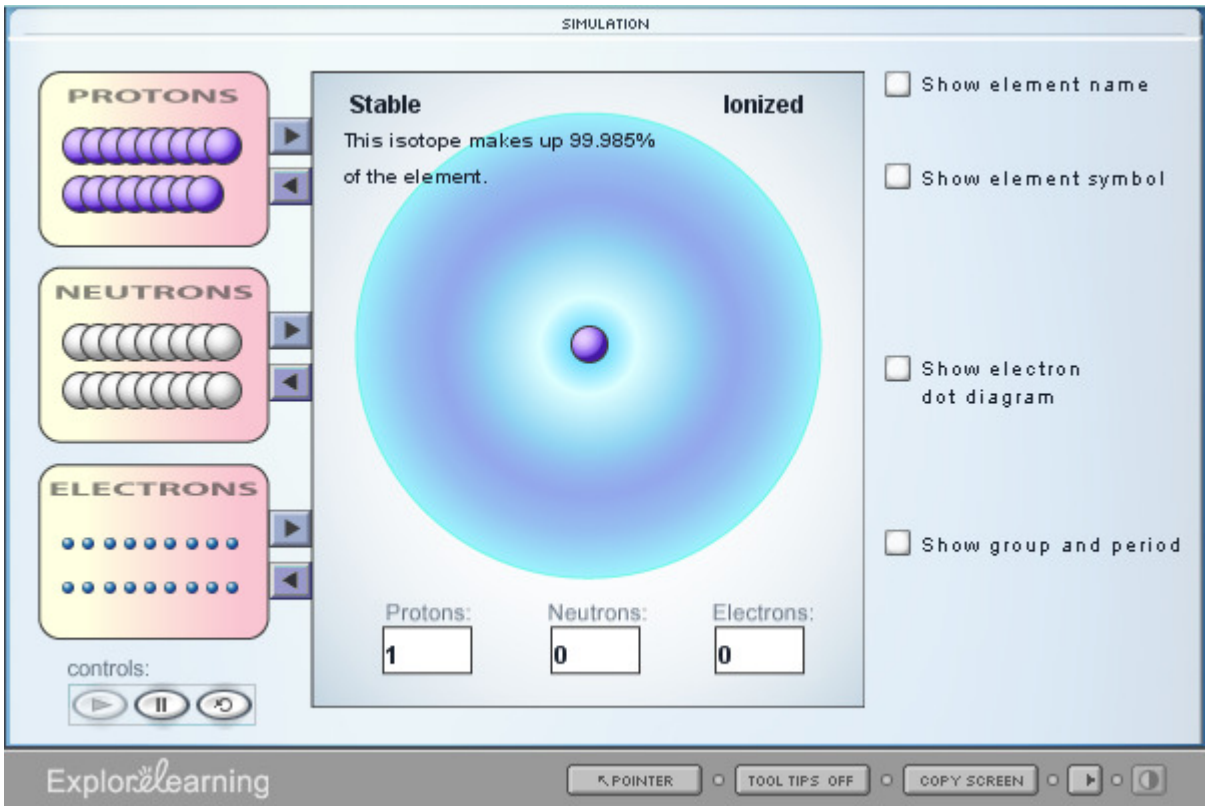


   a. Using the right arrows, add 1 proton, 2 neutrons, and 2 electrons to the atom so that there are 2 of each of the three particles located in the atom. Fill in the following chart.

Particle	Location
Proton	
Neutron	
Electron	

Identity of the Atom

2. Place a check in the "Show element name" box, which is in the top right portion of the gizmo. Manipulate the number of protons to achieve the number of protons in the data table. Do not worry about the number of neutrons or electrons. Experiment with adding one and removing one proton to and from the atom. Fill in the following table. Once you have the identity of the element, look at the periodic table and write down the atomic number for the element, this is the larger number located by the element symbol.

Number of protons	Name of element	Atomic Number from Periodic Table
2		
3		
1		

   a. **Does changing the number of protons change the identity of the element you have built?**

   b. **What is the relationship between the number of protons and the atomic number for an element?**

3. Now you will do the same thing as step 2 except you will be changing the number of neutrons. Make sure that you begin with 2 each for the protons, neutrons, and electrons. Add one neutron to the atom to place 3 neutrons in the atom. Record the name of the element and look at the periodic table to find the atomic number. Next, take 2 neutrons away (a total of 1 should now be in the atom.) Again record the name of the atom and the atomic number from the periodic table.

Number of neutrons	Name of element	Atomic Number from Periodic Table
2		
3		
1		

   a. **Does changing the number of neutrons change the identity of the element you have built?**

   b. **Does changing the number of neutrons change the affect the atomic number?**

4. Make sure that you have 2 each for the protons, neutrons, and electrons. Add one electron to the atom to place 3 electrons in the atom. Record the name of the element and look at the periodic table to find the atomic number. Next, take 2 electrons away (a total of 1 should now be in the atom.) Again record the name of the atom and the atomic number from the periodic table.

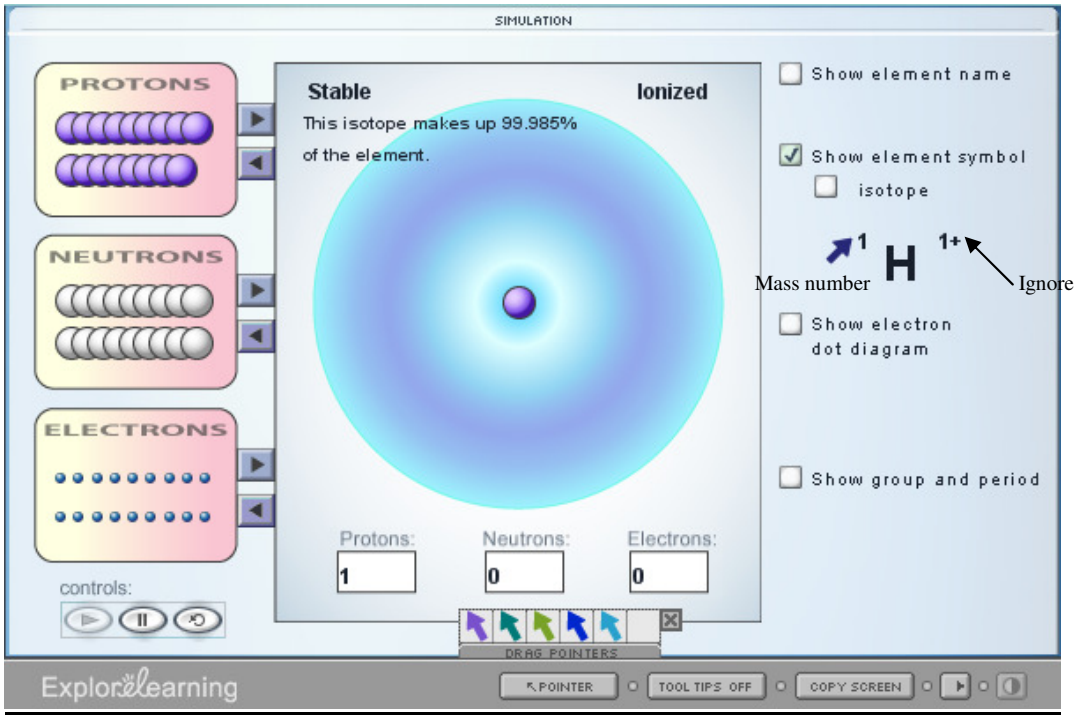
Number of electrons	Name of element	Atomic Number from Periodic Table
2		
3		
1		

a. Does changing the number of electrons change the identity of the element you have built?

KEY FACT: Now looking at questions 2a, 3a, and 4a, which subatomic particle is responsible for the identity of an atom?

Mass of an atom

5. Build an atom again with exactly 2 protons, 2 neutrons, and 2 electrons. Check "Show element symbol." Be sure "isotope" is not selected. Make adjustments to the atom to attain the number of protons, neutrons, and electrons as shown in the data table. Then finish filling in the table. ***The number to the upper left of the symbol indicates the mass of the atom.*** (See where the pointer is pointing in the screen shot.)



Number of protons	Number of neutrons	Number of electrons	Identity of atom (give name)	Mass of atom
2	2	2		
3	2	2		
2	3	2		
2	2	3		

a. Does the proton affect the mass of an atom? You MUST EXPLAIN by referring to an example or data from above .

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d. Looking at the atom in the Gizmo, where is most of the mass of an atom concentrated? Explain.

5. Which 2 subatomic particles affect the mass of an atom?

KEY FACT: Write a mathematical formula to show the relationship between the number of protons, the number of neutrons, and the mass number for an atom.

SUMMARY: Based on this gizmo, the number of protons equals the _____ _____ from the periodic table. The number of protons determines the _____ of an atom. The _____ and _____ determines the mass of an atom. The protons and neutrons are located in the _____ of an atom and electrons are in the _____ _____.

- How many protons are in the nucleus of an atom of Carbon (C)? _____
- What is the formula for finding the mass number of an atom? _____
- If an atom of C has 7 neutrons in the nucleus, then it would have a mass number of _____ (see previous 2 questions).
- How many electrons would be found in the nucleus? _____

Subatomic Particle Gizmo Name _____Sci # _____

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Location of Subatomic Particles

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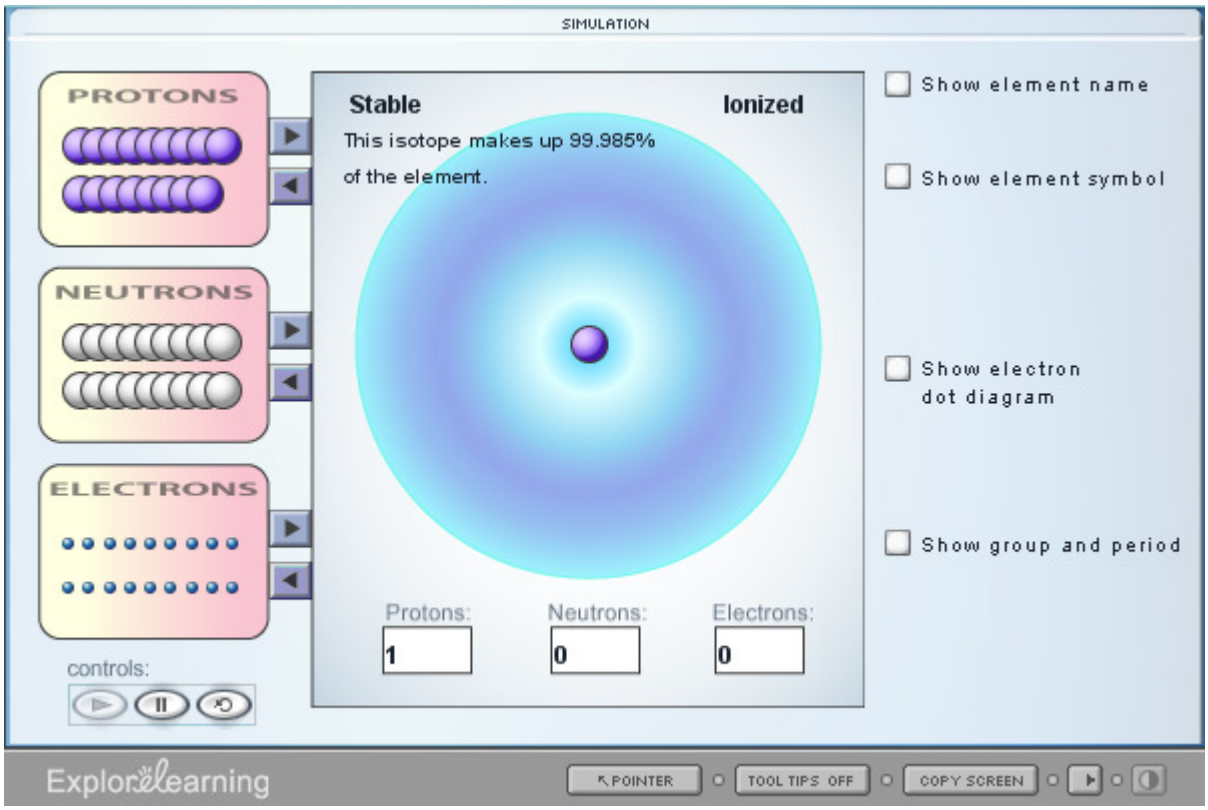

   a. Using the right arrows, add 1 proton, 2 neutrons, and 2 electrons to the atom so that there are 2 of each of the three particles located in the atom. Fill in the following chart.

Particle	Location
Proton	
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Identity of the Atom

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3		
1		

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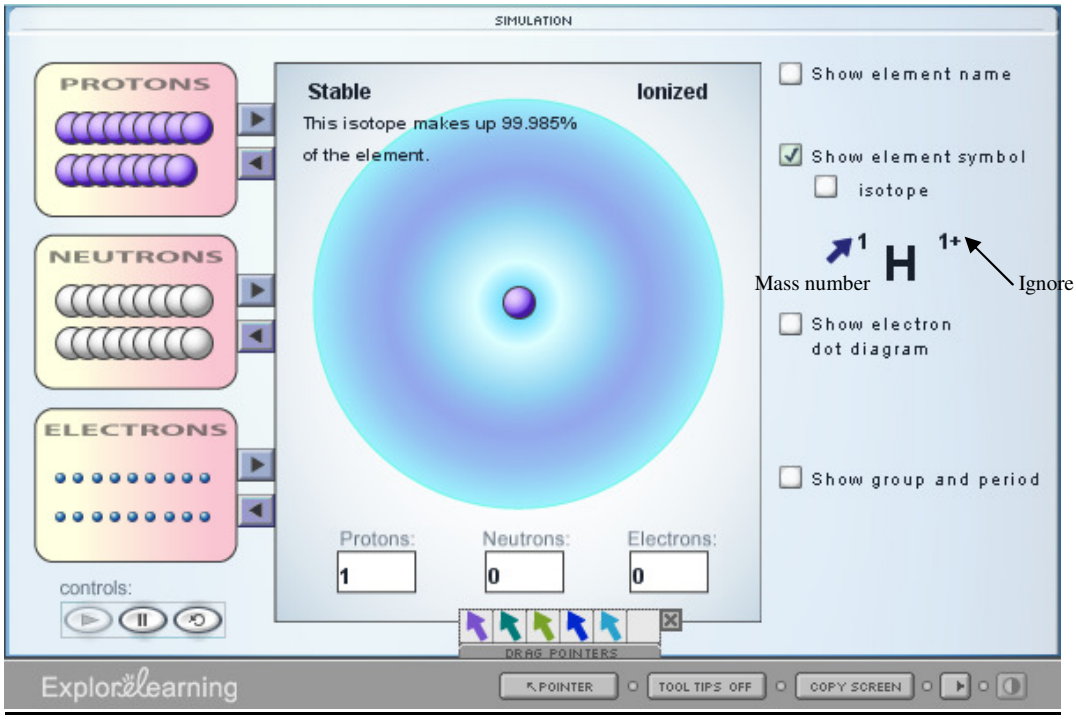

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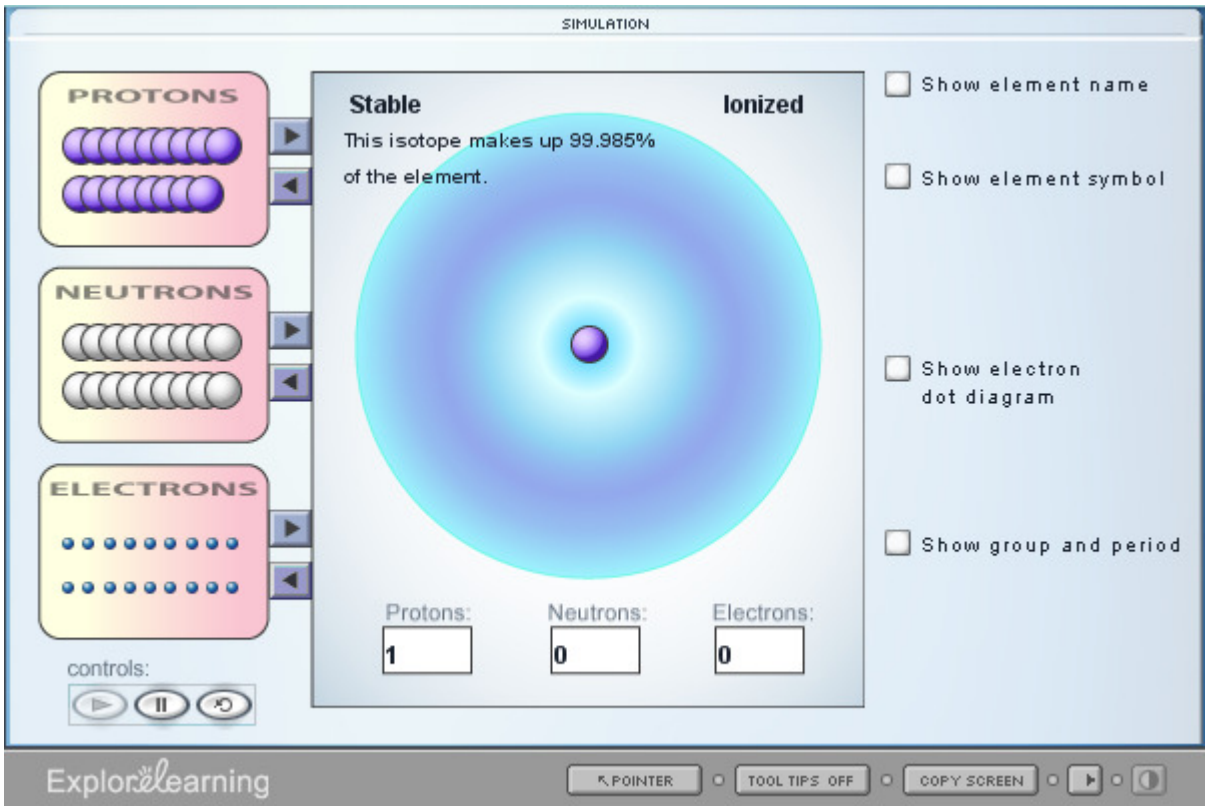

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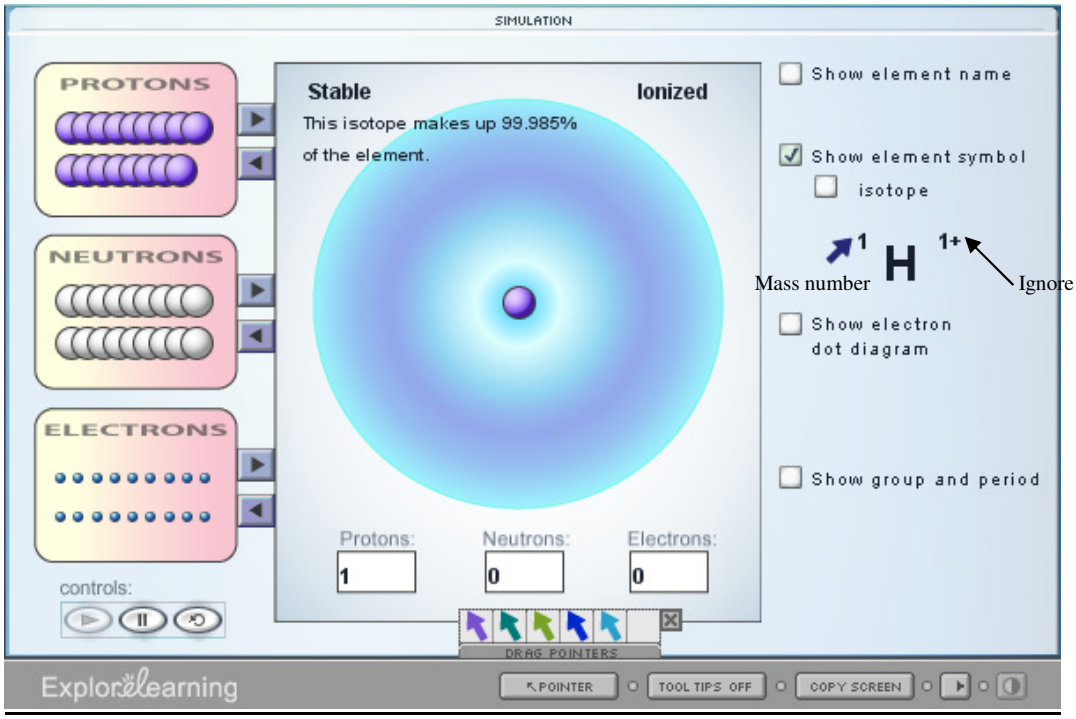

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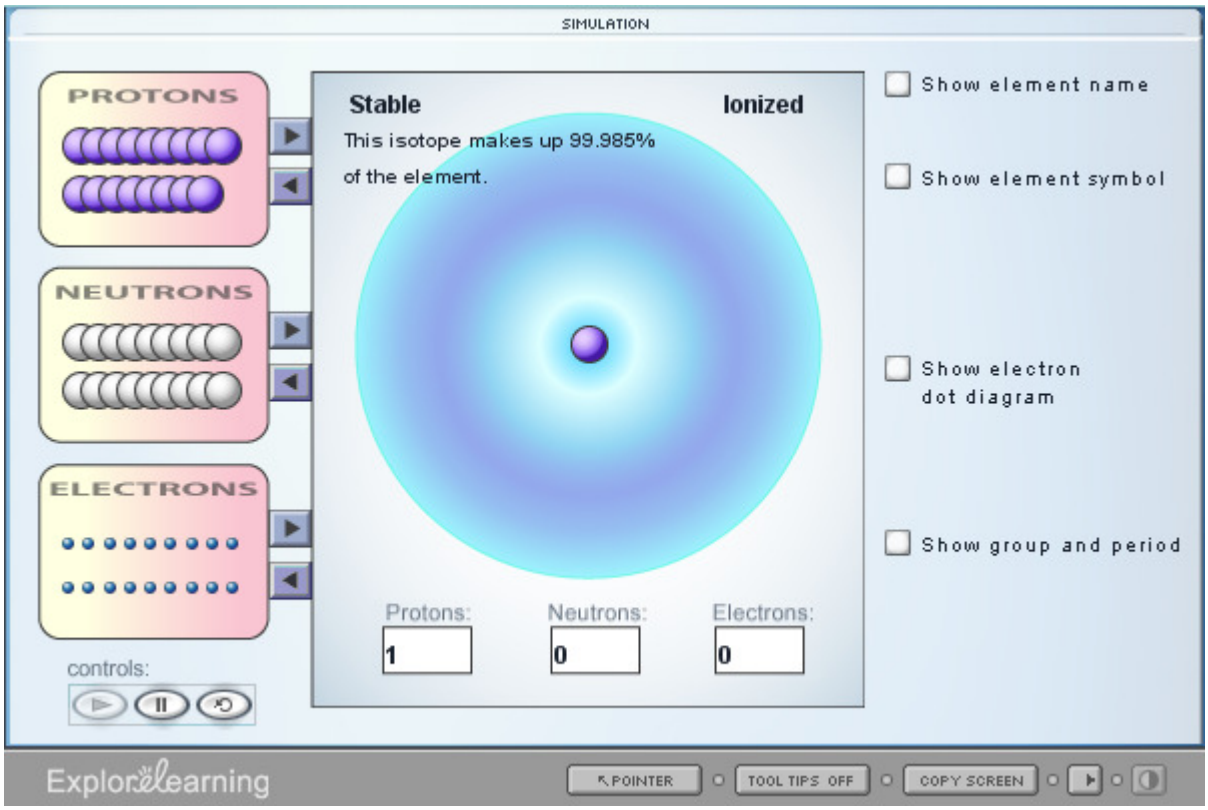

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Number of electrons	Name of element	Atomic Number from Periodic Table
2		
3		
1		

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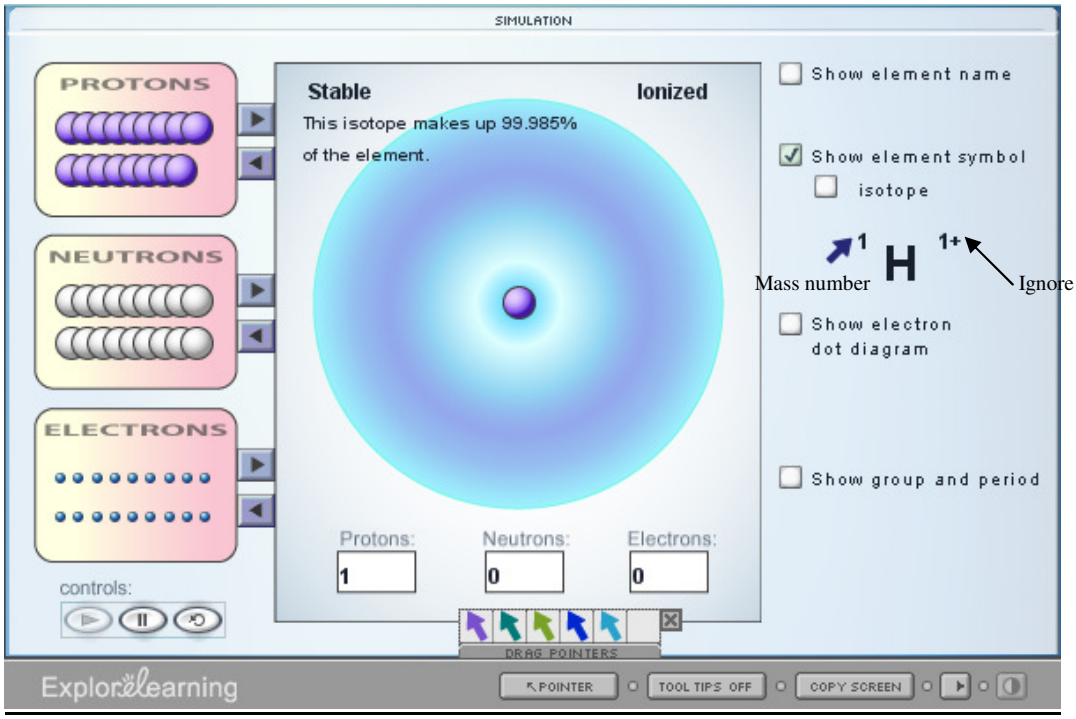

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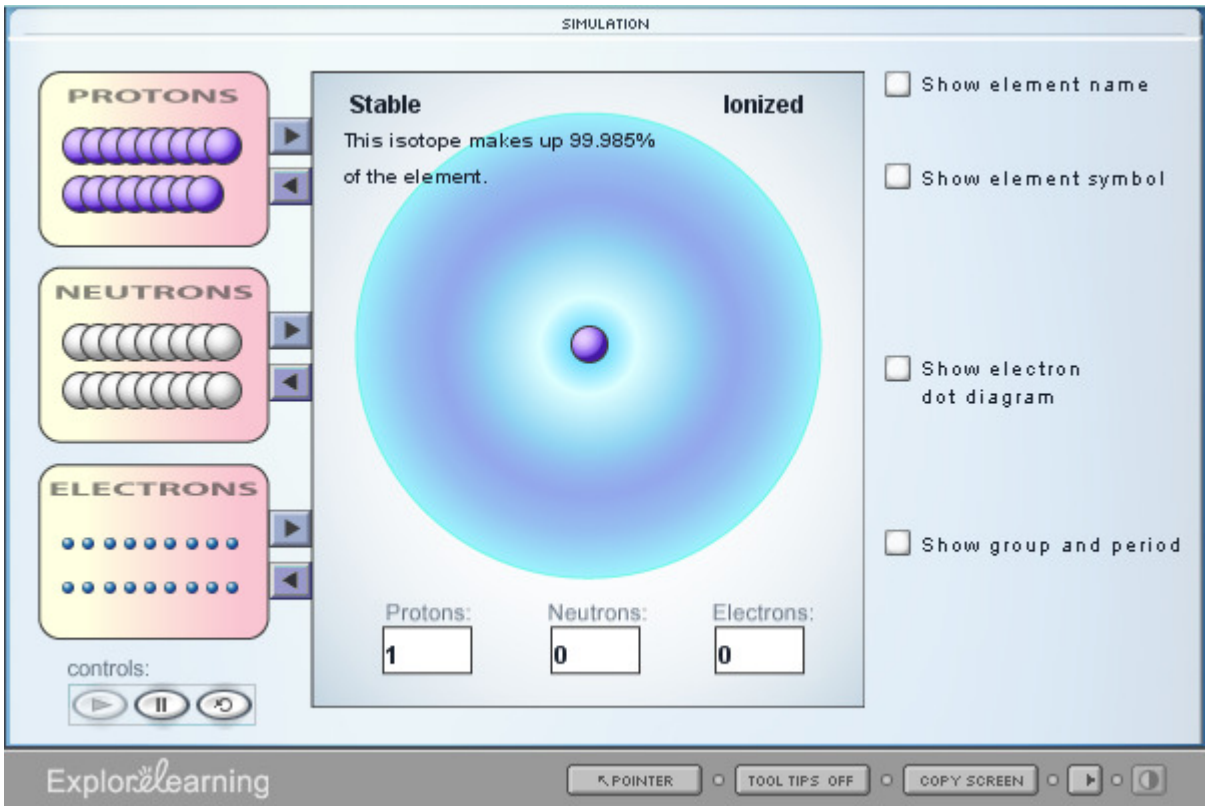

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3		
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Number of electrons	Name of element	Atomic Number from Periodic Table
2		
3		
1		

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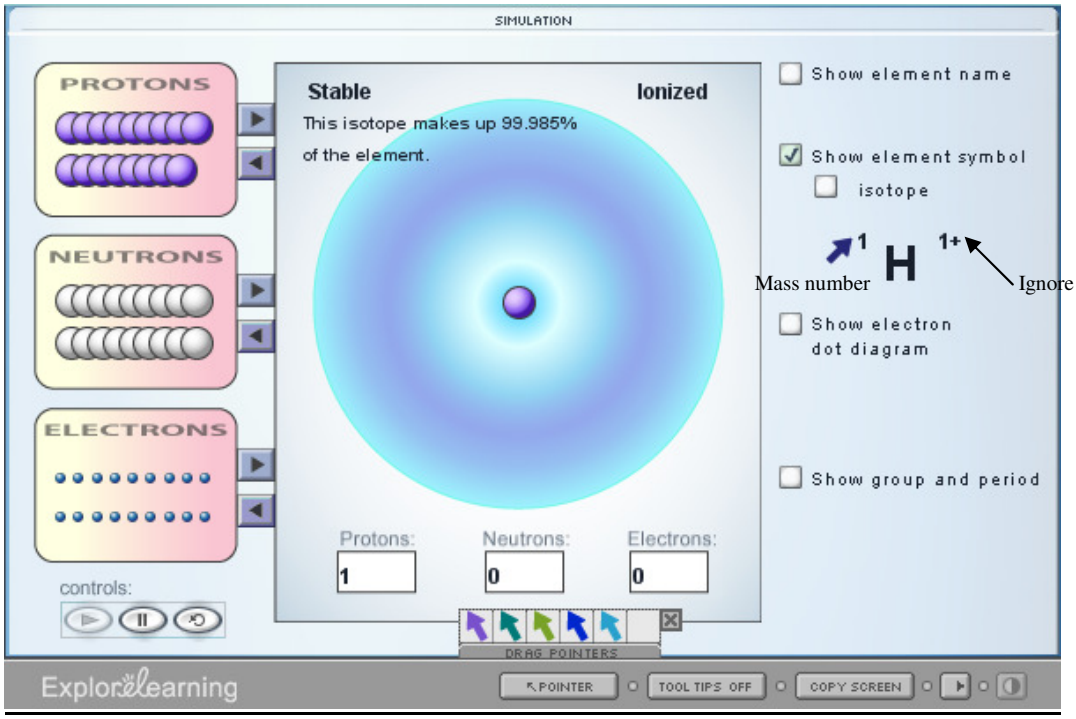

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Subatomic Particle Gizmo Name _____Sci # _____

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Once you log in, find the GIZMO named "Element Builder" Gizmo and select "Launch Gizmo."

Location of Subatomic Particles

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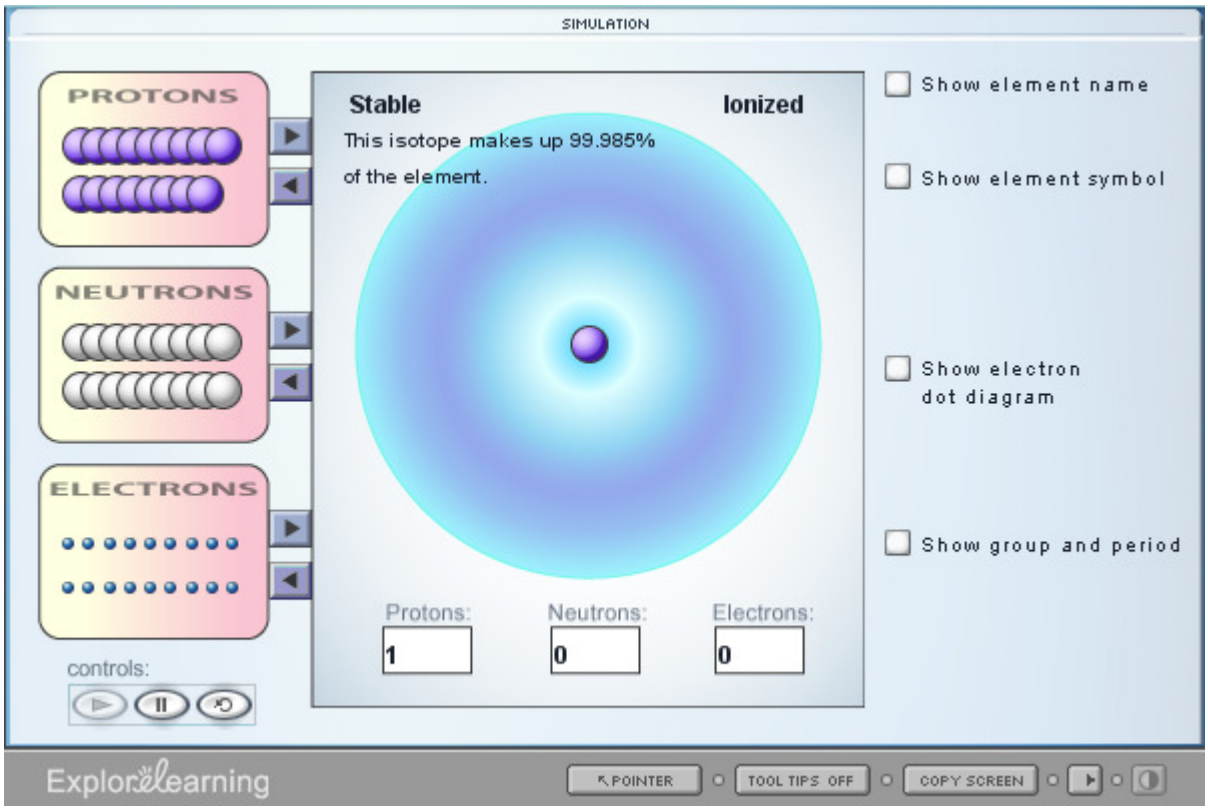

   a. Using the right arrows, add 1 proton, 2 neutrons, and 2 electrons to the atom so that there are 2 of each of the three particles located in the atom. Fill in the following chart.

Particle	Location
Proton	
Neutron	
Electron	

Identity of the Atom

2. Place a check in the "Show element name" box, which is in the top right portion of the gizmo. Manipulate the number of protons to achieve the number of protons in the data table. Do not worry about the number of neutrons or electrons. Experiment with adding one and removing one proton to and from the atom. Fill in the following table. Once you have the identity of the element, look at the periodic table and write down the atomic number for the element, this is the larger number located by the element symbol.

Number of protons	Name of element	Atomic Number from Periodic Table
2		
3		
1		

   a. **Does changing the number of protons change the identity of the element you have built?**

   b. **What is the relationship between the number of protons and the atomic number for an element?**

3. Now you will do the same thing as step 2 except you will be changing the number of neutrons. Make sure that you begin with 2 each for the protons, neutrons, and electrons. Add one neutron to the atom to place 3 neutrons in the atom. Record the name of the element and look at the periodic table to find the atomic number. Next, take 2 neutrons away (a total of 1 should now be in the atom.) Again record the name of the atom and the atomic number from the periodic table.

Number of neutrons	Name of element	Atomic Number from Periodic Table
2		
3		
1		

   a. **Does changing the number of neutrons change the identity of the element you have built?**

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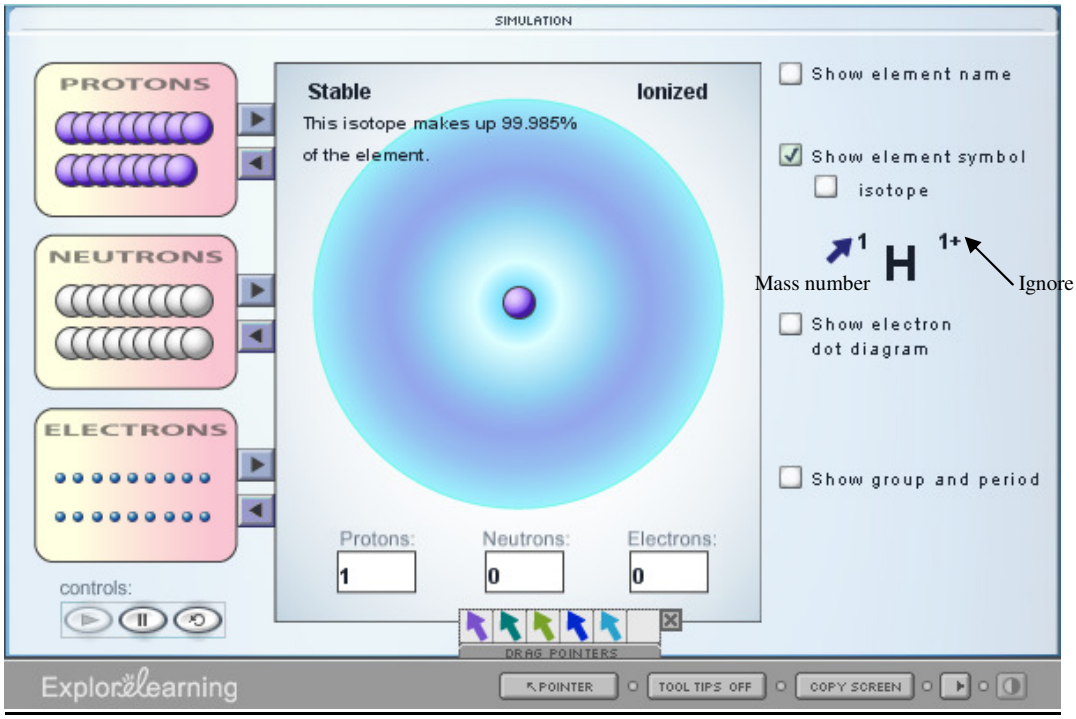
Number of electrons	Name of element	Atomic Number from Periodic Table
2		
3		
1		

a. Does changing the number of electrons change the identity of the element you have built?

KEY FACT: Now looking at questions 2a, 3a, and 4a, which subatomic particle is responsible for the identity of an atom?

Mass of an atom

5. Build an atom again with exactly 2 protons, 2 neutrons, and 2 electrons. Check "Show element symbol." Be sure "isotope" is not selected. Make adjustments to the atom to attain the number of protons, neutrons, and electrons as shown in the data table. Then finish filling in the table. ***The number to the upper left of the symbol indicates the mass of the atom.*** (See where the pointer is pointing in the screen shot.)



Number of protons	Number of neutrons	Number of electrons	Identity of atom (give name)	Mass of atom
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3	2	2		
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a. Does the proton affect the mass of an atom? You MUST EXPLAIN by referring to an example or data from above .

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5. Which 2 subatomic particles affect the mass of an atom?

KEY FACT: Write a mathematical formula to show the relationship between the number of protons, the number of neutrons, and the mass number for an atom.

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- How many protons are in the nucleus of an atom of Carbon (C)? _____
- What is the formula for finding the mass number of an atom? _____
- If an atom of C has 7 neutrons in the nucleus, then it would have a mass number of _____ (see previous 2 questions).
- How many electrons would be found in the nucleus? _____

Subatomic Particle Gizmo Name _____Sci # _____

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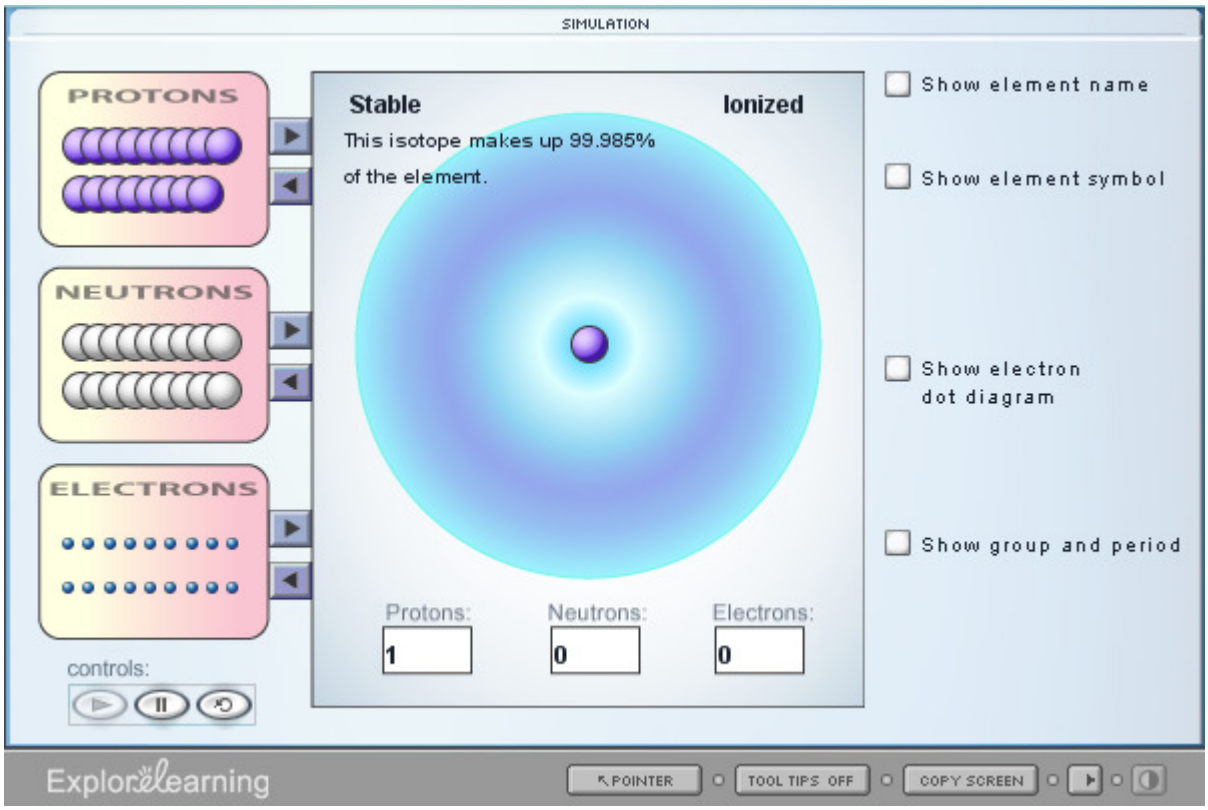

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Particle	Location
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Identity of the Atom

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3		
1		

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3		
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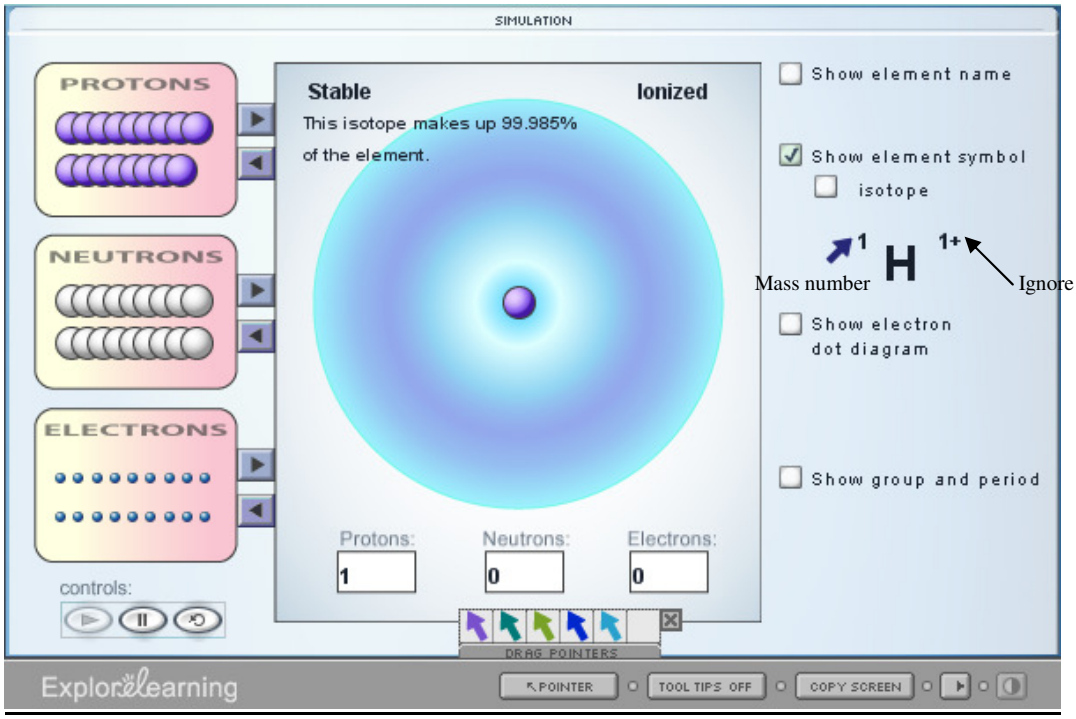

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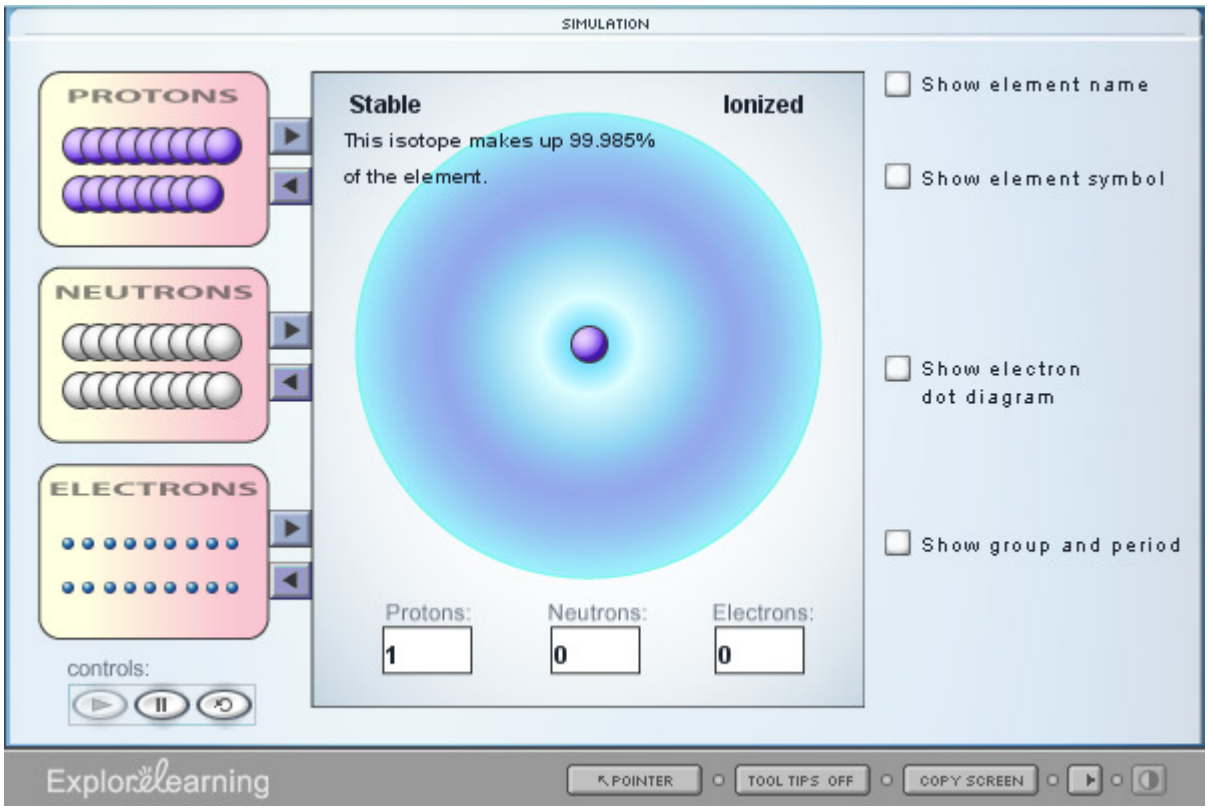

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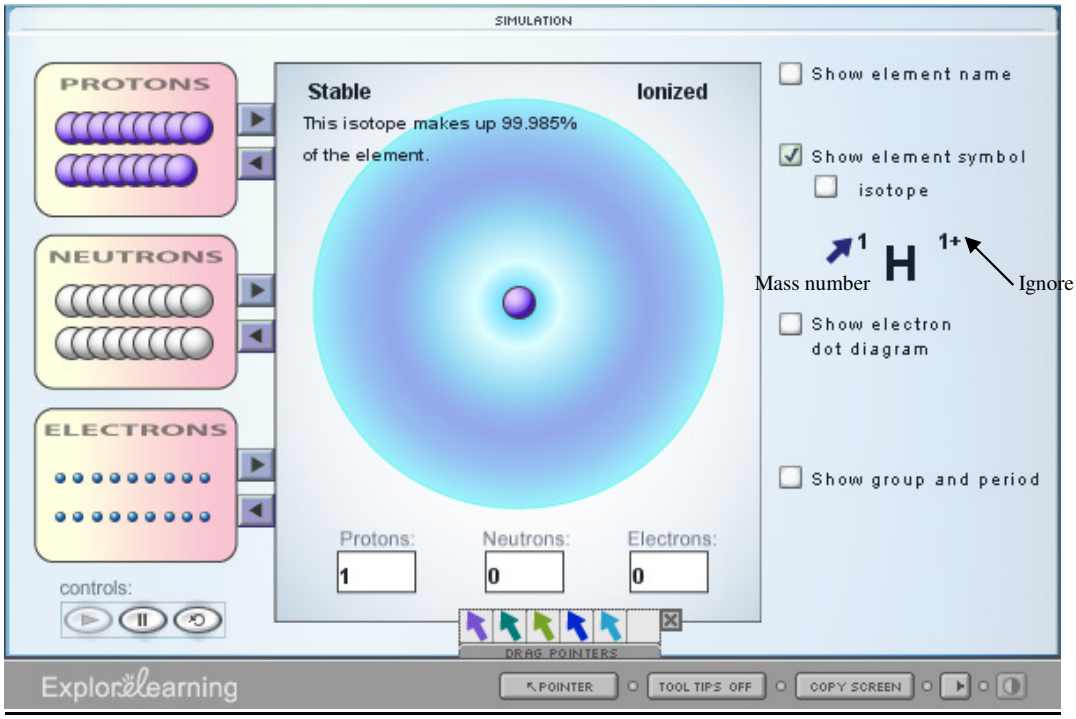

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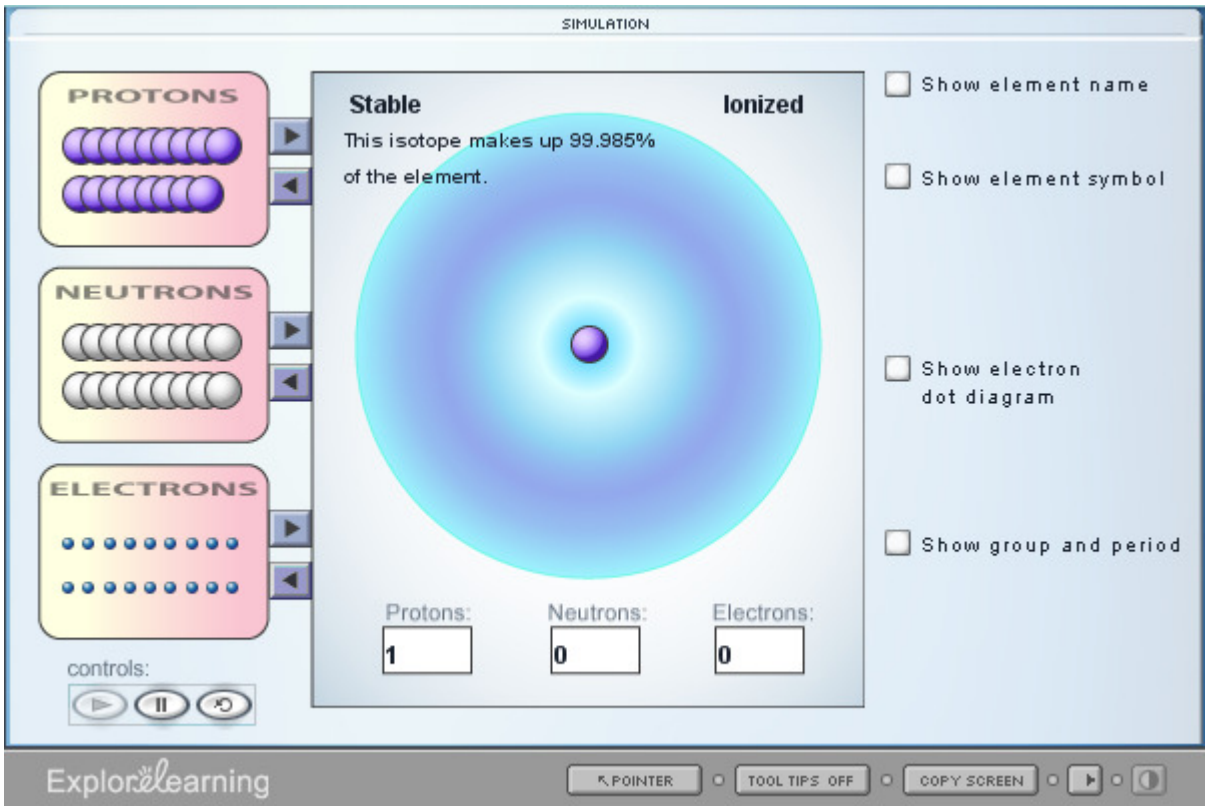

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Number of electrons	Name of element	Atomic Number from Periodic Table
2		
3		
1		

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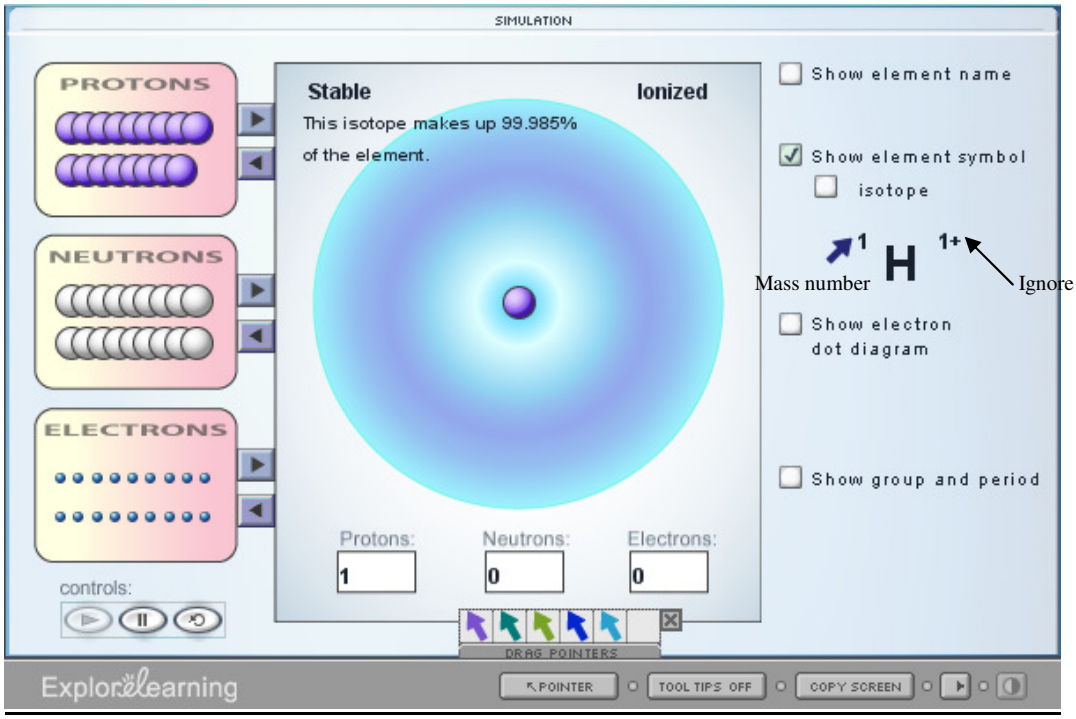

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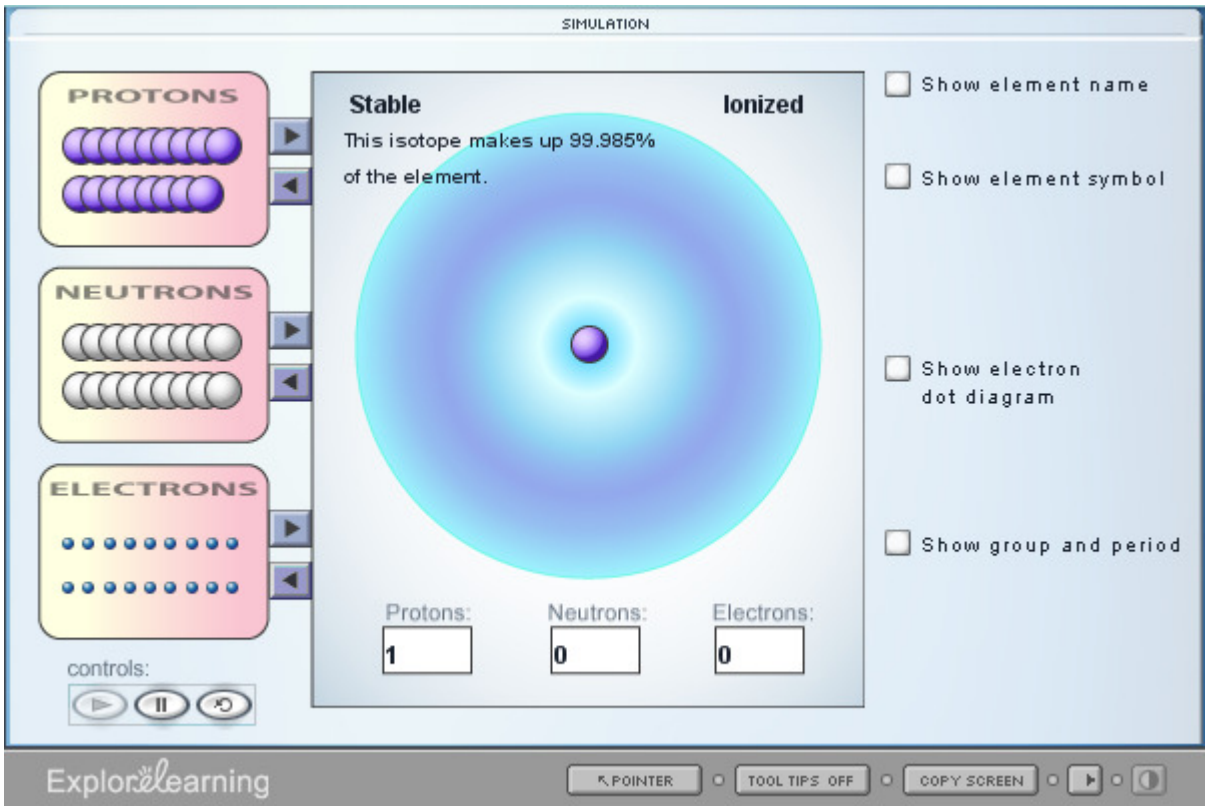

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2		
3		
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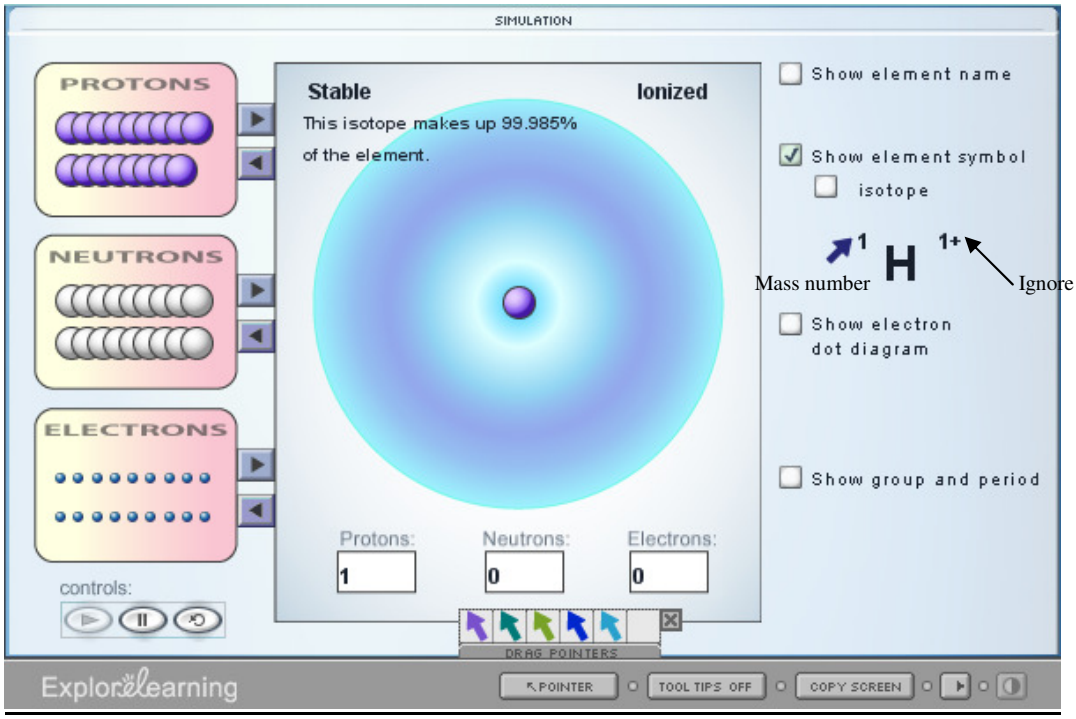

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Subatomic Particle Gizmo Name _____Sci # _____

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Once you log in, find the GIZMO named "Element Builder" Gizmo and select "Launch Gizmo."

Location of Subatomic Particles

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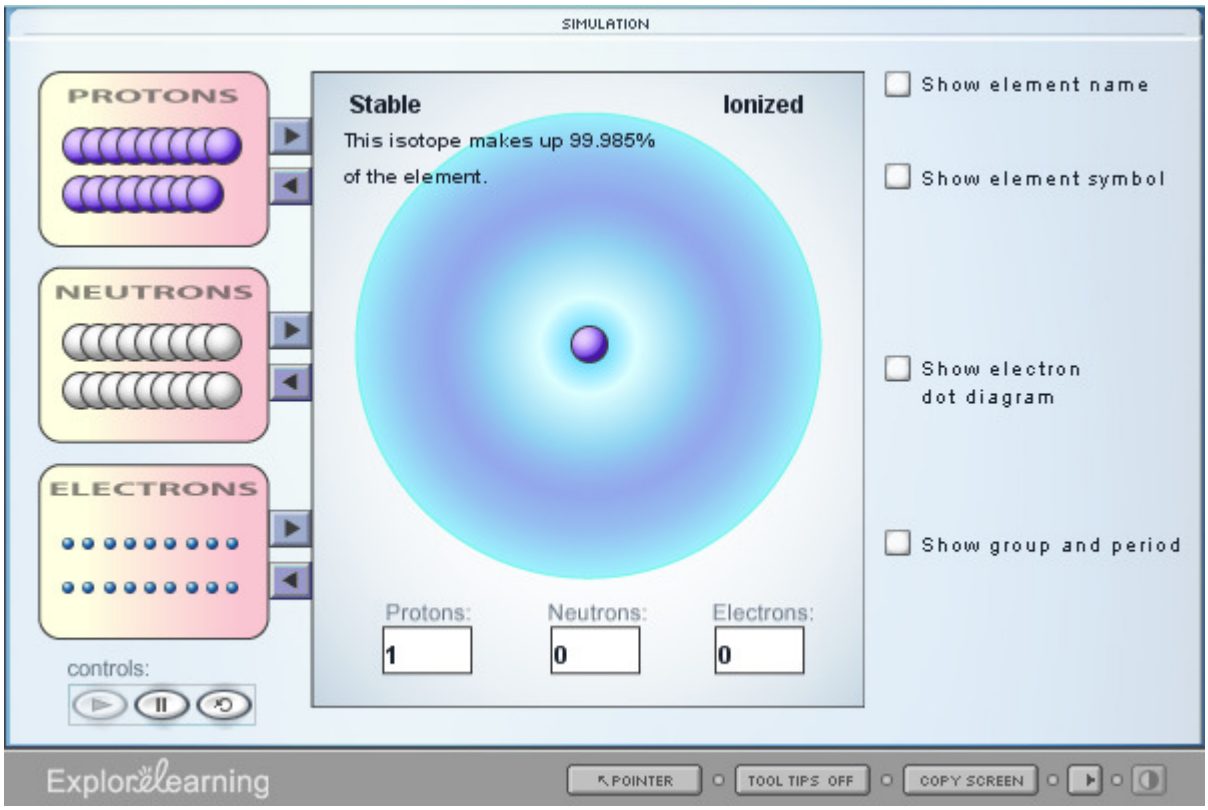

   a. Using the right arrows, add 1 proton, 2 neutrons, and 2 electrons to the atom so that there are 2 of each of the three particles located in the atom. Fill in the following chart.

Particle	Location
Proton	
Neutron	
Electron	

Identity of the Atom

2. Place a check in the "Show element name" box, which is in the top right portion of the gizmo. Manipulate the number of protons to achieve the number of protons in the data table. Do not worry about the number of neutrons or electrons. Experiment with adding one and removing one proton to and from the atom. Fill in the following table. Once you have the identity of the element, look at the periodic table and write down the atomic number for the element, this is the larger number located by the element symbol.

Number of protons	Name of element	Atomic Number from Periodic Table
2		
3		
1		

   a. **Does changing the number of protons change the identity of the element you have built?**

   b. **What is the relationship between the number of protons and the atomic number for an element?**

3. Now you will do the same thing as step 2 except you will be changing the number of neutrons. Make sure that you begin with 2 each for the protons, neutrons, and electrons. Add one neutron to the atom to place 3 neutrons in the atom. Record the name of the element and look at the periodic table to find the atomic number. Next, take 2 neutrons away (a total of 1 should now be in the atom.) Again record the name of the atom and the atomic number from the periodic table.

Number of neutrons	Name of element	Atomic Number from Periodic Table
2		
3		
1		

   a. **Does changing the number of neutrons change the identity of the element you have built?**

   b. **Does changing the number of neutrons change the affect the atomic number?**

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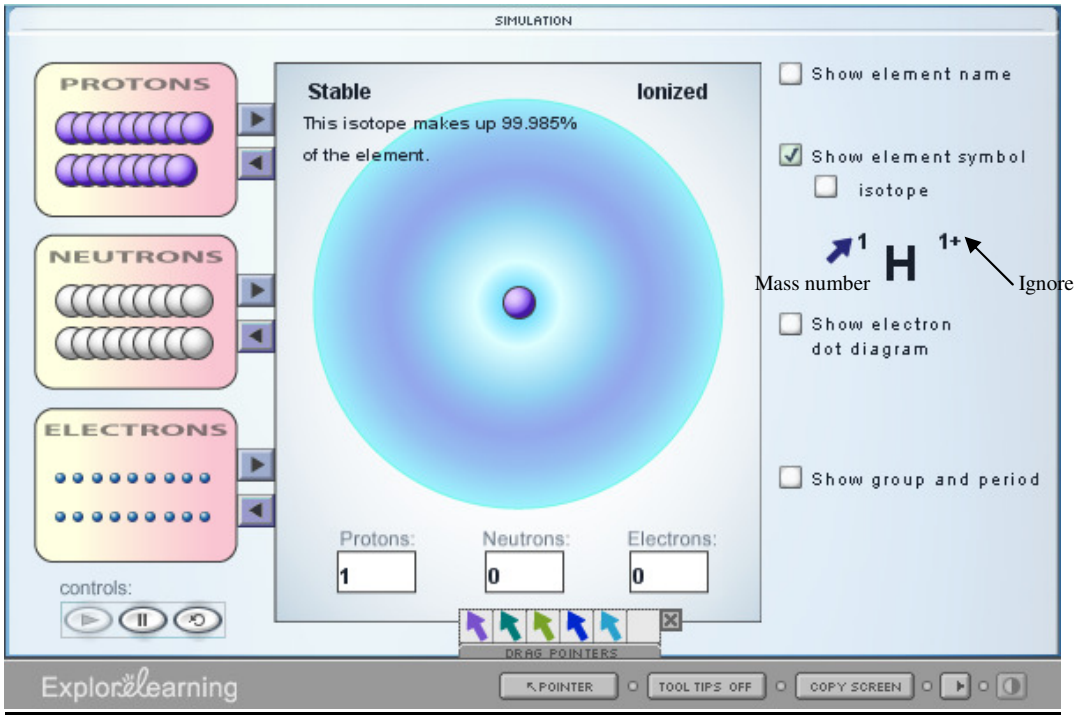
Number of electrons	Name of element	Atomic Number from Periodic Table
2		
3		
1		

a. Does changing the number of electrons change the identity of the element you have built?

KEY FACT: Now looking at questions 2a, 3a, and 4a, which subatomic particle is responsible for the identity of an atom?

Mass of an atom

5. Build an atom again with exactly 2 protons, 2 neutrons, and 2 electrons. Check "Show element symbol." Be sure "isotope" is not selected. Make adjustments to the atom to attain the number of protons, neutrons, and electrons as shown in the data table. Then finish filling in the table. ***The number to the upper left of the symbol indicates the mass of the atom.*** (See where the pointer is pointing in the screen shot.)



Number of protons	Number of neutrons	Number of electrons	Identity of atom (give name)	Mass of atom
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3	2	2		
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a. Does the proton affect the mass of an atom? You MUST EXPLAIN by referring to an example or data from above .

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5. Which 2 subatomic particles affect the mass of an atom?

KEY FACT: Write a mathematical formula to show the relationship between the number of protons, the number of neutrons, and the mass number for an atom.

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- How many protons are in the nucleus of an atom of Carbon (C)? _____
- What is the formula for finding the mass number of an atom? _____
- If an atom of C has 7 neutrons in the nucleus, then it would have a mass number of _____ (see previous 2 questions).
- How many electrons would be found in the nucleus? _____

Subatomic Particle Gizmo Name _____Sci # _____

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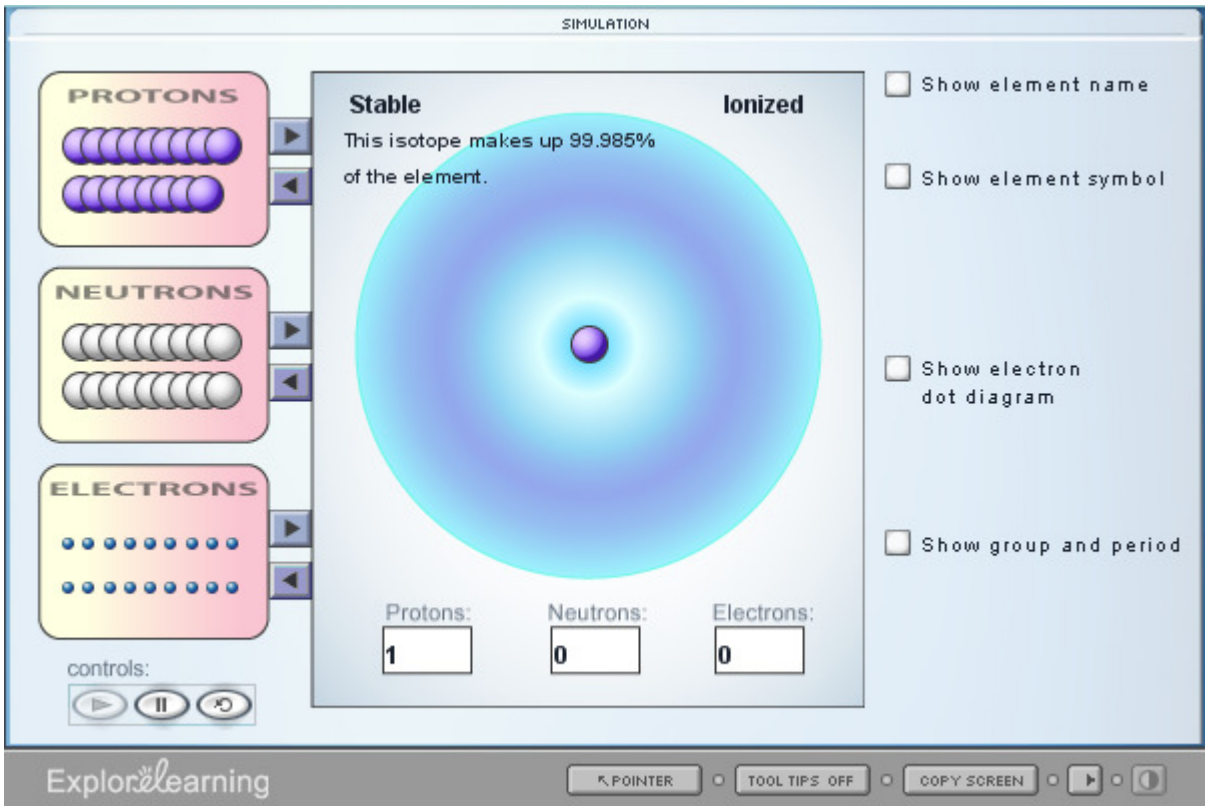

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Particle	Location
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Identity of the Atom

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3		
1		

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3		
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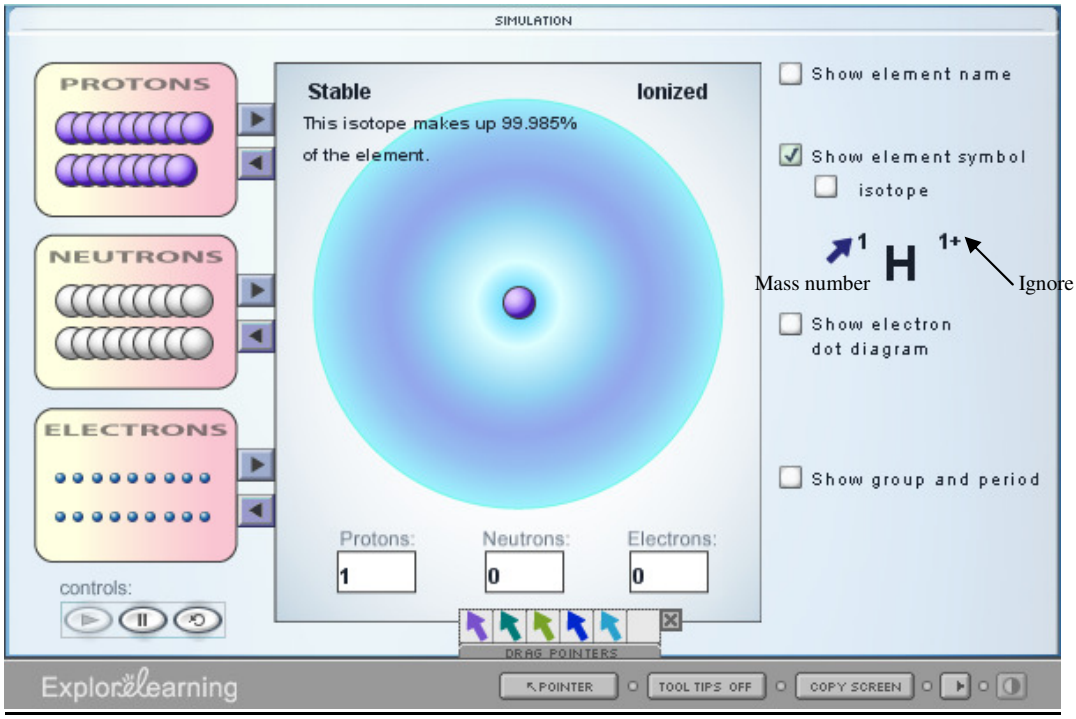

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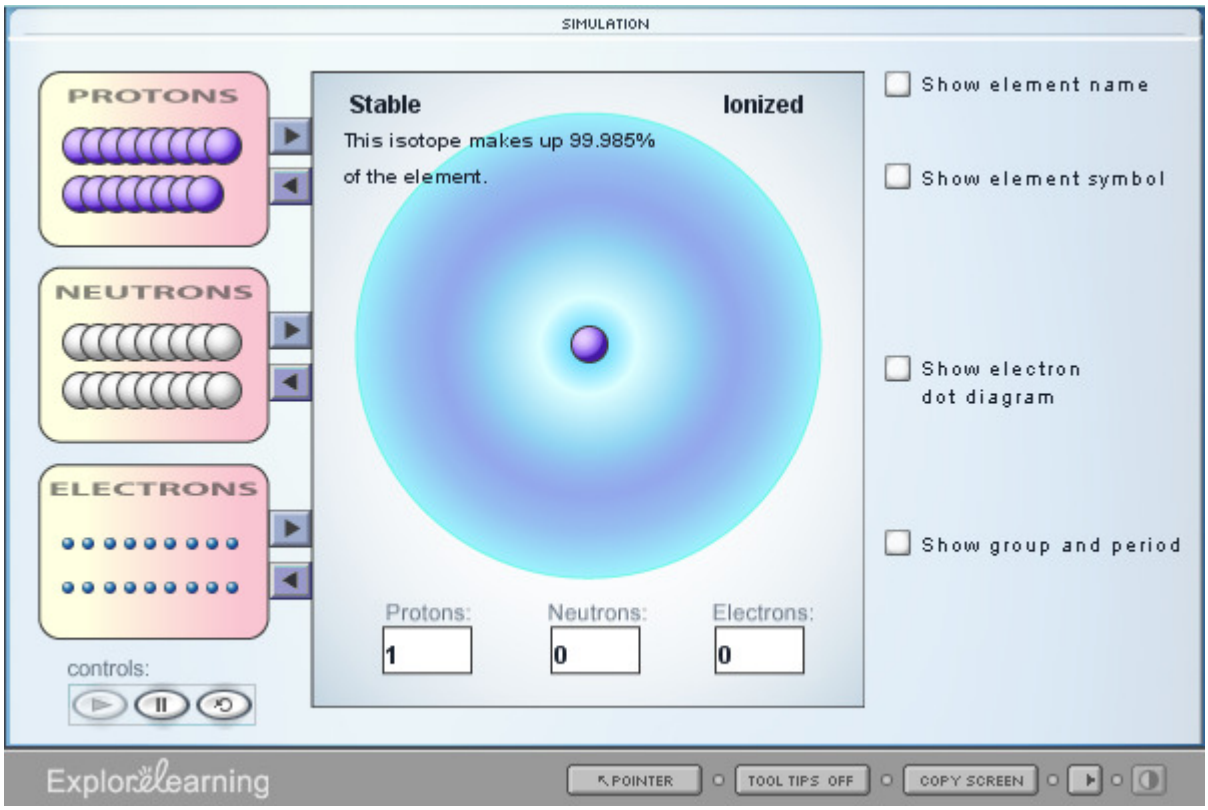

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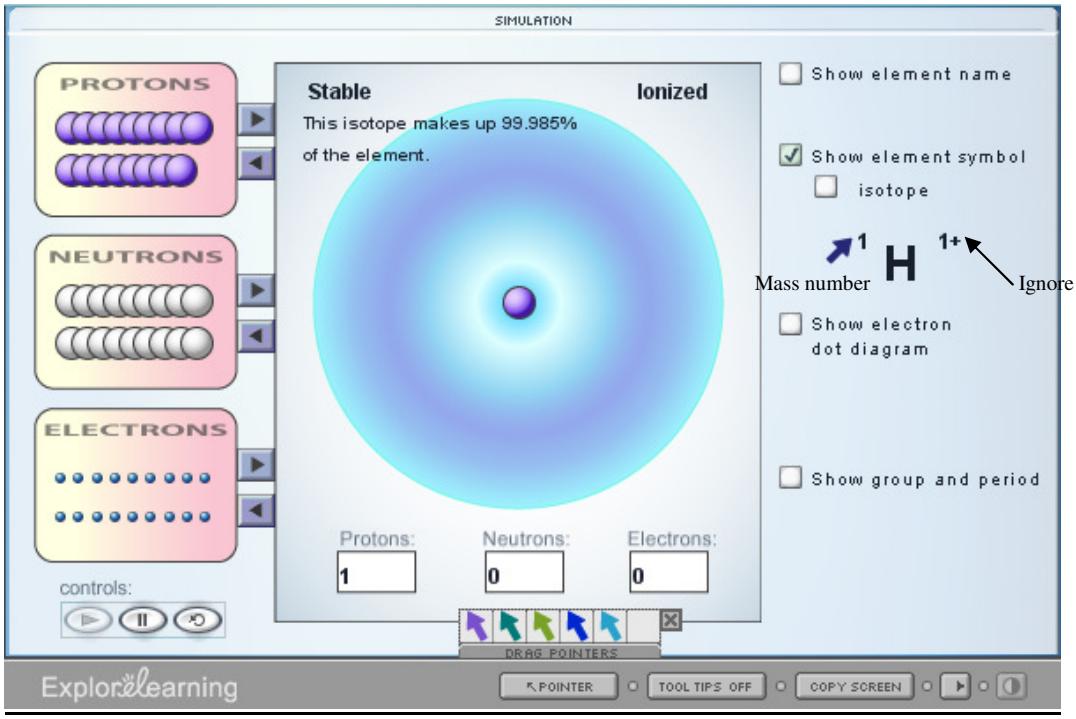

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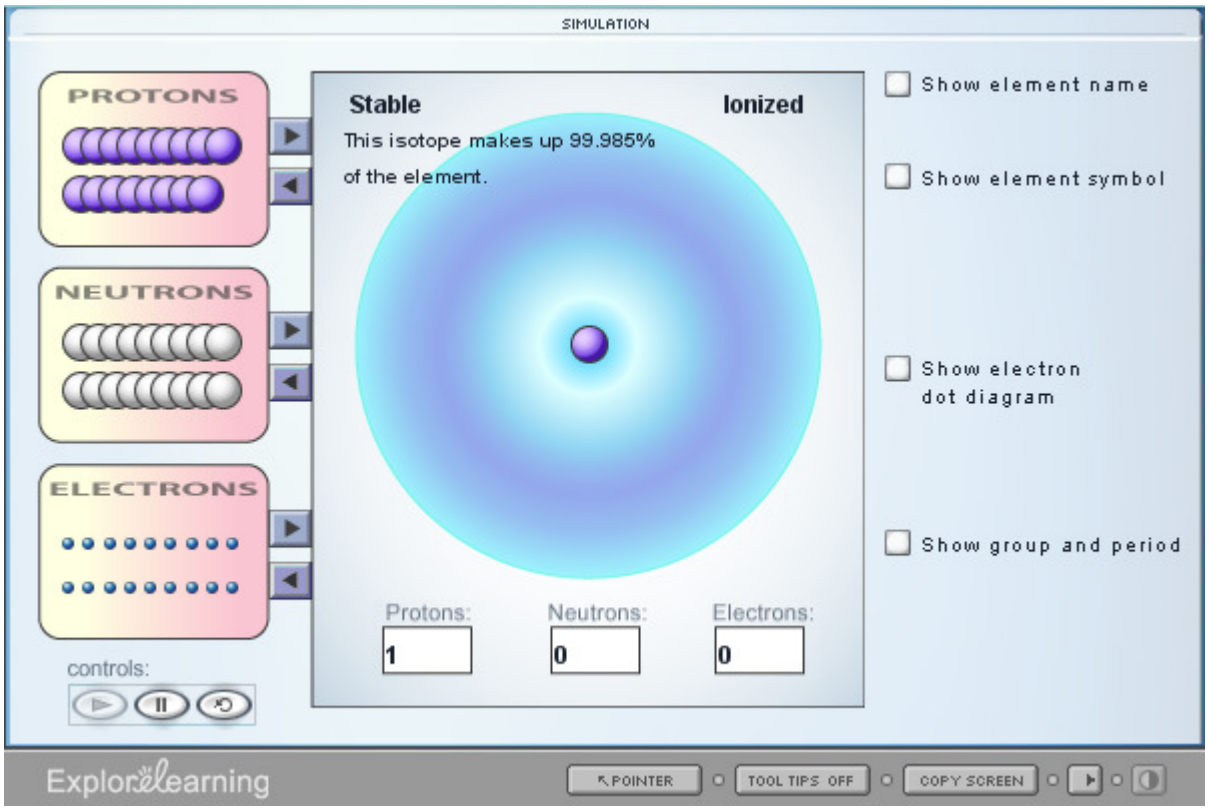

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Number of electrons	Name of element	Atomic Number from Periodic Table
2		
3		
1		

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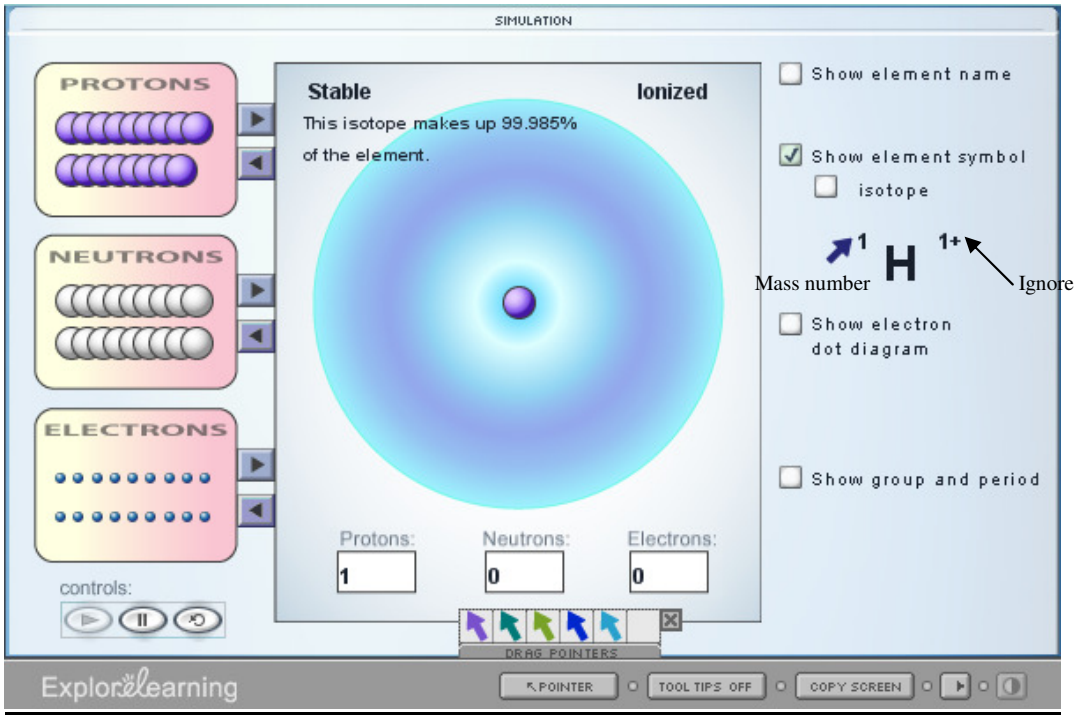

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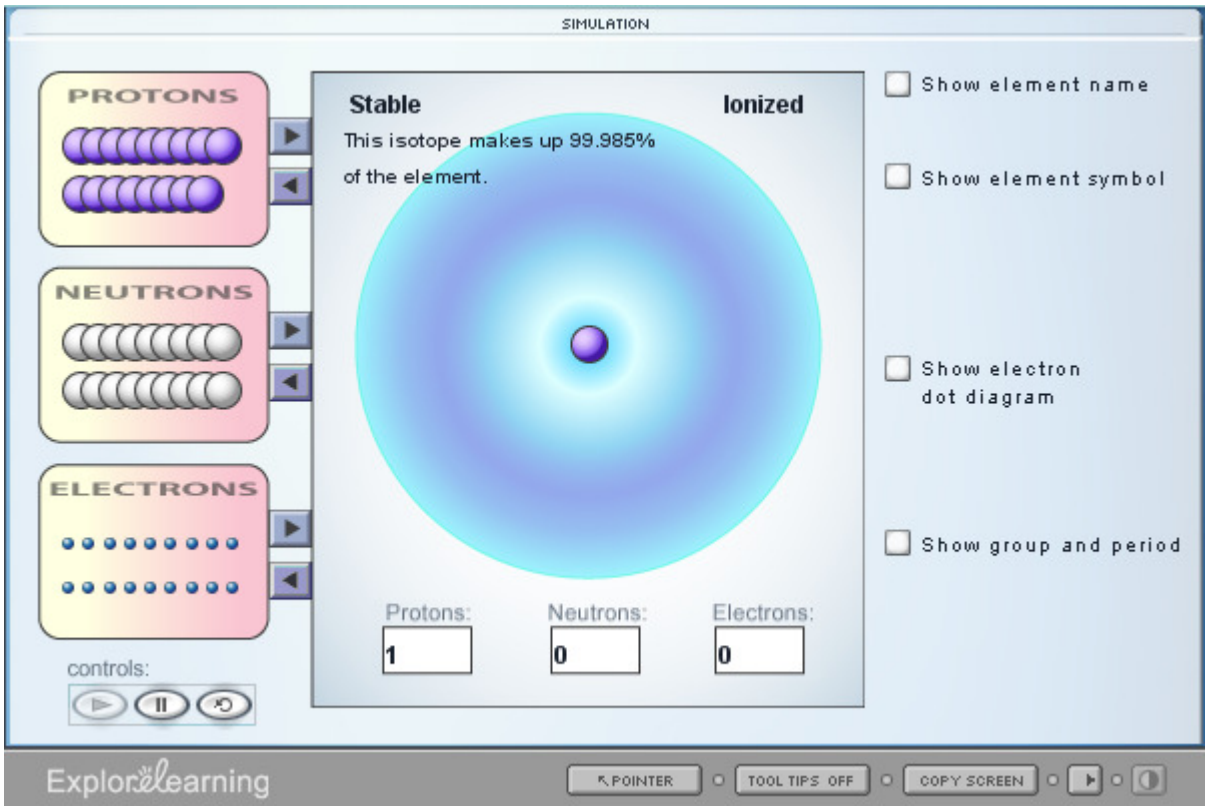

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3		
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2		
3		
1		

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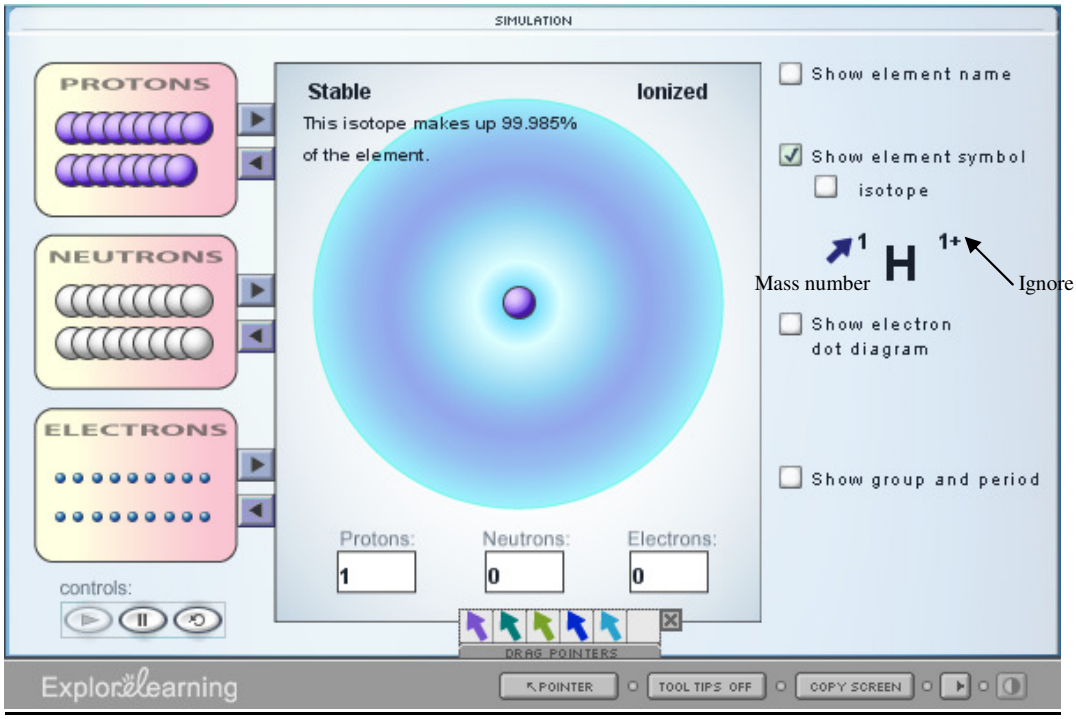

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Subatomic Particle Gizmo Name _____Sci # _____

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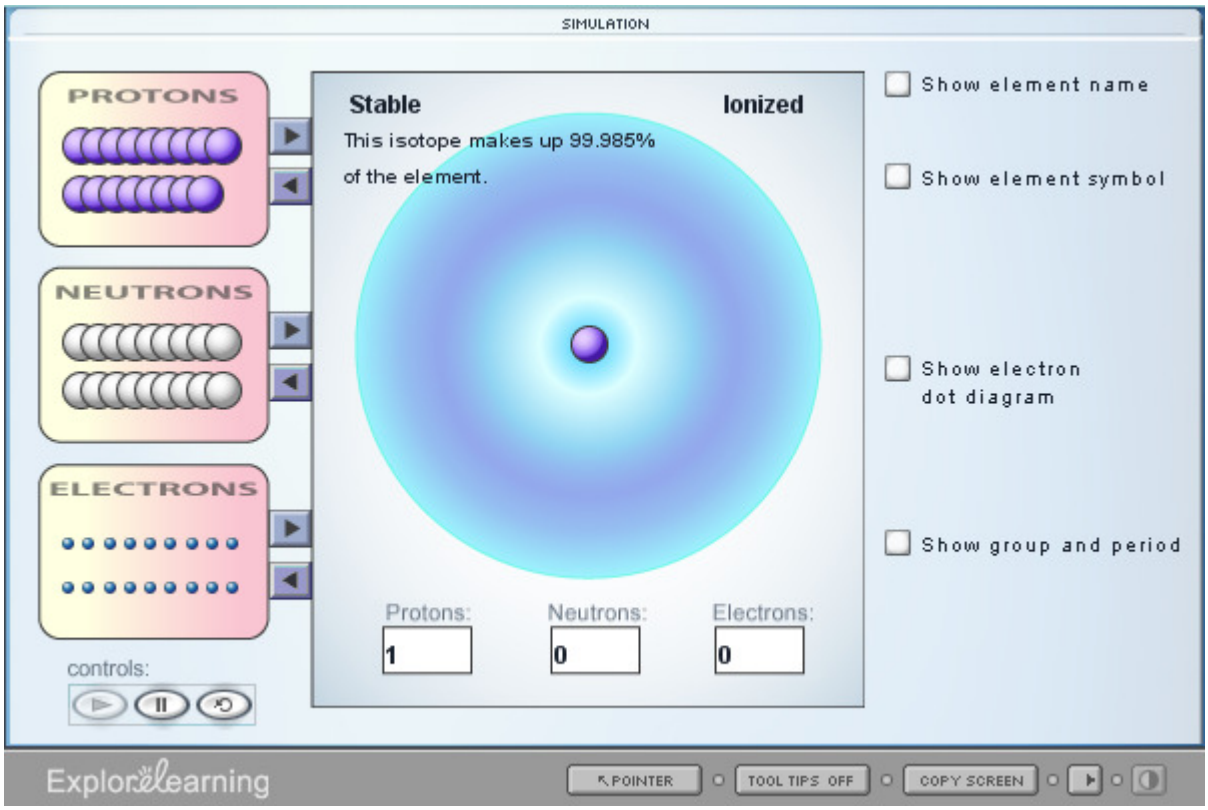
Once you log in, find the GIZMO named "Element Builder" Gizmo and select "Launch Gizmo."

Location of Subatomic Particles

1. In this Gizmo™, subatomic particles (protons, neutrons and electrons) can be added to an atom or removed from it by clicking the arrows next to each supply of particles. Remove any protons (the program will not let you remove the last proton), neutrons, or electrons that are currently in the atom by clicking the left arrows. You can also highlight the number with the cursor and change the numbers manually. Below is what the screen should look like when you begin. The center of the atom is the ***nucleus*** and the area around the nucleus is the ***electron cloud***.



   a. Using the right arrows, add 1 proton, 2 neutrons, and 2 electrons to the atom so that there are 2 of each of the three particles located in the atom. Fill in the following chart.

Particle	Location
Proton	
Neutron	
Electron	

Identity of the Atom

2. Place a check in the "Show element name" box, which is in the top right portion of the gizmo. Manipulate the number of protons to achieve the number of protons in the data table. Do not worry about the number of neutrons or electrons. Experiment with adding one and removing one proton to and from the atom. Fill in the following table. Once you have the identity of the element, look at the periodic table and write down the atomic number for the element, this is the larger number located by the element symbol.

Number of protons	Name of element	Atomic Number from Periodic Table
2		
3		
1		

   a. **Does changing the number of protons change the identity of the element you have built?**

   b. **What is the relationship between the number of protons and the atomic number for an element?**

3. Now you will do the same thing as step 2 except you will be changing the number of neutrons. Make sure that you begin with 2 each for the protons, neutrons, and electrons. Add one neutron to the atom to place 3 neutrons in the atom. Record the name of the element and look at the periodic table to find the atomic number. Next, take 2 neutrons away (a total of 1 should now be in the atom.) Again record the name of the atom and the atomic number from the periodic table.

Number of neutrons	Name of element	Atomic Number from Periodic Table
2		
3		
1		

   a. **Does changing the number of neutrons change the identity of the element you have built?**

   b. **Does changing the number of neutrons change the affect the atomic number?**

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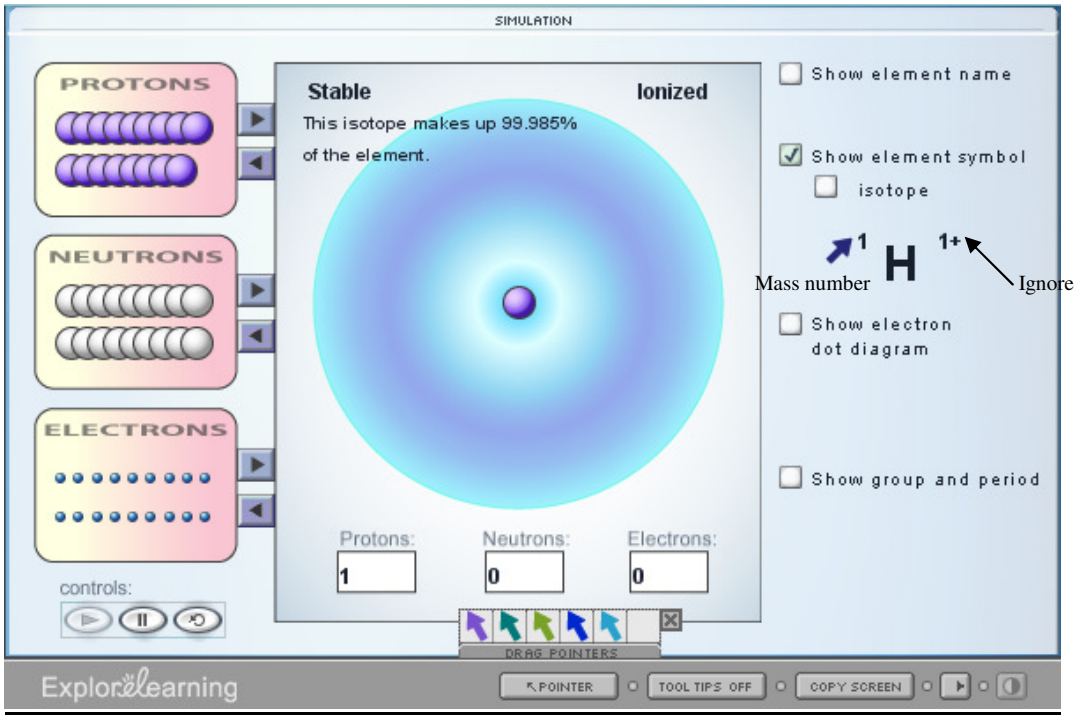
Number of electrons	Name of element	Atomic Number from Periodic Table
2		
3		
1		

a. Does changing the number of electrons change the identity of the element you have built?

KEY FACT: Now looking at questions 2a, 3a, and 4a, which subatomic particle is responsible for the identity of an atom?

Mass of an atom

5. Build an atom again with exactly 2 protons, 2 neutrons, and 2 electrons. Check "Show element symbol." Be sure "isotope" is not selected. Make adjustments to the atom to attain the number of protons, neutrons, and electrons as shown in the data table. Then finish filling in the table. ***The number to the upper left of the symbol indicates the mass of the atom.*** (See where the pointer is pointing in the screen shot.)



Number of protons	Number of neutrons	Number of electrons	Identity of atom (give name)	Mass of atom
2	2	2		
3	2	2		
2	3	2		
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a. Does the proton affect the mass of an atom? You MUST EXPLAIN by referring to an example or data from above .

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d. Looking at the atom in the Gizmo, where is most of the mass of an atom concentrated? Explain.

5. Which 2 subatomic particles affect the mass of an atom?

KEY FACT: Write a mathematical formula to show the relationship between the number of protons, the number of neutrons, and the mass number for an atom.

SUMMARY: Based on this gizmo, the number of protons equals the _____ _____ from the periodic table. The number of protons determines the _____ of an atom. The _____ and _____ determines the mass of an atom. The protons and neutrons are located in the _____ of an atom and electrons are in the _____ _____.

- How many protons are in the nucleus of an atom of Carbon (C)? _____
- What is the formula for finding the mass number of an atom? _____
- If an atom of C has 7 neutrons in the nucleus, then it would have a mass number of _____ (see previous 2 questions).
- How many electrons would be found in the nucleus? _____

Subatomic Particle Gizmo Name _____Sci # _____

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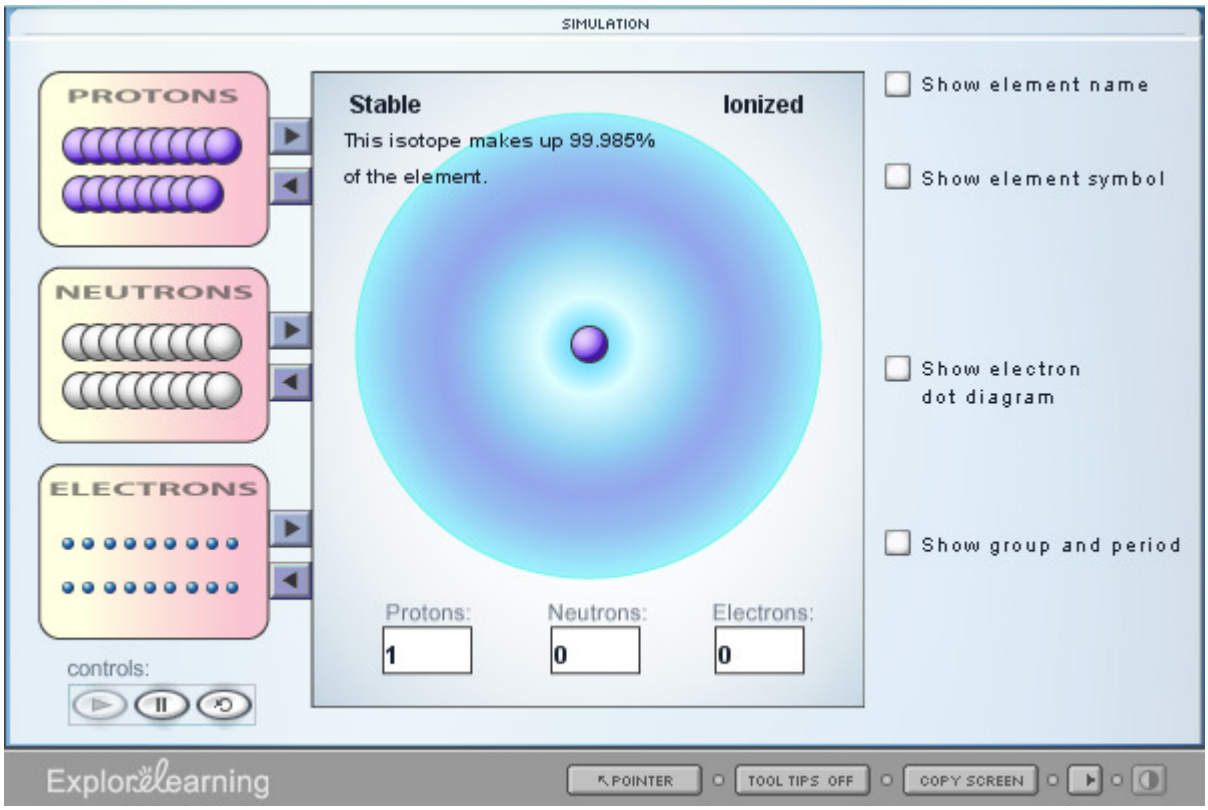

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Particle	Location
Proton	
Neutron	
Electron	

Identity of the Atom

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Number of neutrons	Name of element	Atomic Number from Periodic Table
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3		
1		

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Number of electrons	Name of element	Atomic Number from Periodic Table
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3		
1		

a. Does changing the number of electrons change the identity of the element you have built?

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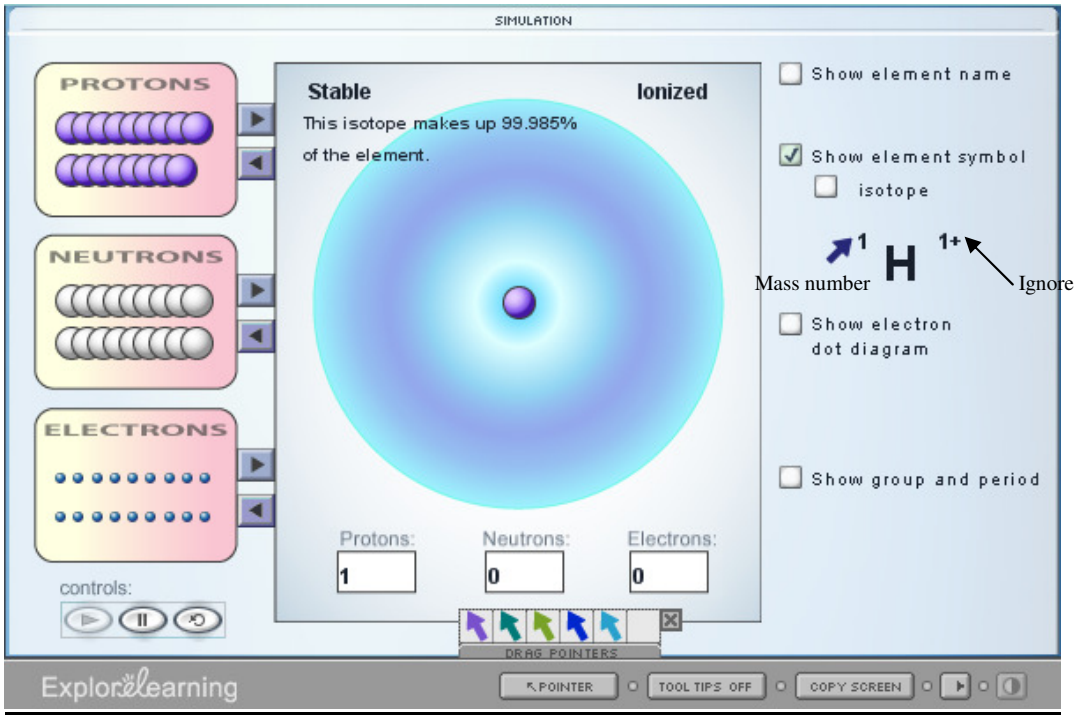
5. Build an atom again with exactly 2 protons, 2 neutrons, and 2 electrons. Check "Show element symbol." Be sure "isotope" is not selected. Make adjustments to the atom to attain the number of protons, neutrons, and electrons as shown in the data table. Then finish filling in the table. ***The number to the upper left of the symbol indicates the mass of the atom.*** (See where the pointer is pointing in the screen shot.)



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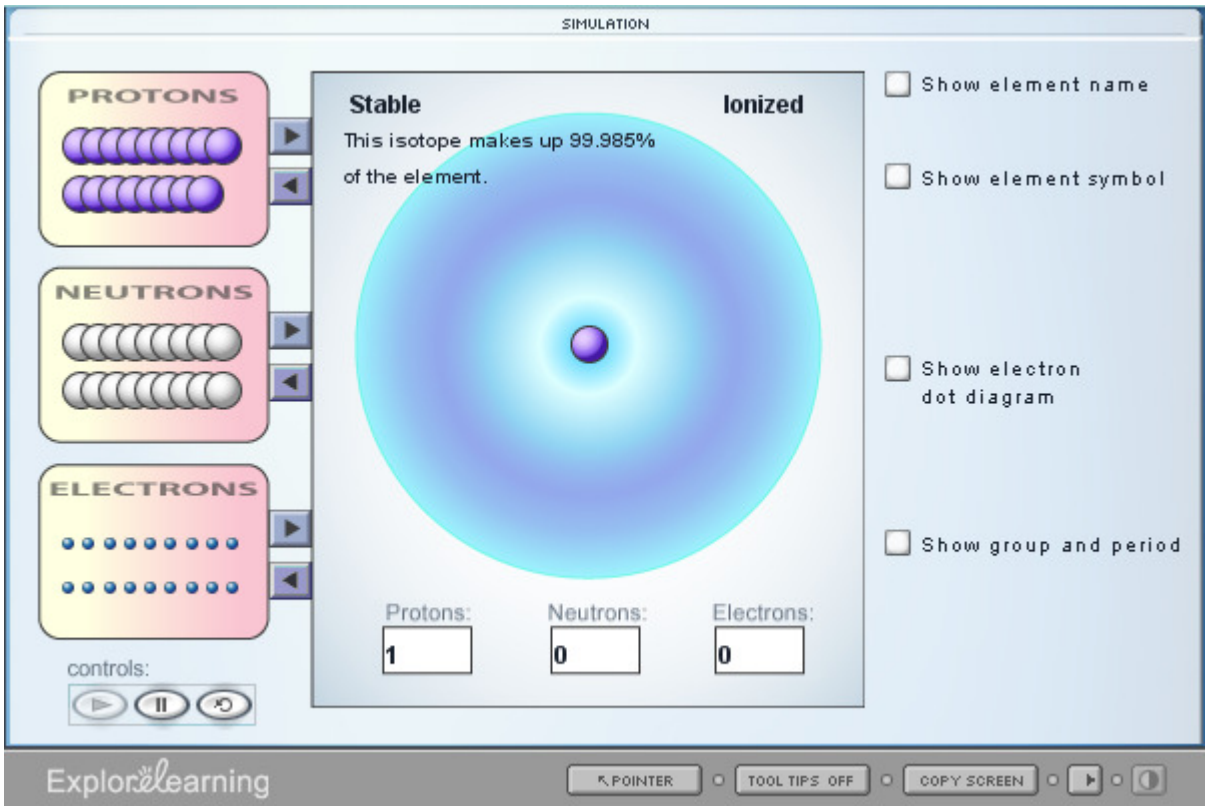

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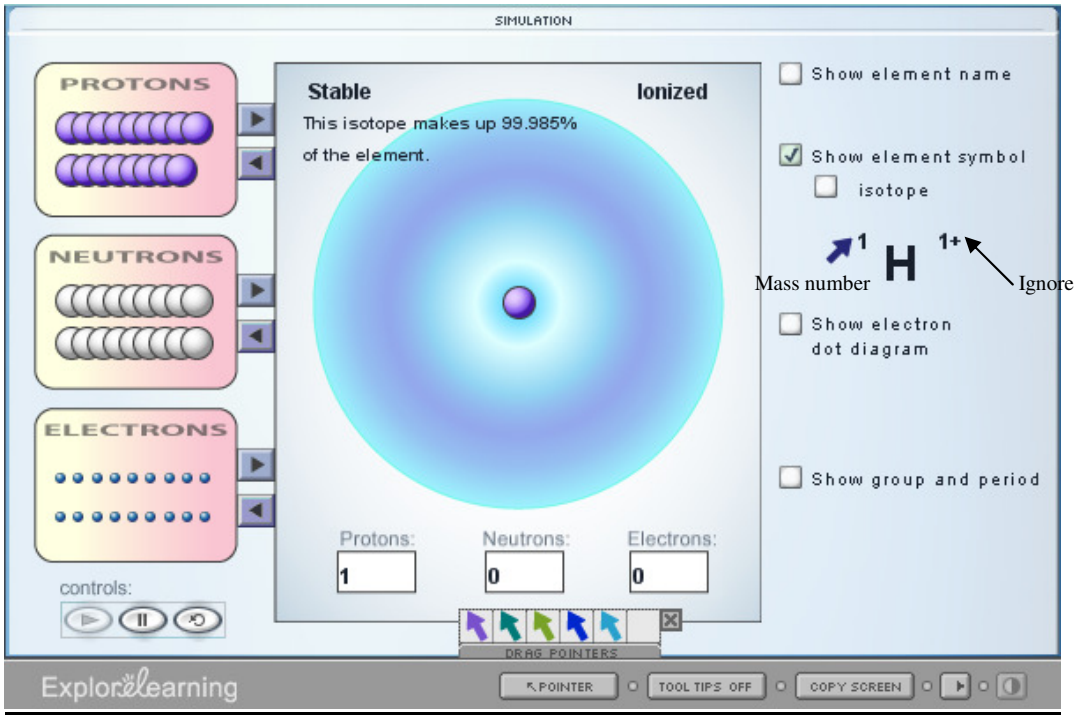

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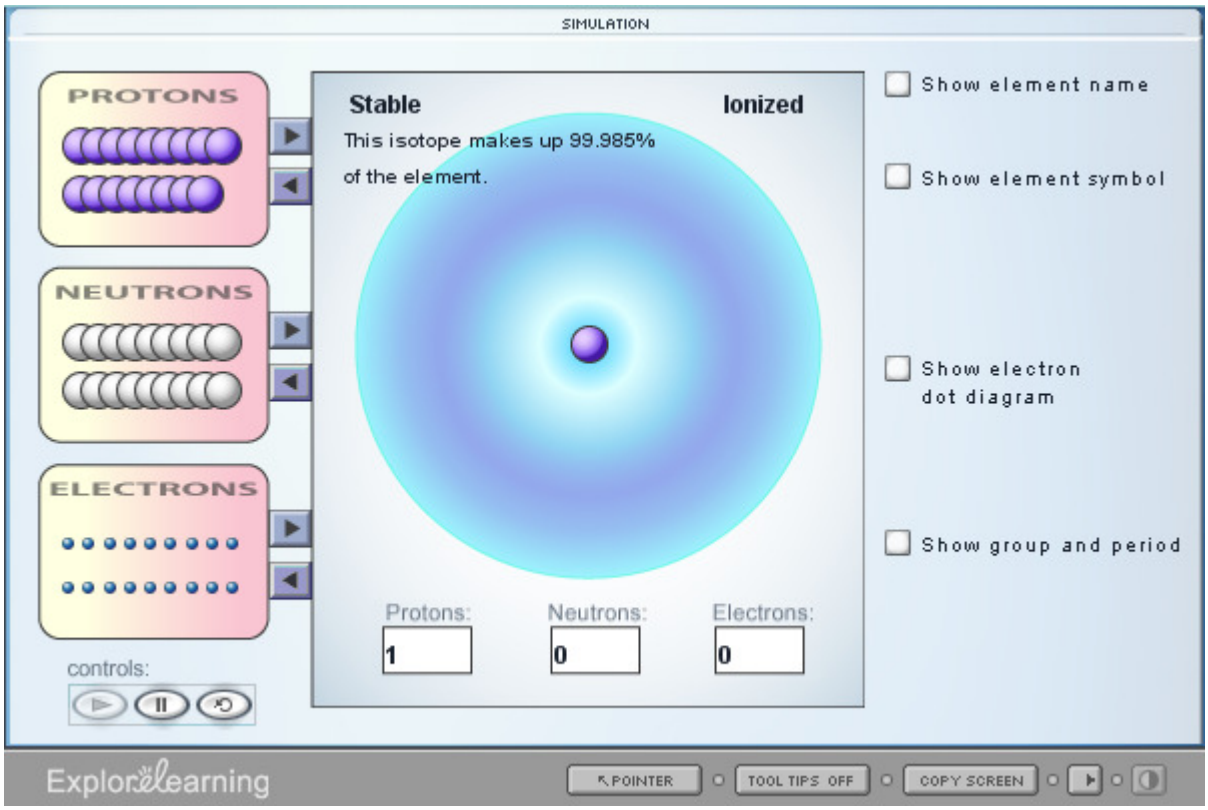

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Number of electrons	Name of element	Atomic Number from Periodic Table
2		
3		
1		

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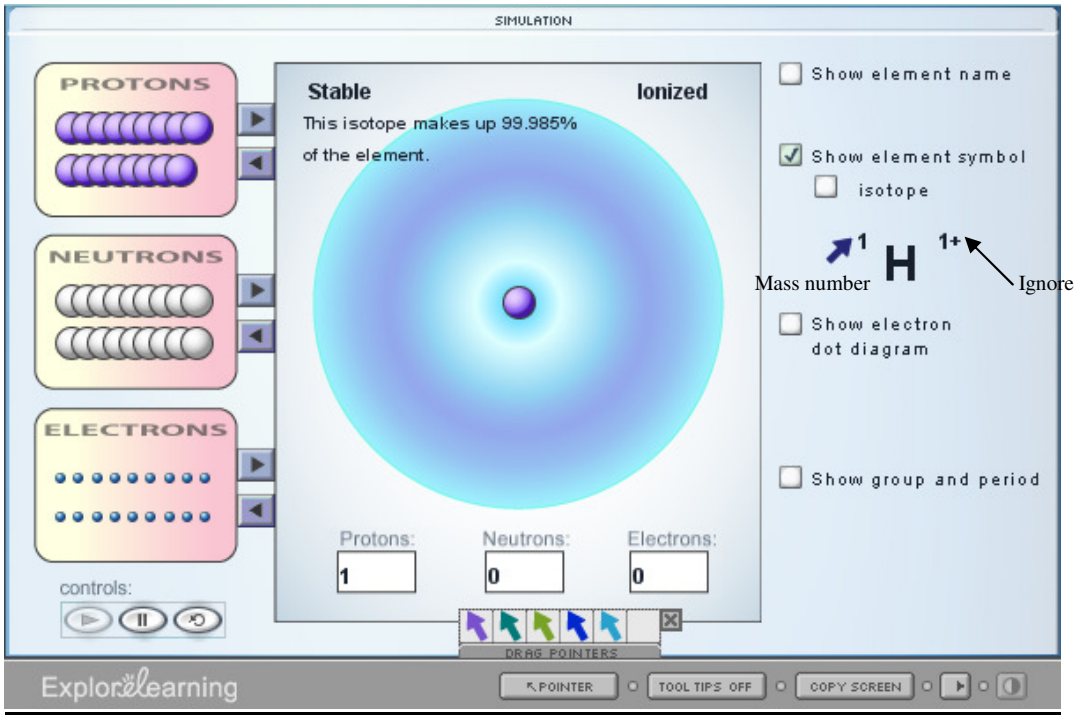

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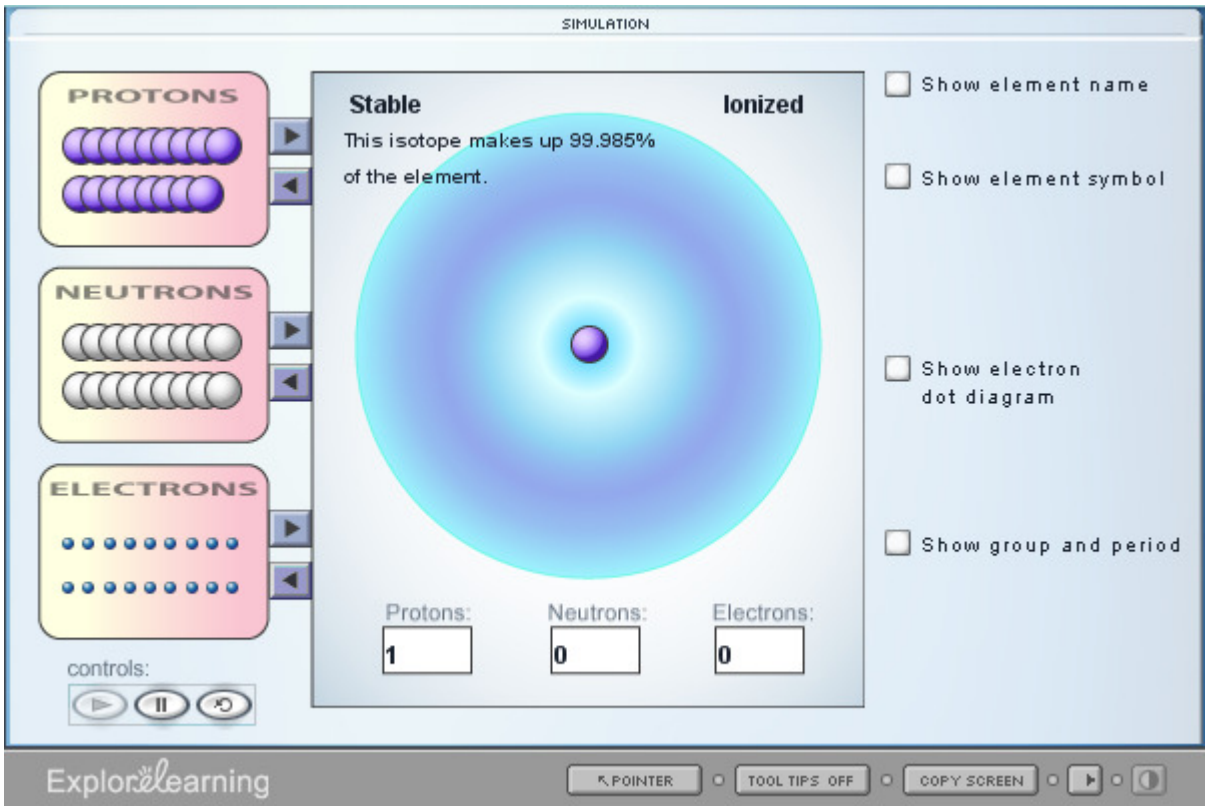

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1		

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2		
3		
1		

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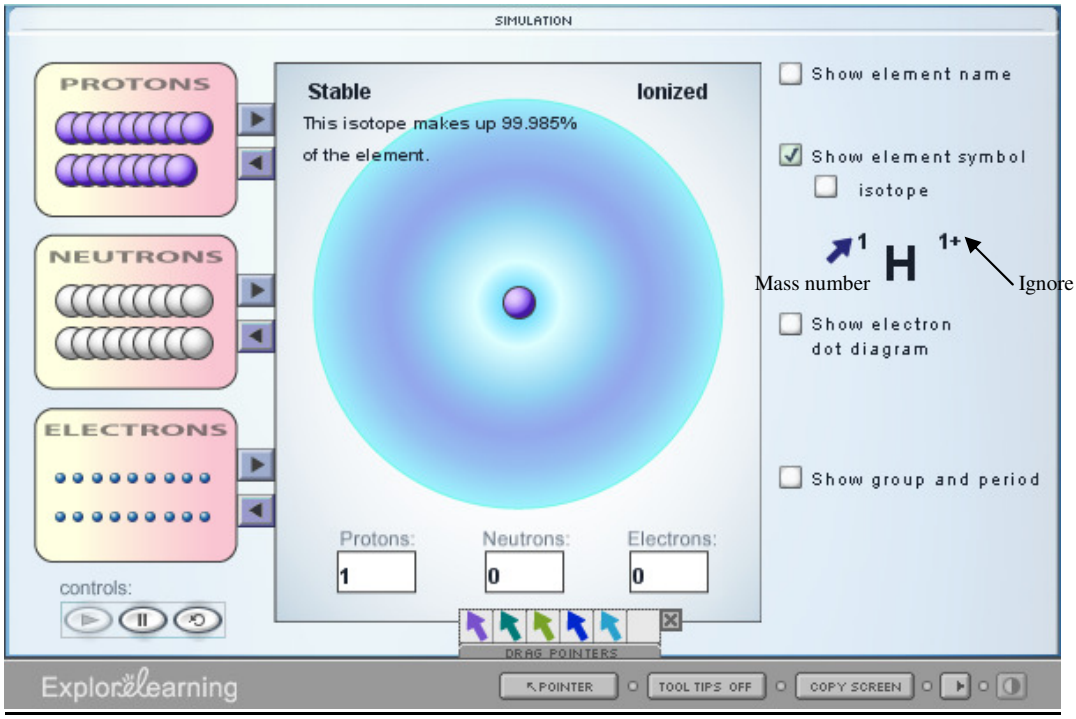

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Subatomic Particle Gizmo Name _____Sci # _____

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Once you log in, find the GIZMO named "Element Builder" Gizmo and select "Launch Gizmo."

Location of Subatomic Particles

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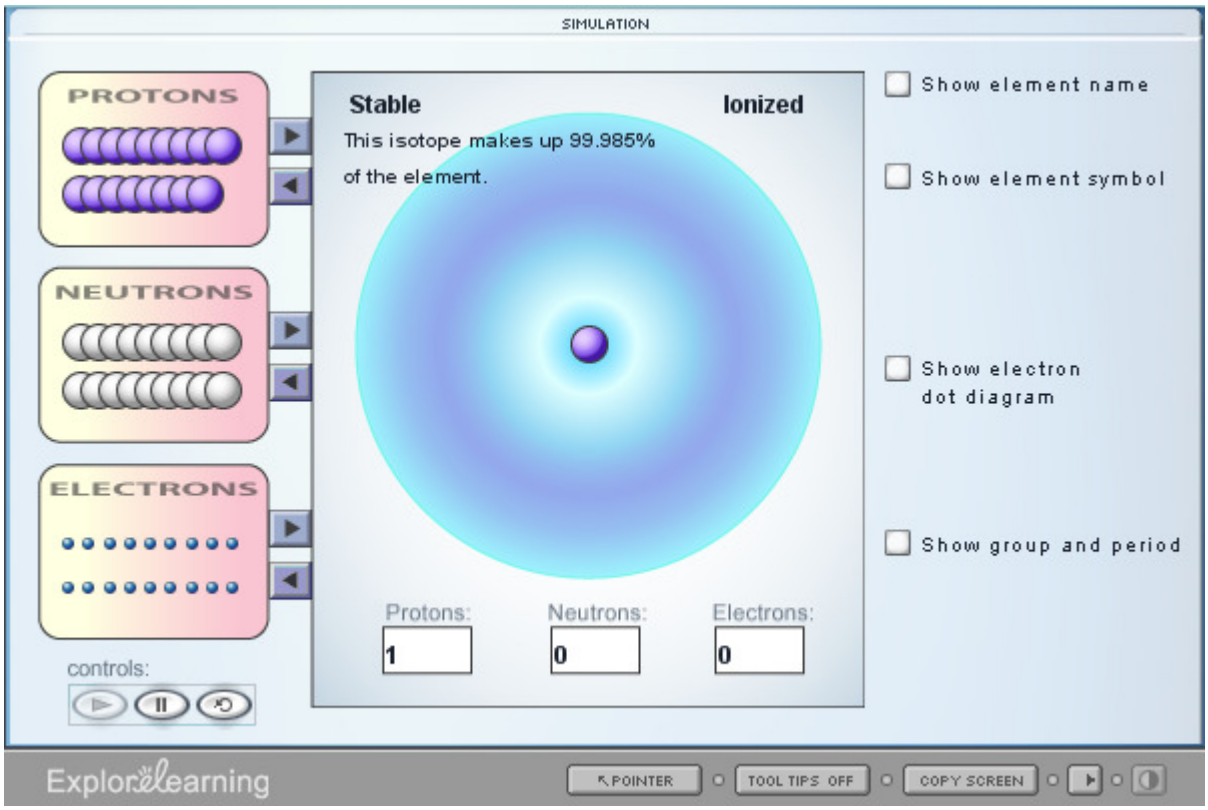

   a. Using the right arrows, add 1 proton, 2 neutrons, and 2 electrons to the atom so that there are 2 of each of the three particles located in the atom. Fill in the following chart.

Particle	Location
Proton	
Neutron	
Electron	

Identity of the Atom

2. Place a check in the "Show element name" box, which is in the top right portion of the gizmo. Manipulate the number of protons to achieve the number of protons in the data table. Do not worry about the number of neutrons or electrons. Experiment with adding one and removing one proton to and from the atom. Fill in the following table. Once you have the identity of the element, look at the periodic table and write down the atomic number for the element, this is the larger number located by the element symbol.

Number of protons	Name of element	Atomic Number from Periodic Table
2		
3		
1		

   a. **Does changing the number of protons change the identity of the element you have built?**

   b. **What is the relationship between the number of protons and the atomic number for an element?**

3. Now you will do the same thing as step 2 except you will be changing the number of neutrons. Make sure that you begin with 2 each for the protons, neutrons, and electrons. Add one neutron to the atom to place 3 neutrons in the atom. Record the name of the element and look at the periodic table to find the atomic number. Next, take 2 neutrons away (a total of 1 should now be in the atom.) Again record the name of the atom and the atomic number from the periodic table.

Number of neutrons	Name of element	Atomic Number from Periodic Table
2		
3		
1		

   a. **Does changing the number of neutrons change the identity of the element you have built?**

   b. **Does changing the number of neutrons change the affect the atomic number?**

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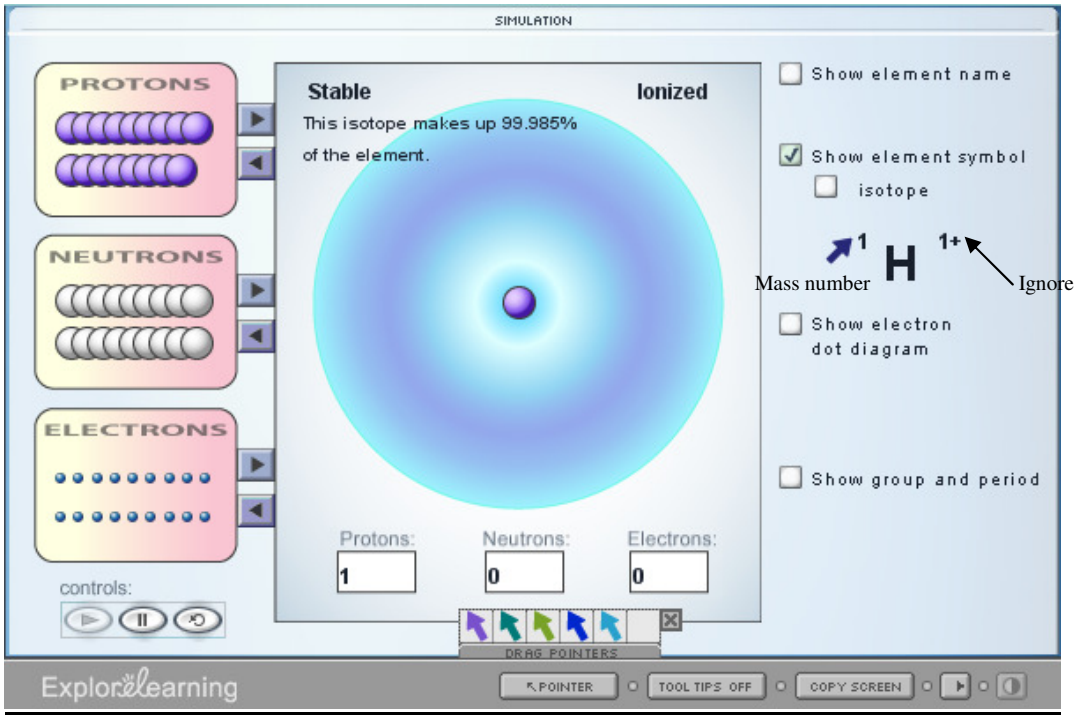
Number of electrons	Name of element	Atomic Number from Periodic Table
2		
3		
1		

a. Does changing the number of electrons change the identity of the element you have built?

KEY FACT: Now looking at questions 2a, 3a, and 4a, which subatomic particle is responsible for the identity of an atom?

Mass of an atom

5. Build an atom again with exactly 2 protons, 2 neutrons, and 2 electrons. Check "Show element symbol." Be sure "isotope" is not selected. Make adjustments to the atom to attain the number of protons, neutrons, and electrons as shown in the data table. Then finish filling in the table. ***The number to the upper left of the symbol indicates the mass of the atom.*** (See where the pointer is pointing in the screen shot.)



Number of protons	Number of neutrons	Number of electrons	Identity of atom (give name)	Mass of atom
2	2	2		
3	2	2		
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a. Does the proton affect the mass of an atom? You MUST EXPLAIN by referring to an example or data from above .

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d. Looking at the atom in the Gizmo, where is most of the mass of an atom concentrated? Explain.

5. Which 2 subatomic particles affect the mass of an atom?

KEY FACT: Write a mathematical formula to show the relationship between the number of protons, the number of neutrons, and the mass number for an atom.

SUMMARY: Based on this gizmo, the number of protons equals the _____ _____ from the periodic table. The number of protons determines the _____ of an atom. The _____ and _____ determines the mass of an atom. The protons and neutrons are located in the _____ of an atom and electrons are in the _____ _____.

- How many protons are in the nucleus of an atom of Carbon (C)? _____
- What is the formula for finding the mass number of an atom? _____
- If an atom of C has 7 neutrons in the nucleus, then it would have a mass number of _____ (see previous 2 questions).
- How many electrons would be found in the nucleus? _____

Subatomic Particle Gizmo Name _____Sci # _____

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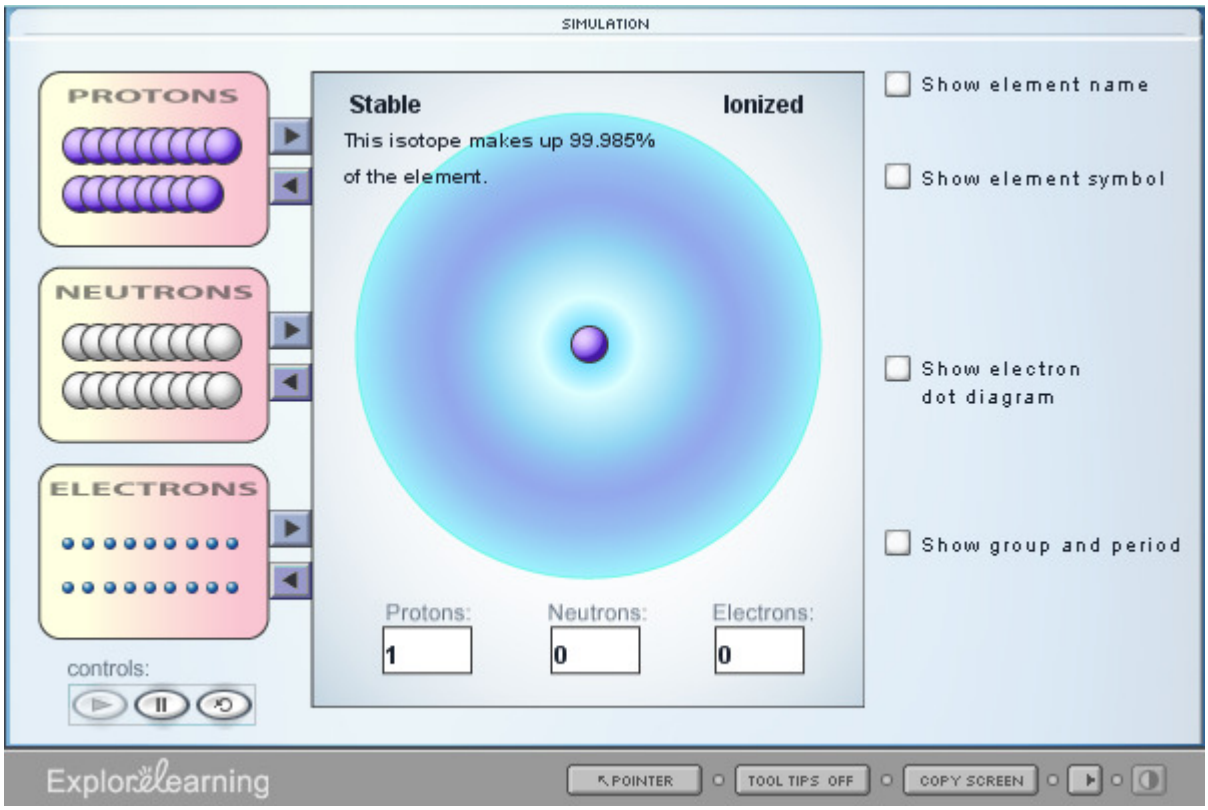

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Particle	Location
Proton	
Neutron	
Electron	

Identity of the Atom

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3		
1		

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Number of electrons	Name of element	Atomic Number from Periodic Table
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3		
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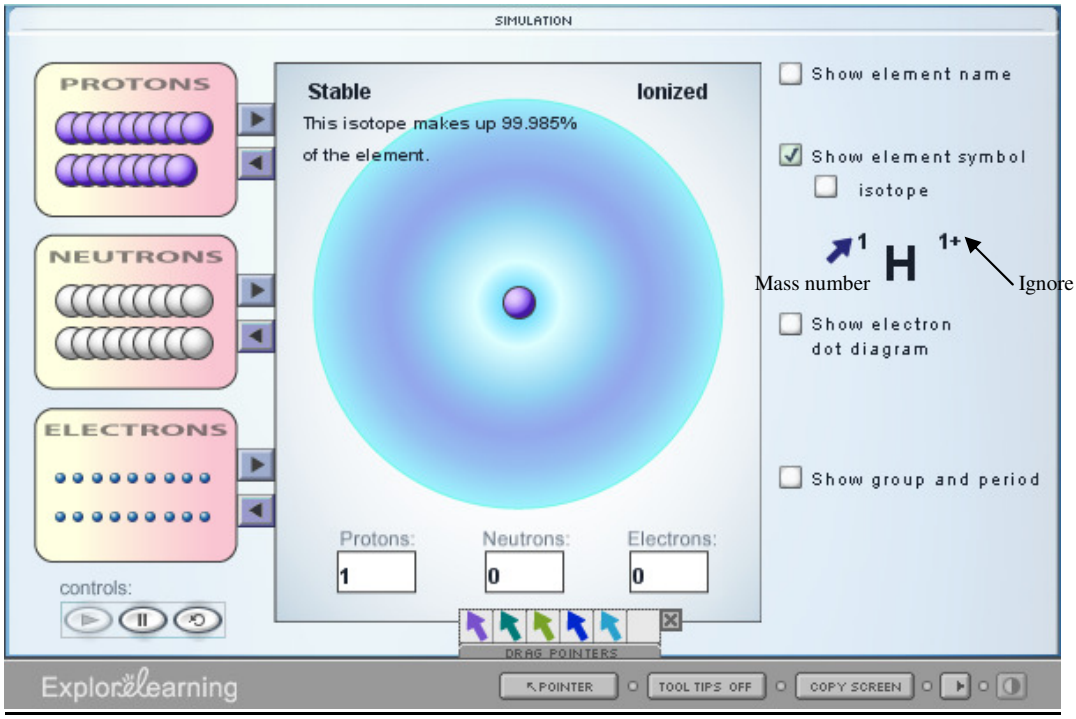

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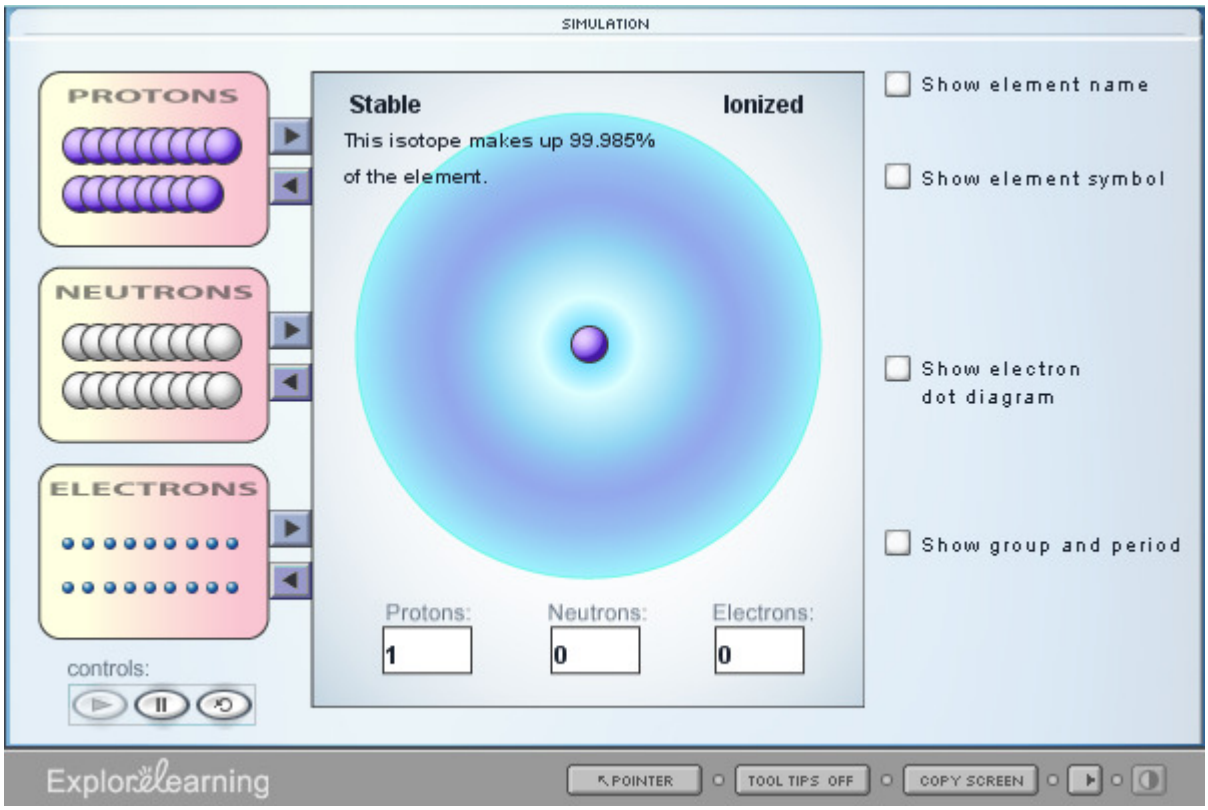

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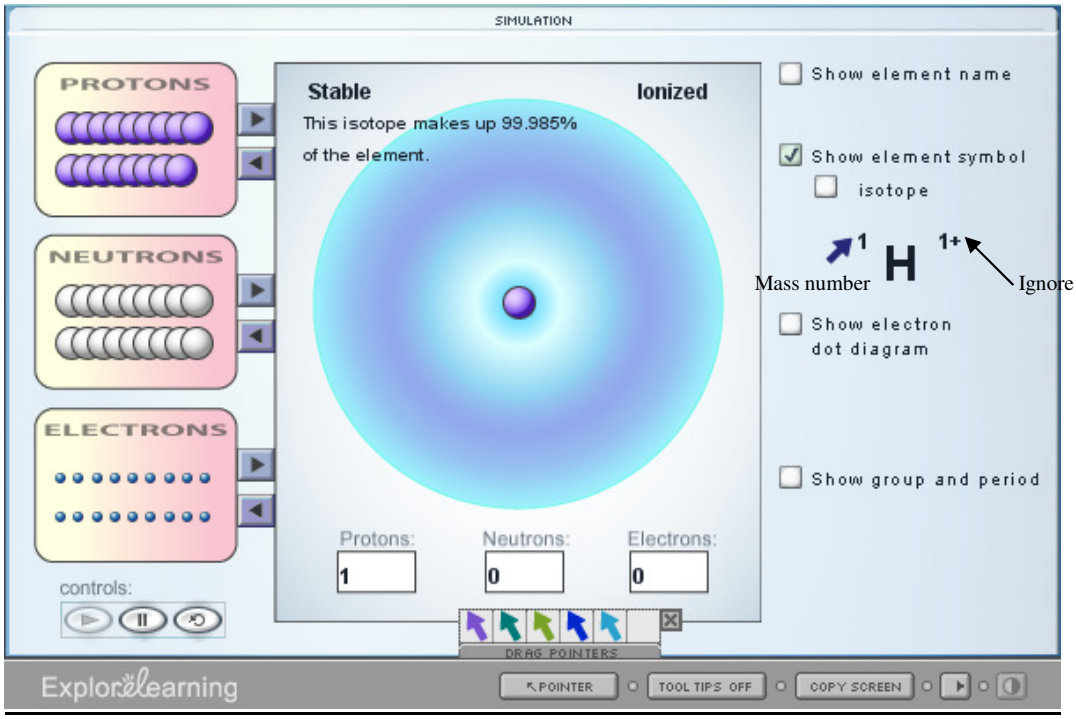

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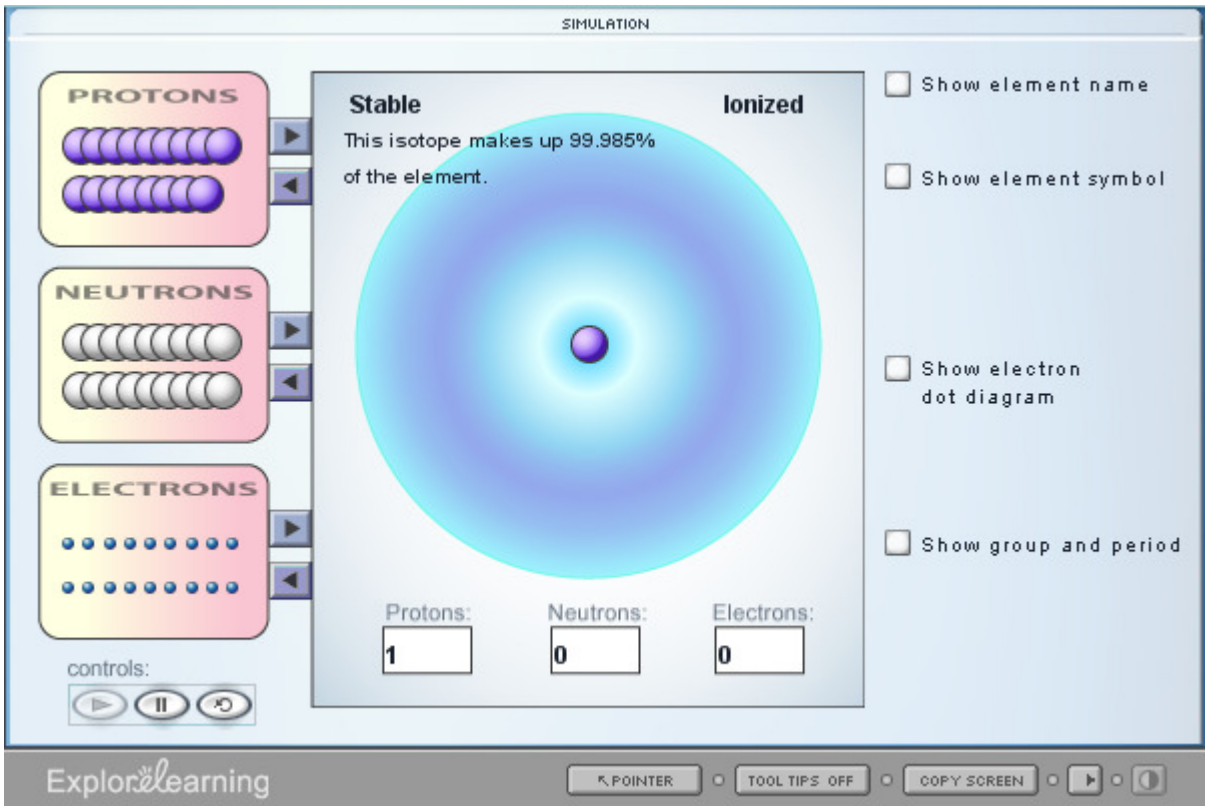

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Number of electrons	Name of element	Atomic Number from Periodic Table
2		
3		
1		

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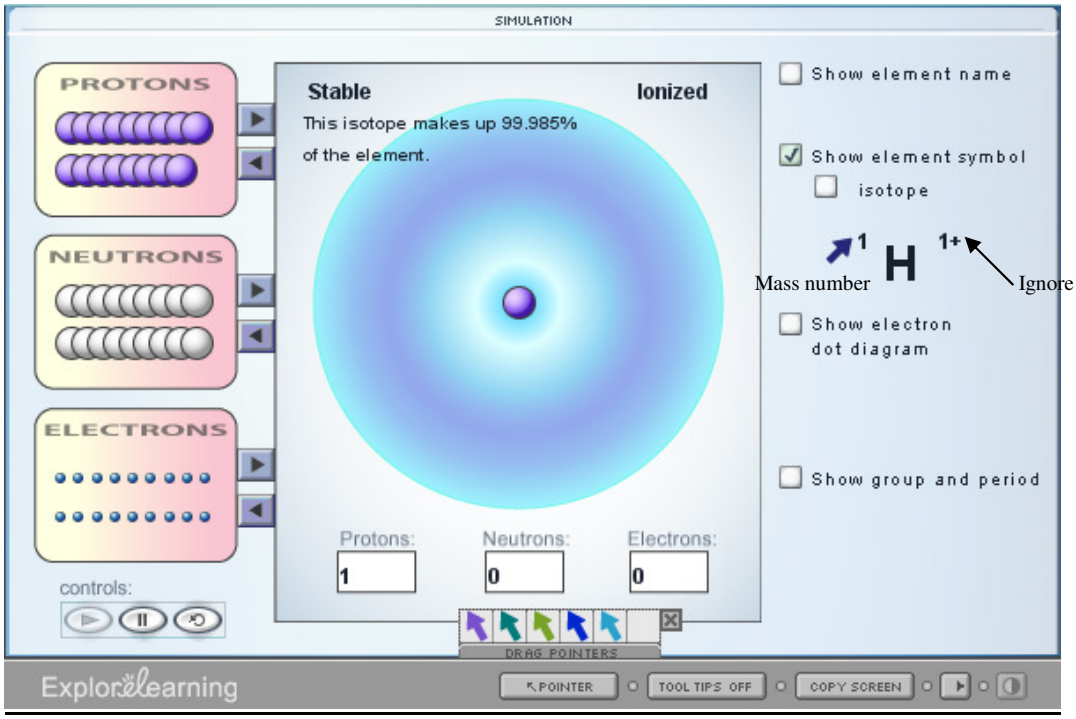

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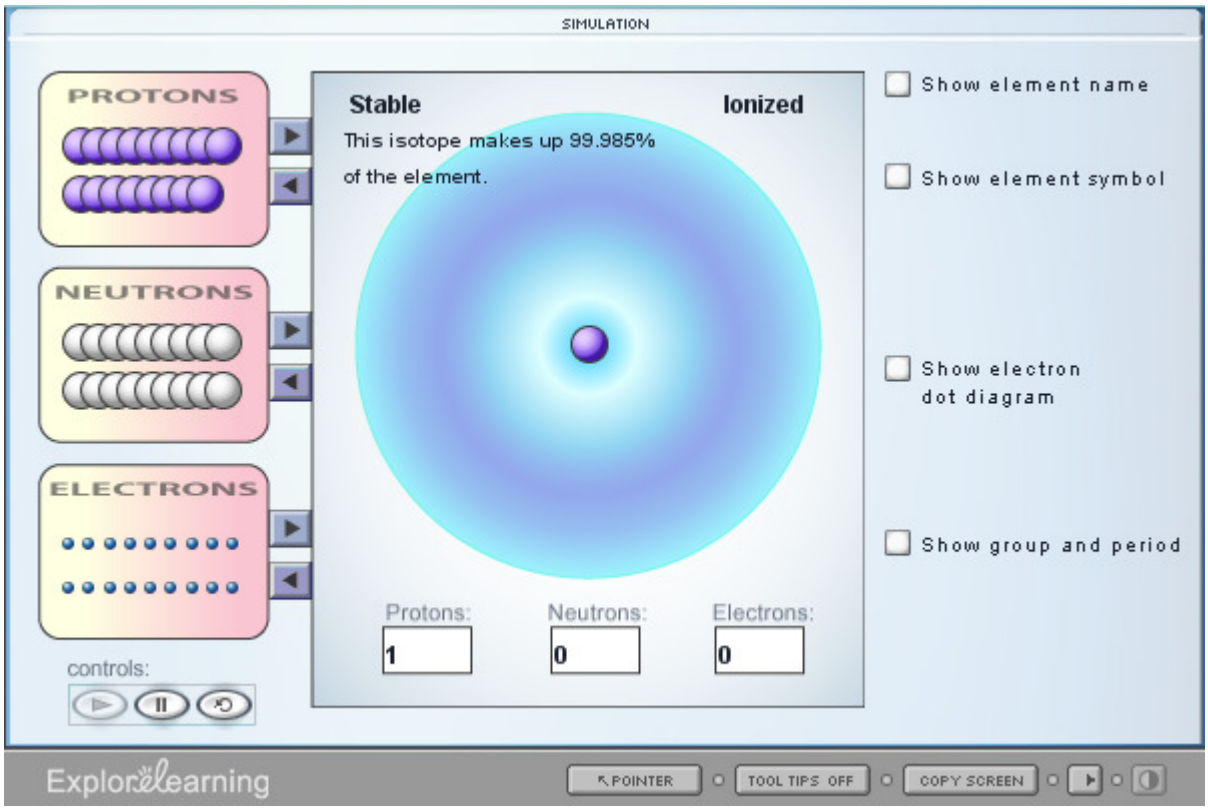

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3		
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2		
3		
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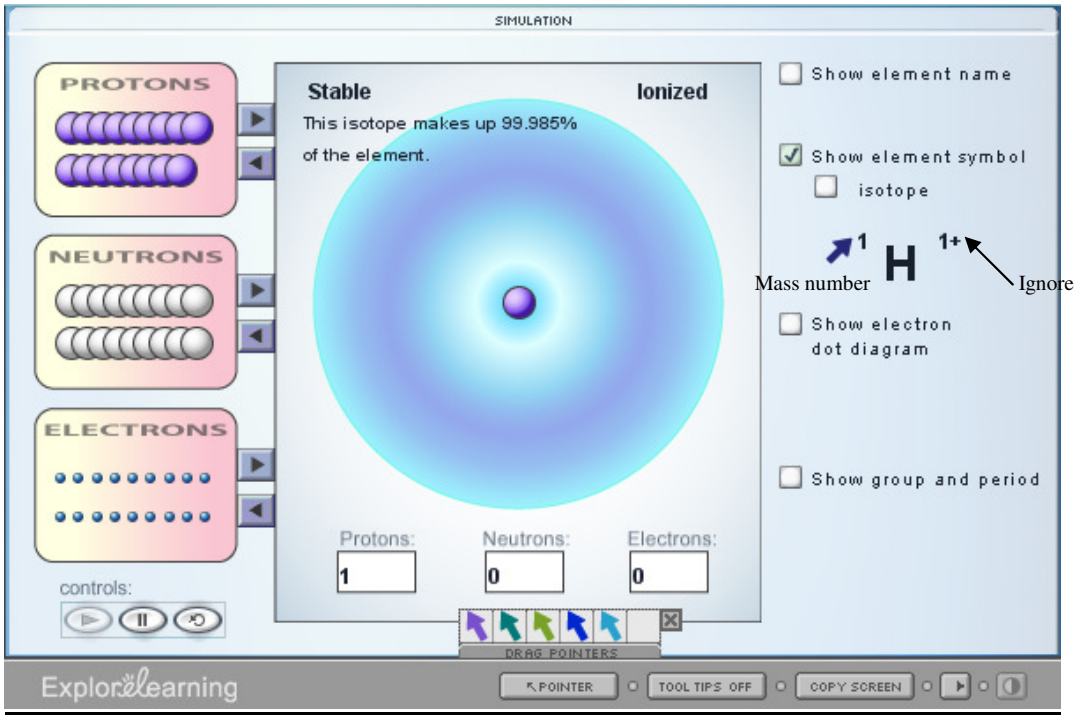

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Subatomic Particle Gizmo Name _____Sci # _____

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Once you log in, find the GIZMO named "Element Builder" Gizmo and select "Launch Gizmo."

Location of Subatomic Particles

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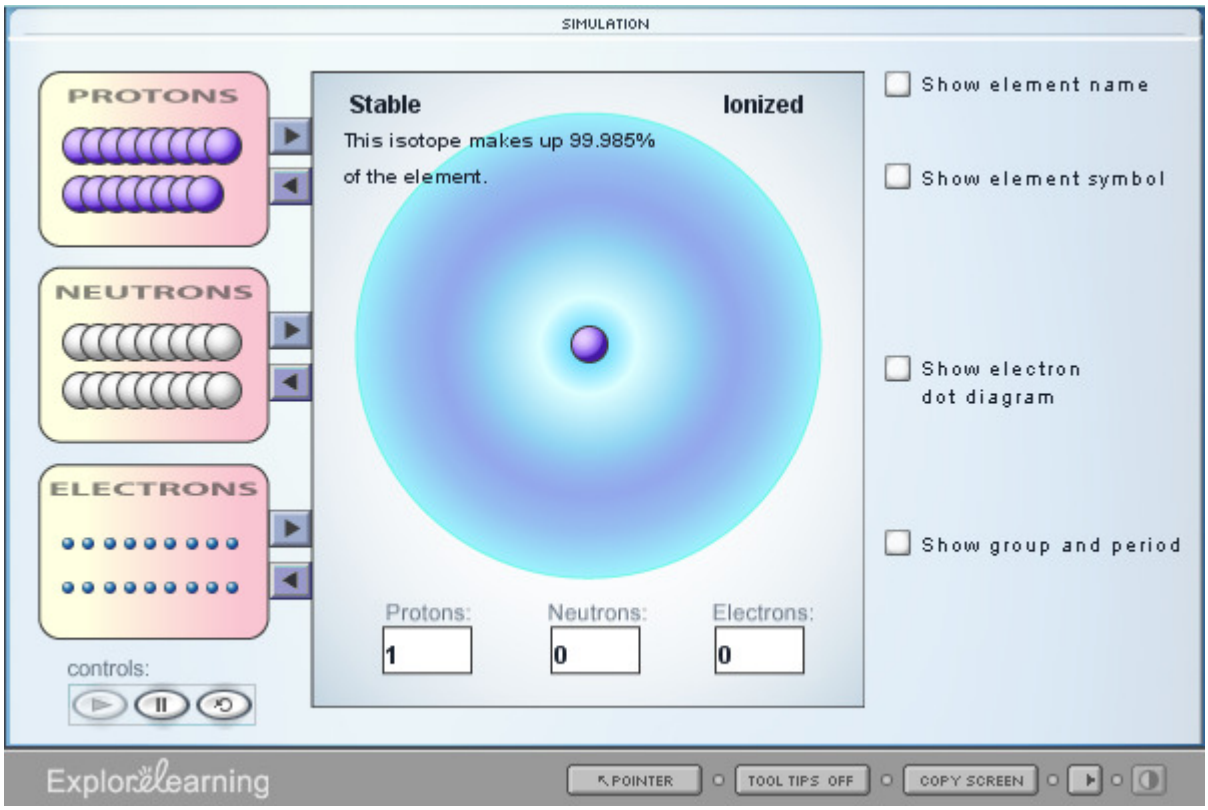


   a. Using the right arrows, add 1 proton, 2 neutrons, and 2 electrons to the atom so that there are 2 of each of the three particles located in the atom. Fill in the following chart.

Particle	Location
Proton	
Neutron	
Electron	

Identity of the Atom

2. Place a check in the "Show element name" box, which is in the top right portion of the gizmo. Manipulate the number of protons to achieve the number of protons in the data table. Do not worry about the number of neutrons or electrons. Experiment with adding one and removing one proton to and from the atom. Fill in the following table. Once you have the identity of the element, look at the periodic table and write down the atomic number for the element, this is the larger number located by the element symbol.

Number of protons	Name of element	Atomic Number from Periodic Table
2		
3		
1		

   a. **Does changing the number of protons change the identity of the element you have built?**

   b. **What is the relationship between the number of protons and the atomic number for an element?**

3. Now you will do the same thing as step 2 except you will be changing the number of neutrons. Make sure that you begin with 2 each for the protons, neutrons, and electrons. Add one neutron to the atom to place 3 neutrons in the atom. Record the name of the element and look at the periodic table to find the atomic number. Next, take 2 neutrons away (a total of 1 should now be in the atom.) Again record the name of the atom and the atomic number from the periodic table.

Number of neutrons	Name of element	Atomic Number from Periodic Table
2		
3		
1		

   a. **Does changing the number of neutrons change the identity of the element you have built?**

   b. **Does changing the number of neutrons change the affect the atomic number?**

4. Make sure that you have 2 each for the protons, neutrons, and electrons. Add one electron to the atom to place 3 electrons in the atom. Record the name of the element and look at the periodic table to find the atomic number. Next, take 2 electrons away (a total of 1 should now be in the atom.) Again record the name of the atom and the atomic number from the periodic table.

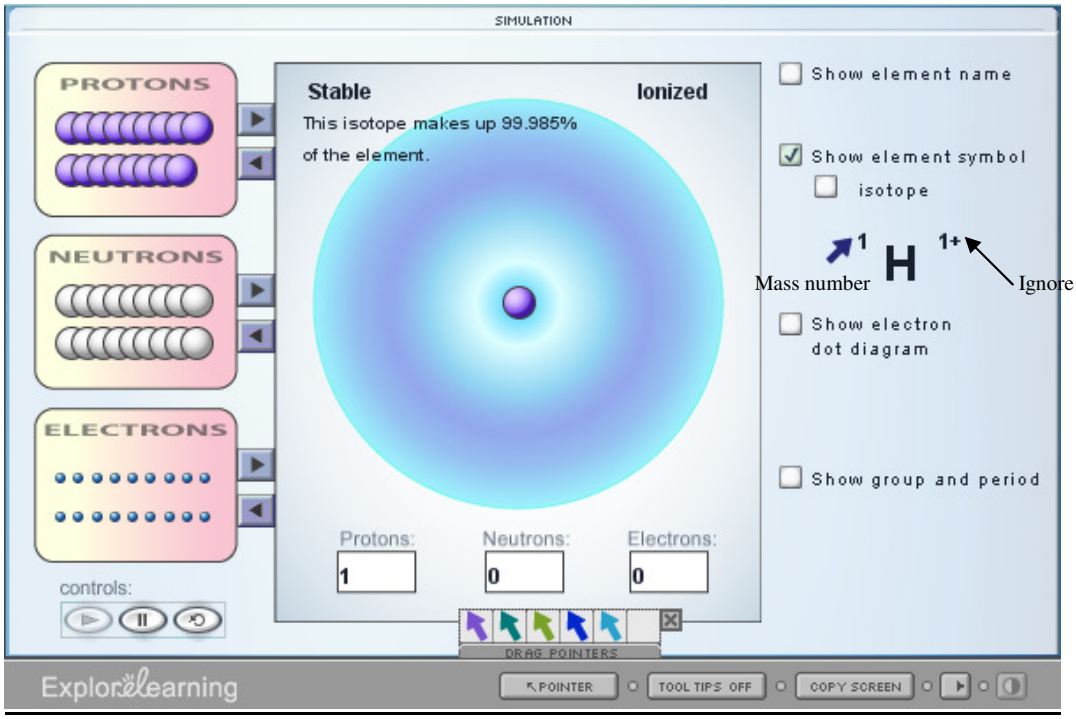
Number of electrons	Name of element	Atomic Number from Periodic Table
2		
3		
1		

a. Does changing the number of electrons change the identity of the element you have built?

KEY FACT: Now looking at questions 2a, 3a, and 4a, which subatomic particle is responsible for the identity of an atom?

Mass of an atom

5. Build an atom again with exactly 2 protons, 2 neutrons, and 2 electrons. Check "Show element symbol." Be sure "isotope" is not selected. Make adjustments to the atom to attain the number of protons, neutrons, and electrons as shown in the data table. Then finish filling in the table. ***The number to the upper left of the symbol indicates the mass of the atom.*** (See where the pointer is pointing in the screen shot.)



Number of protons	Number of neutrons	Number of electrons	Identity of atom (give name)	Mass of atom
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3	2	2		
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a. Does the proton affect the mass of an atom? You MUST EXPLAIN by referring to an example or data from above .

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5. Which 2 subatomic particles affect the mass of an atom?

KEY FACT: Write a mathematical formula to show the relationship between the number of protons, the number of neutrons, and the mass number for an atom.

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- How many protons are in the nucleus of an atom of Carbon (C)? _____
- What is the formula for finding the mass number of an atom? _____
- If an atom of C has 7 neutrons in the nucleus, then it would have a mass number of _____ (see previous 2 questions).
- How many electrons would be found in the nucleus? _____

Subatomic Particle Gizmo Name _____Sci # _____

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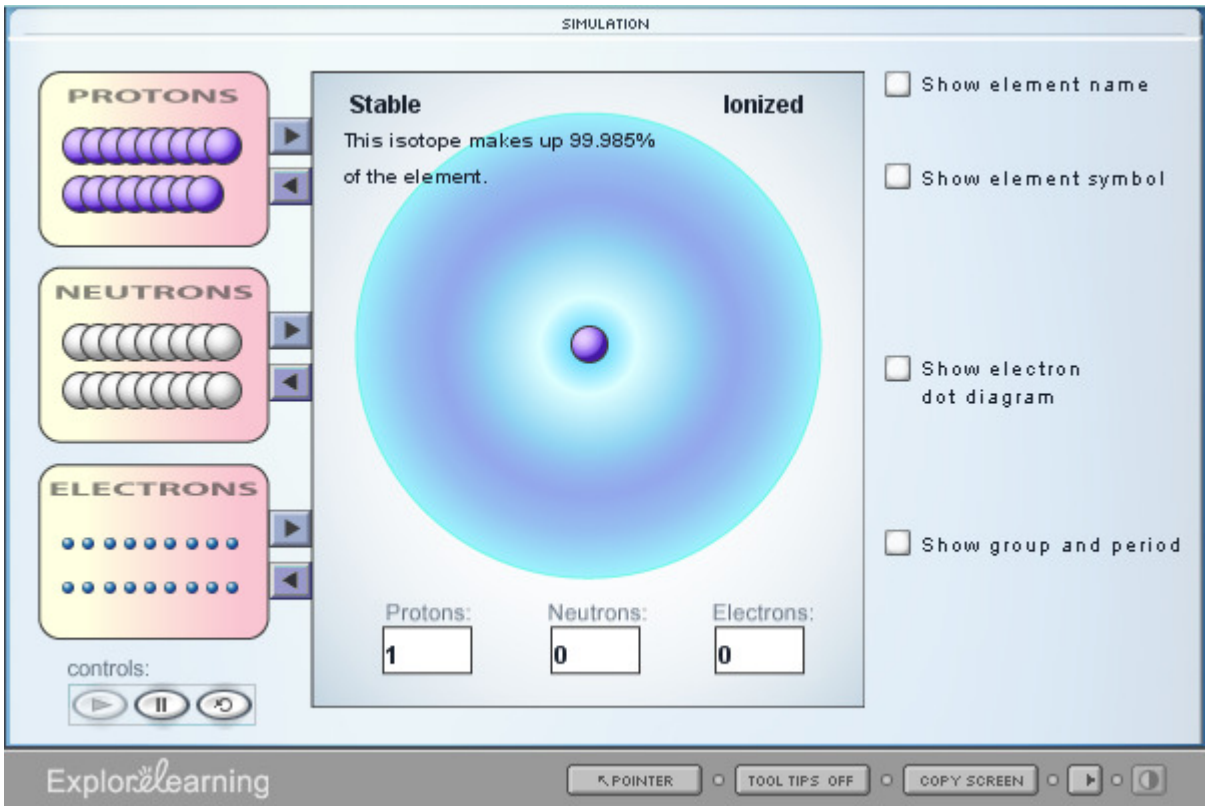

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Particle	Location
Proton	
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Identity of the Atom

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3		
1		

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3		
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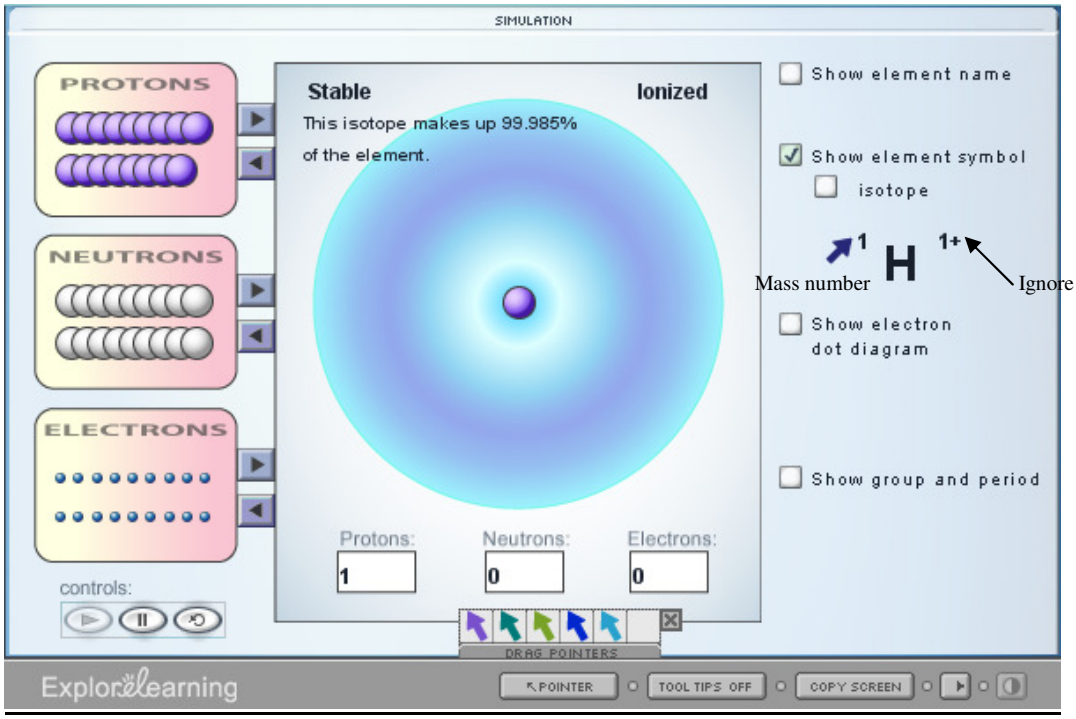

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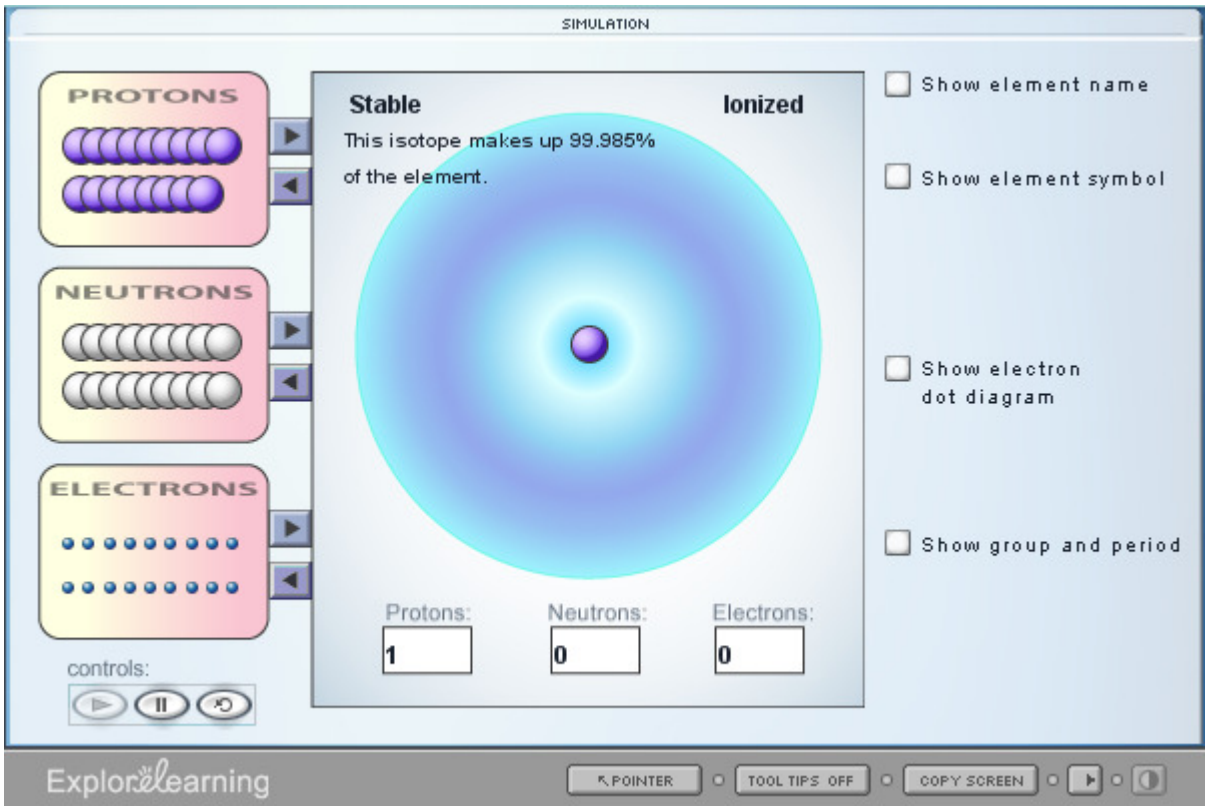

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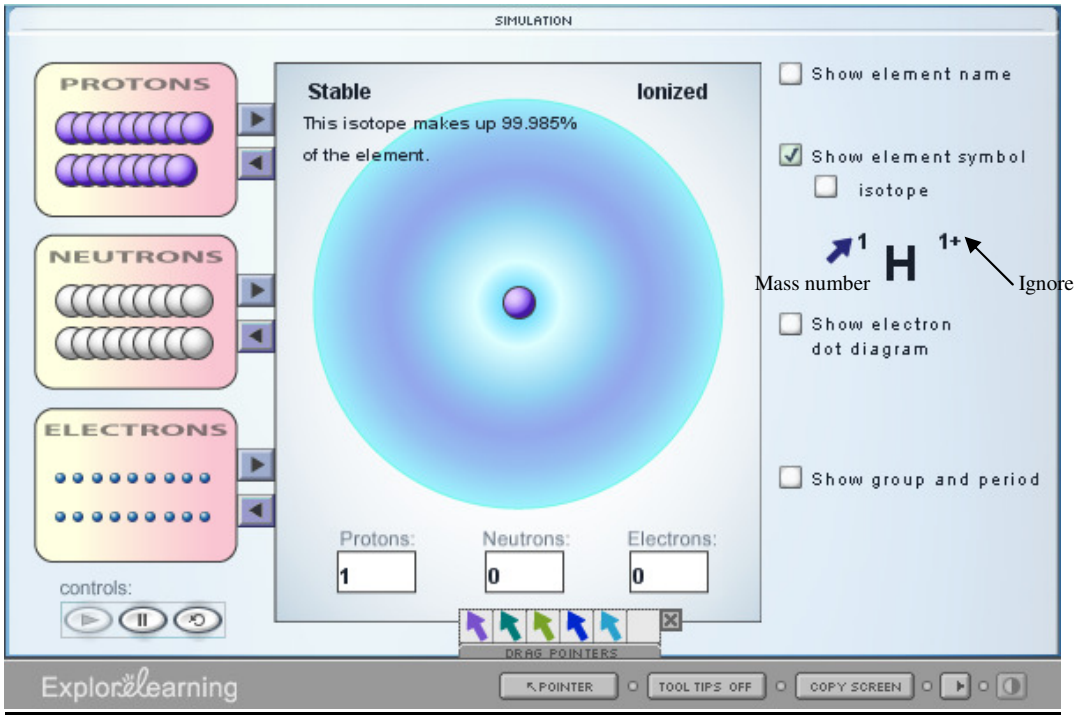

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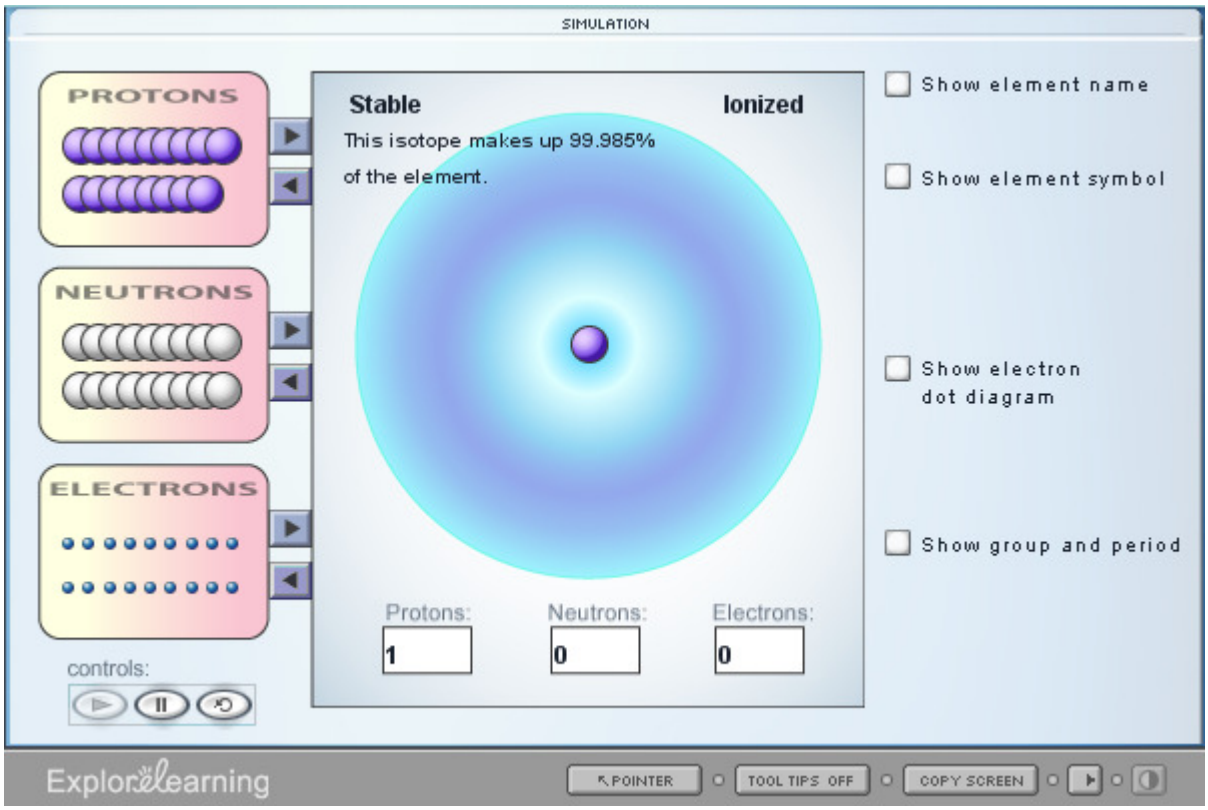

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Number of electrons	Name of element	Atomic Number from Periodic Table
2		
3		
1		

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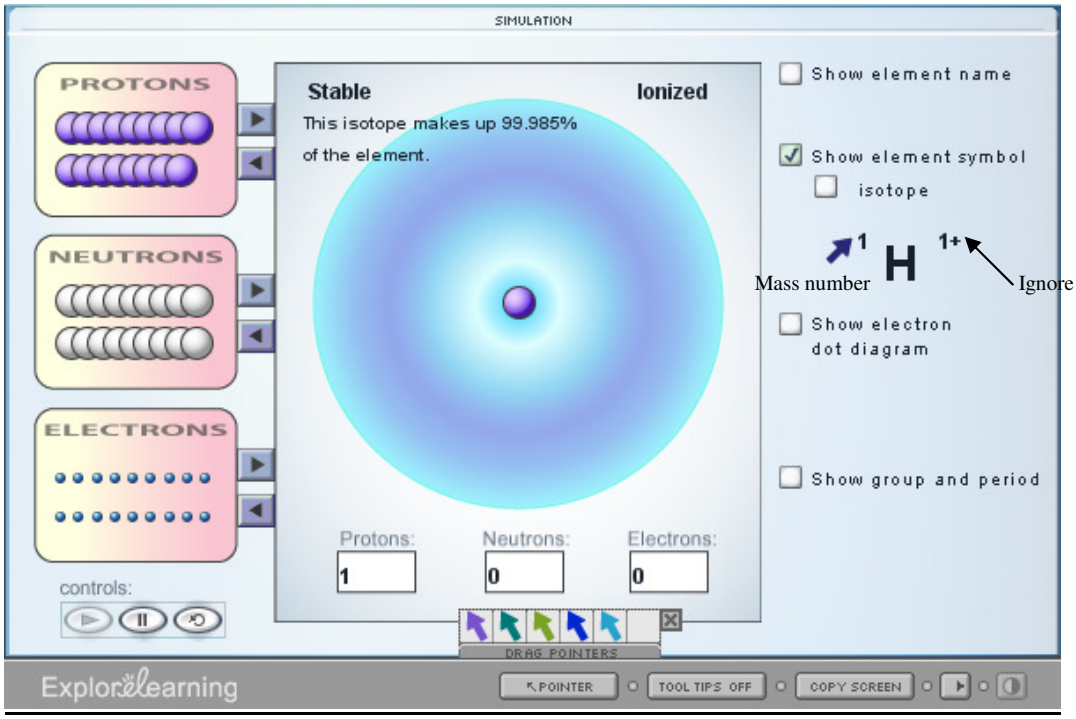

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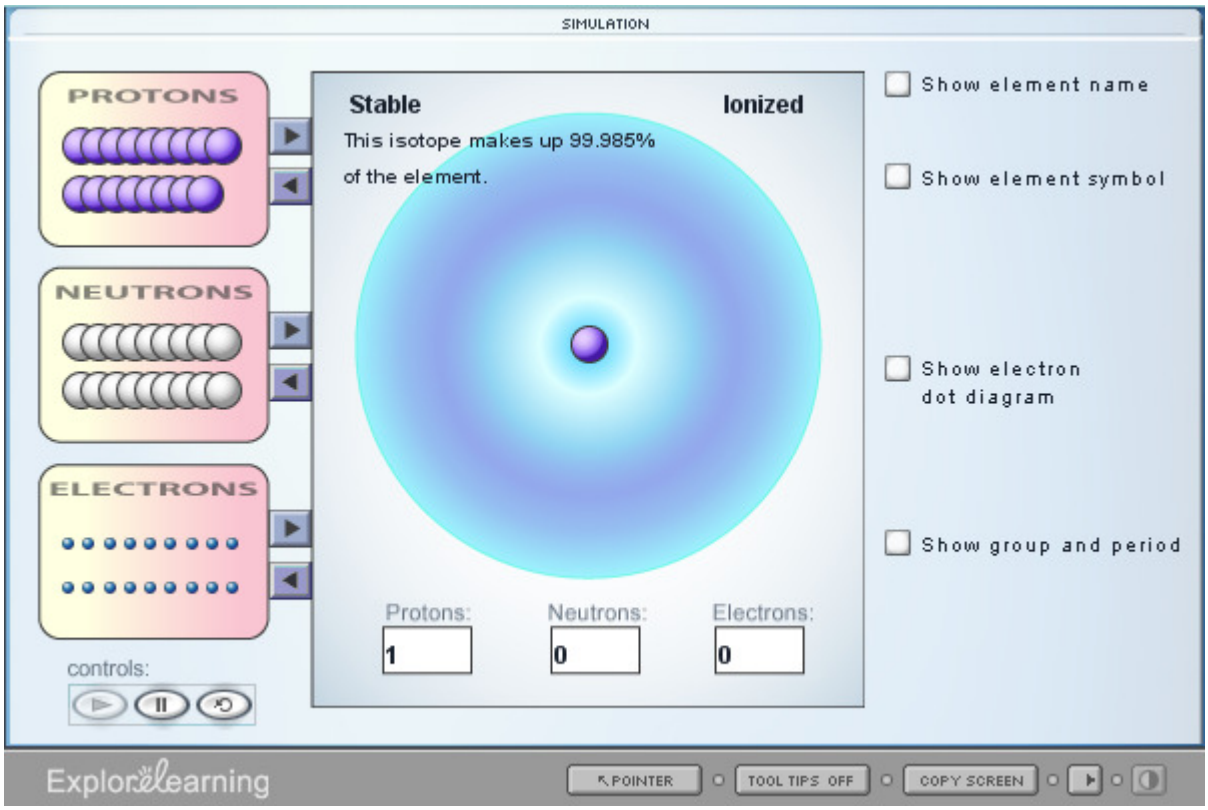

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3		
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2		
3		
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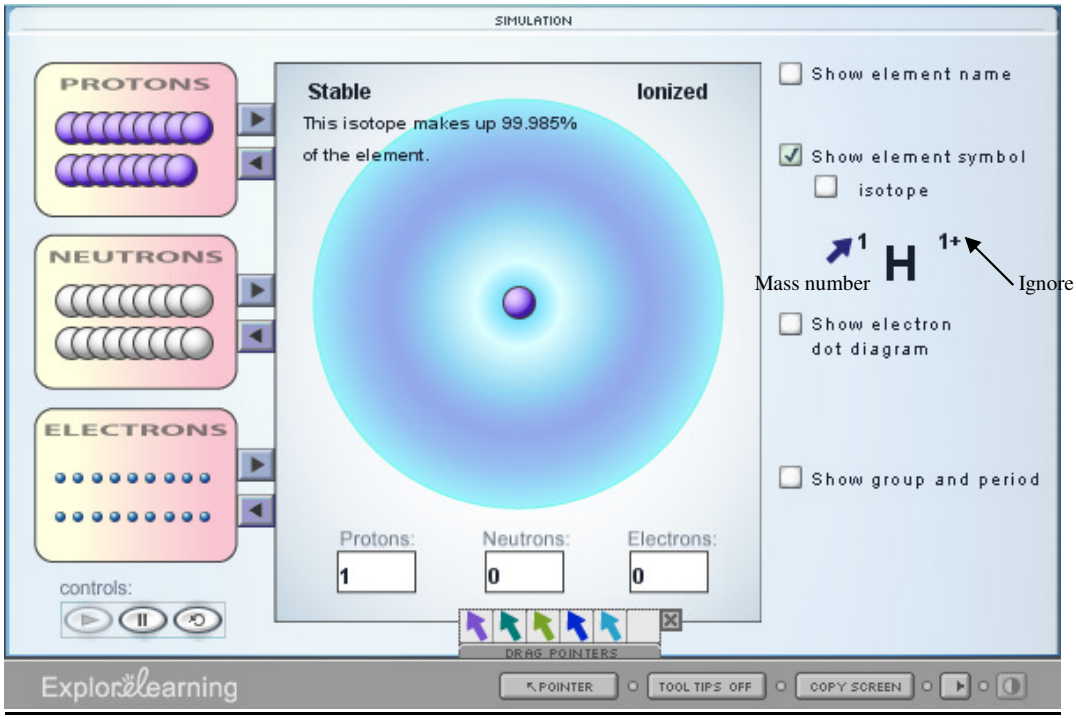

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Subatomic Particle Gizmo Name _____Sci # _____

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Once you log in, find the GIZMO named "Element Builder" Gizmo and select "Launch Gizmo."

Location of Subatomic Particles

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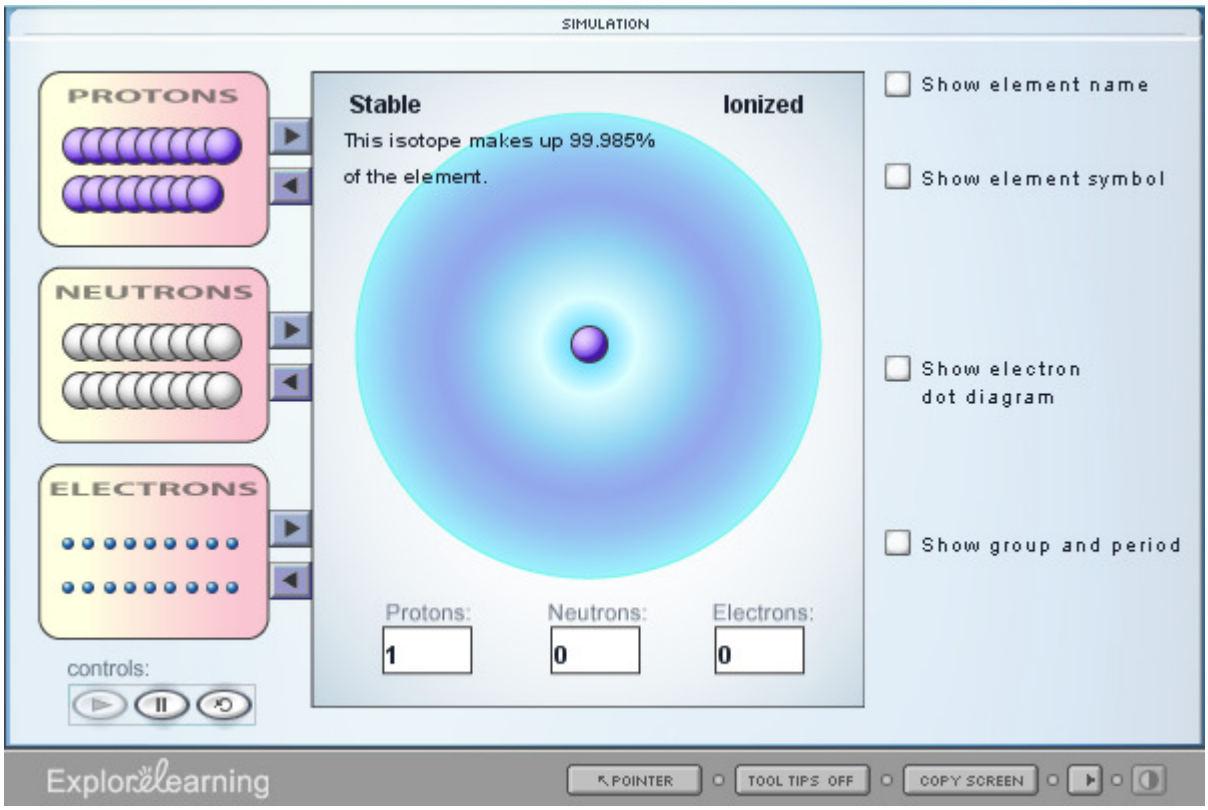


   a. Using the right arrows, add 1 proton, 2 neutrons, and 2 electrons to the atom so that there are 2 of each of the three particles located in the atom. Fill in the following chart.

Particle	Location
Proton	
Neutron	
Electron	

Identity of the Atom

2. Place a check in the "Show element name" box, which is in the top right portion of the gizmo. Manipulate the number of protons to achieve the number of protons in the data table. Do not worry about the number of neutrons or electrons. Experiment with adding one and removing one proton to and from the atom. Fill in the following table. Once you have the identity of the element, look at the periodic table and write down the atomic number for the element, this is the larger number located by the element symbol.

Number of protons	Name of element	Atomic Number from Periodic Table
2		
3		
1		

   a. **Does changing the number of protons change the identity of the element you have built?**

   b. **What is the relationship between the number of protons and the atomic number for an element?**

3. Now you will do the same thing as step 2 except you will be changing the number of neutrons. Make sure that you begin with 2 each for the protons, neutrons, and electrons. Add one neutron to the atom to place 3 neutrons in the atom. Record the name of the element and look at the periodic table to find the atomic number. Next, take 2 neutrons away (a total of 1 should now be in the atom.) Again record the name of the atom and the atomic number from the periodic table.

Number of neutrons	Name of element	Atomic Number from Periodic Table
2		
3		
1		

   a. **Does changing the number of neutrons change the identity of the element you have built?**

   b. **Does changing the number of neutrons change the affect the atomic number?**

4. Make sure that you have 2 each for the protons, neutrons, and electrons. Add one electron to the atom to place 3 electrons in the atom. Record the name of the element and look at the periodic table to find the atomic number. Next, take 2 electrons away (a total of 1 should now be in the atom.) Again record the name of the atom and the atomic number from the periodic table.

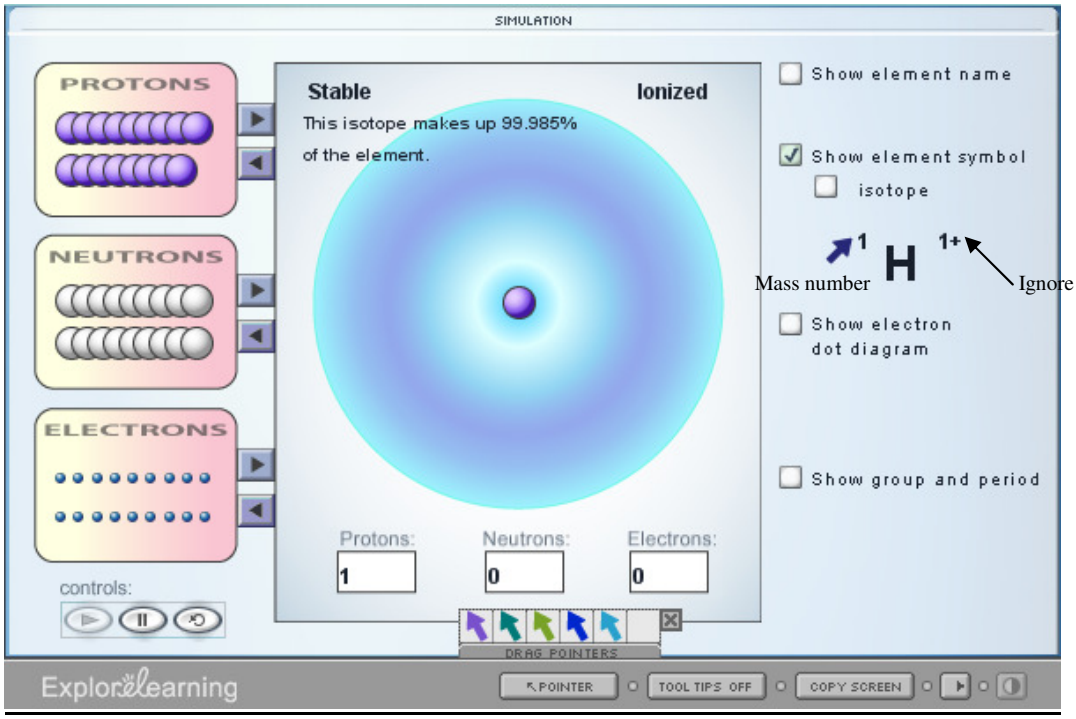
Number of electrons	Name of element	Atomic Number from Periodic Table
2		
3		
1		

a. Does changing the number of electrons change the identity of the element you have built?

KEY FACT: Now looking at questions 2a, 3a, and 4a, which subatomic particle is responsible for the identity of an atom?

Mass of an atom

5. Build an atom again with exactly 2 protons, 2 neutrons, and 2 electrons. Check "Show element symbol." Be sure "isotope" is not selected. Make adjustments to the atom to attain the number of protons, neutrons, and electrons as shown in the data table. Then finish filling in the table. ***The number to the upper left of the symbol indicates the mass of the atom.*** (See where the pointer is pointing in the screen shot.)



Number of protons	Number of neutrons	Number of electrons	Identity of atom (give name)	Mass of atom
2	2	2		
3	2	2		
2	3	2		
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a. Does the proton affect the mass of an atom? You MUST EXPLAIN by referring to an example or data from above .

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d. Looking at the atom in the Gizmo, where is most of the mass of an atom concentrated? Explain.

5. Which 2 subatomic particles affect the mass of an atom?

KEY FACT: Write a mathematical formula to show the relationship between the number of protons, the number of neutrons, and the mass number for an atom.

SUMMARY: Based on this gizmo, the number of protons equals the _____ _____ from the periodic table. The number of protons determines the _____ of an atom. The _____ and _____ determines the mass of an atom. The protons and neutrons are located in the _____ of an atom and electrons are in the _____ _____.

- How many protons are in the nucleus of an atom of Carbon (C)? _____
- What is the formula for finding the mass number of an atom? _____
- If an atom of C has 7 neutrons in the nucleus, then it would have a mass number of _____ (see previous 2 questions).
- How many electrons would be found in the nucleus? _____

Subatomic Particle Gizmo Name _____Sci # _____

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Location of Subatomic Particles

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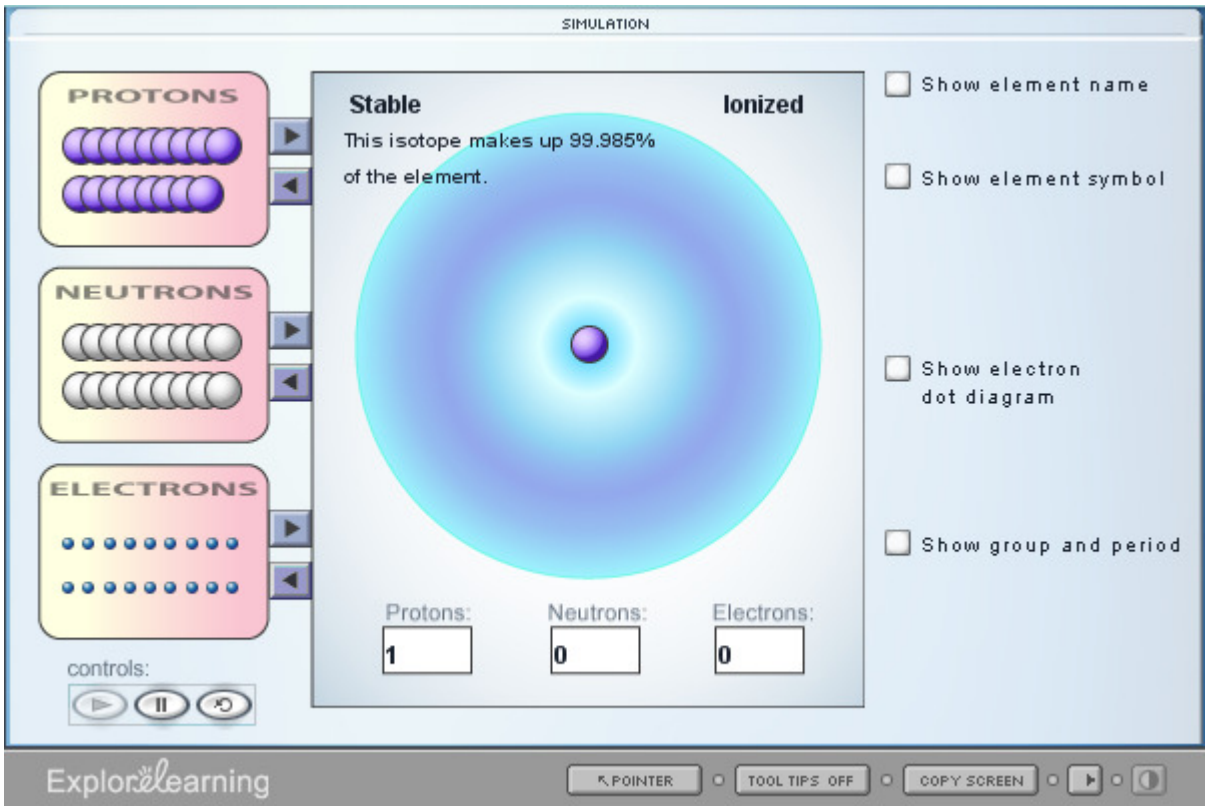

   a. Using the right arrows, add 1 proton, 2 neutrons, and 2 electrons to the atom so that there are 2 of each of the three particles located in the atom. Fill in the following chart.

Particle	Location
Proton	
Neutron	
Electron	

Identity of the Atom

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Number of neutrons	Name of element	Atomic Number from Periodic Table
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3		
1		

   a. **Does changing the number of neutrons change the identity of the element you have built?**

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Number of electrons	Name of element	Atomic Number from Periodic Table
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3		
1		

a. Does changing the number of electrons change the identity of the element you have built?

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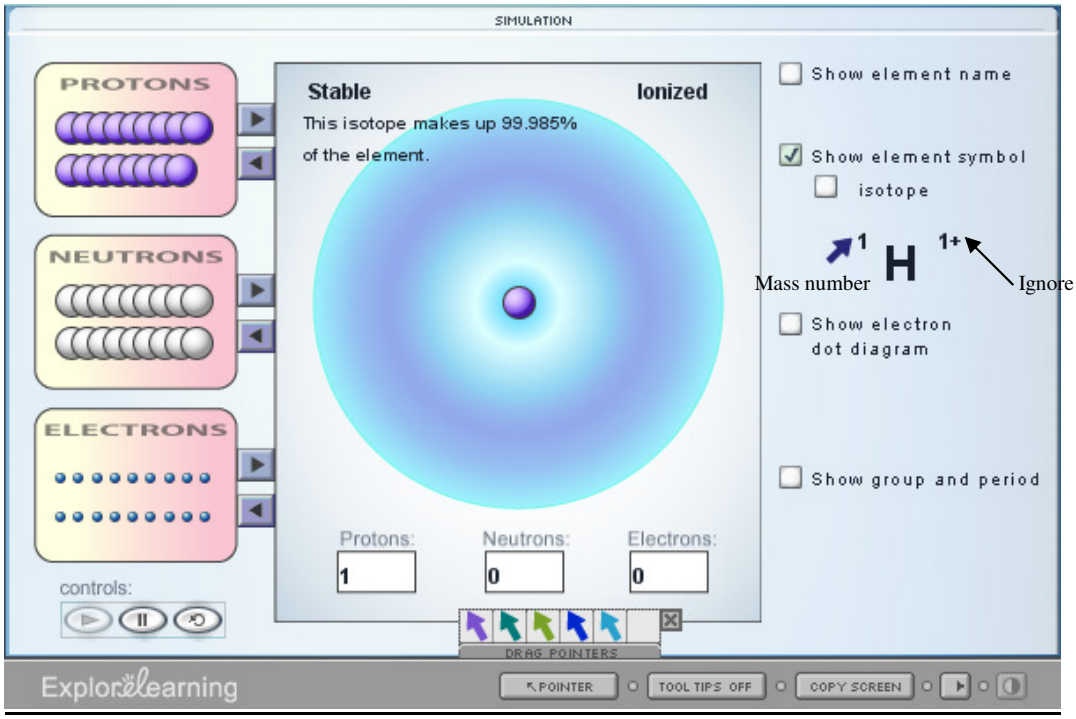
5. Build an atom again with exactly 2 protons, 2 neutrons, and 2 electrons. Check "Show element symbol." Be sure "isotope" is not selected. Make adjustments to the atom to attain the number of protons, neutrons, and electrons as shown in the data table. Then finish filling in the table. ***The number to the upper left of the symbol indicates the mass of the atom.*** (See where the pointer is pointing in the screen shot.)



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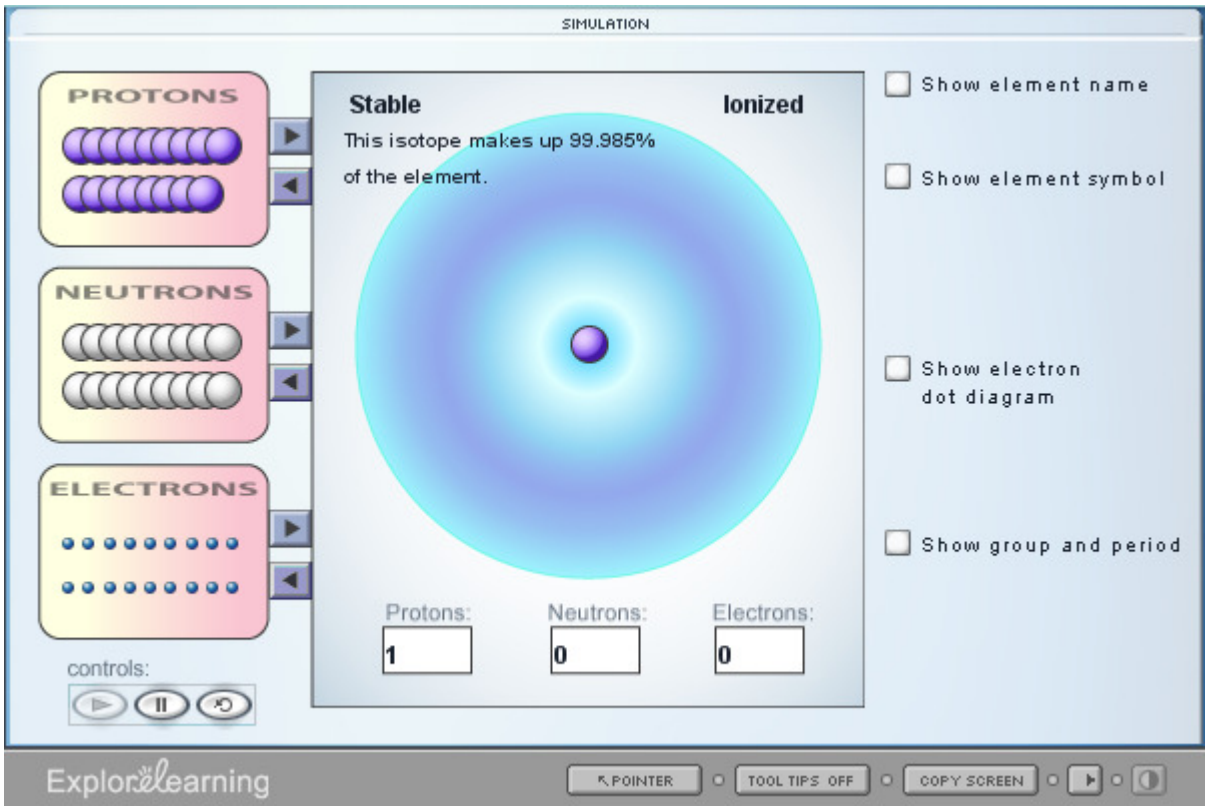

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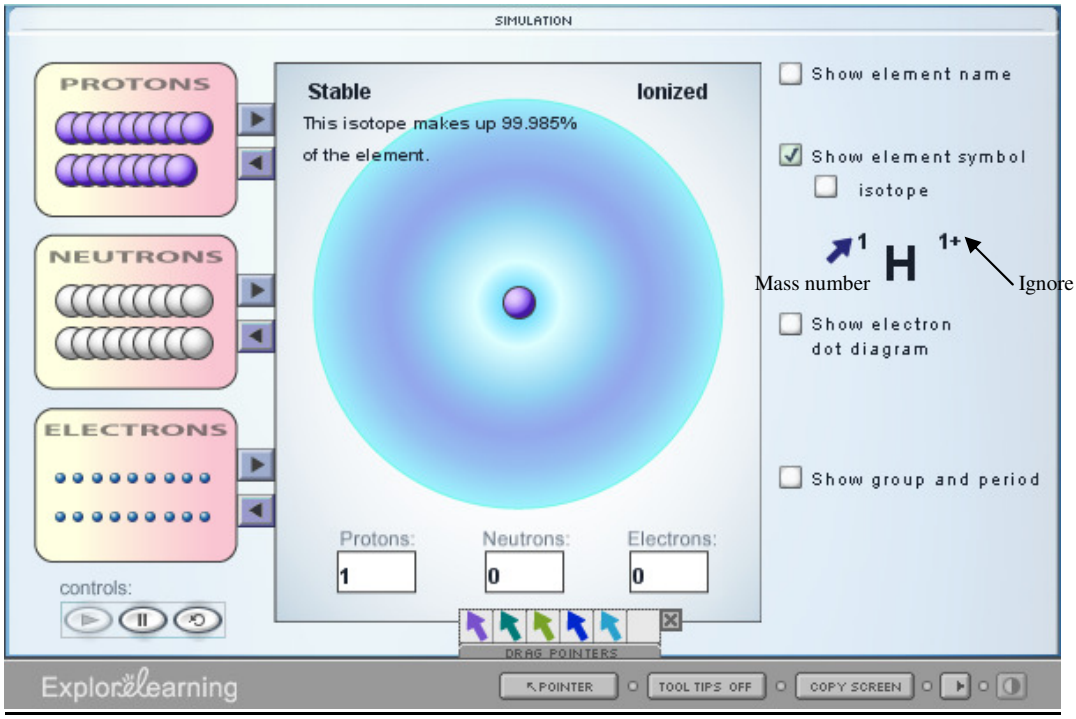

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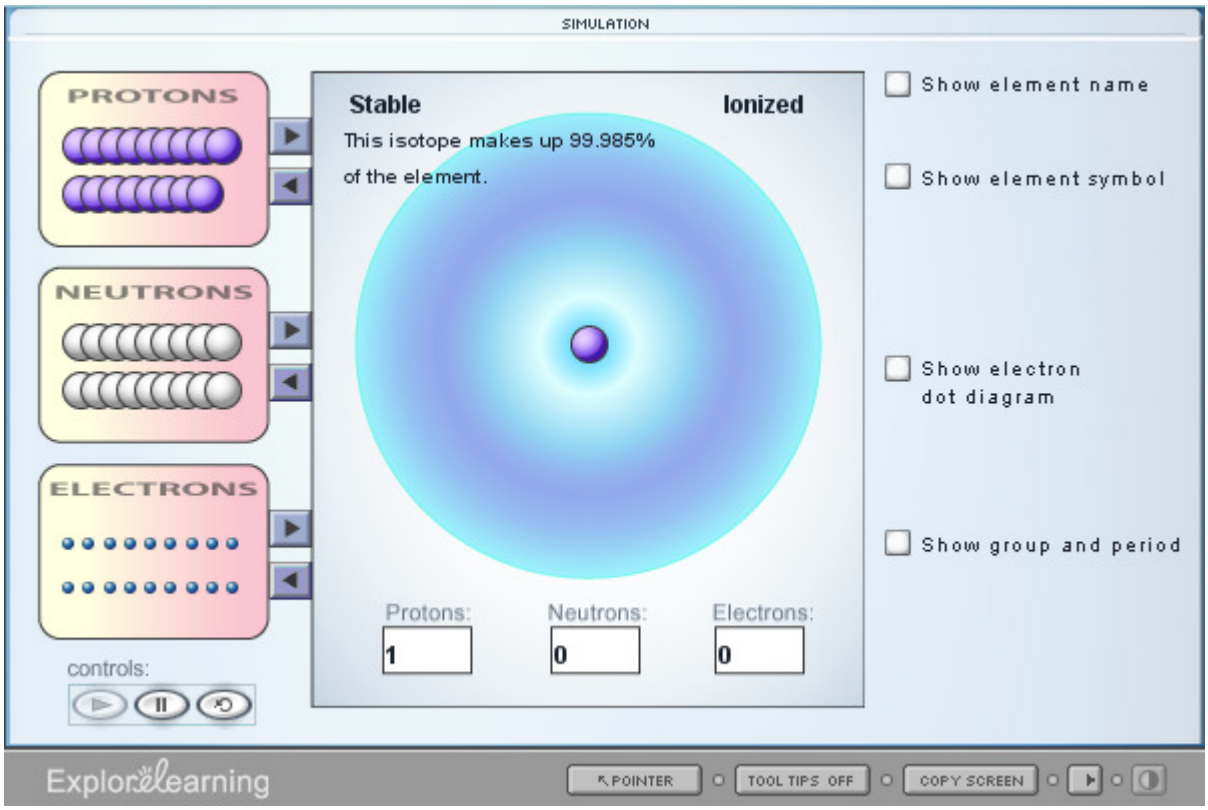

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Number of electrons	Name of element	Atomic Number from Periodic Table
2		
3		
1		

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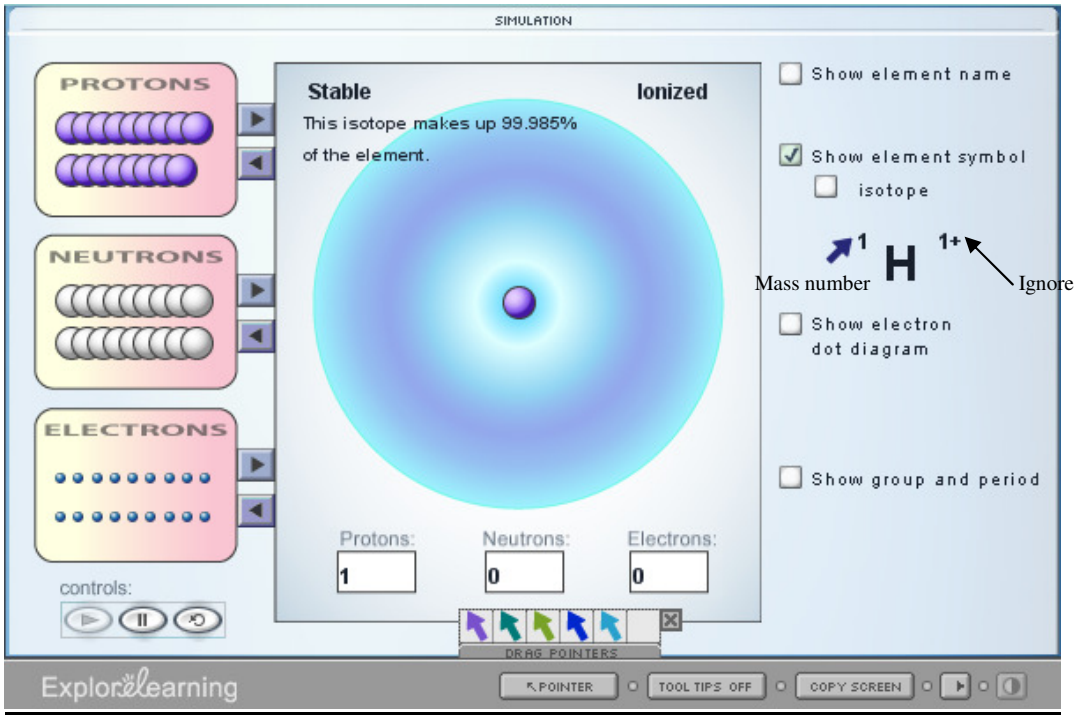

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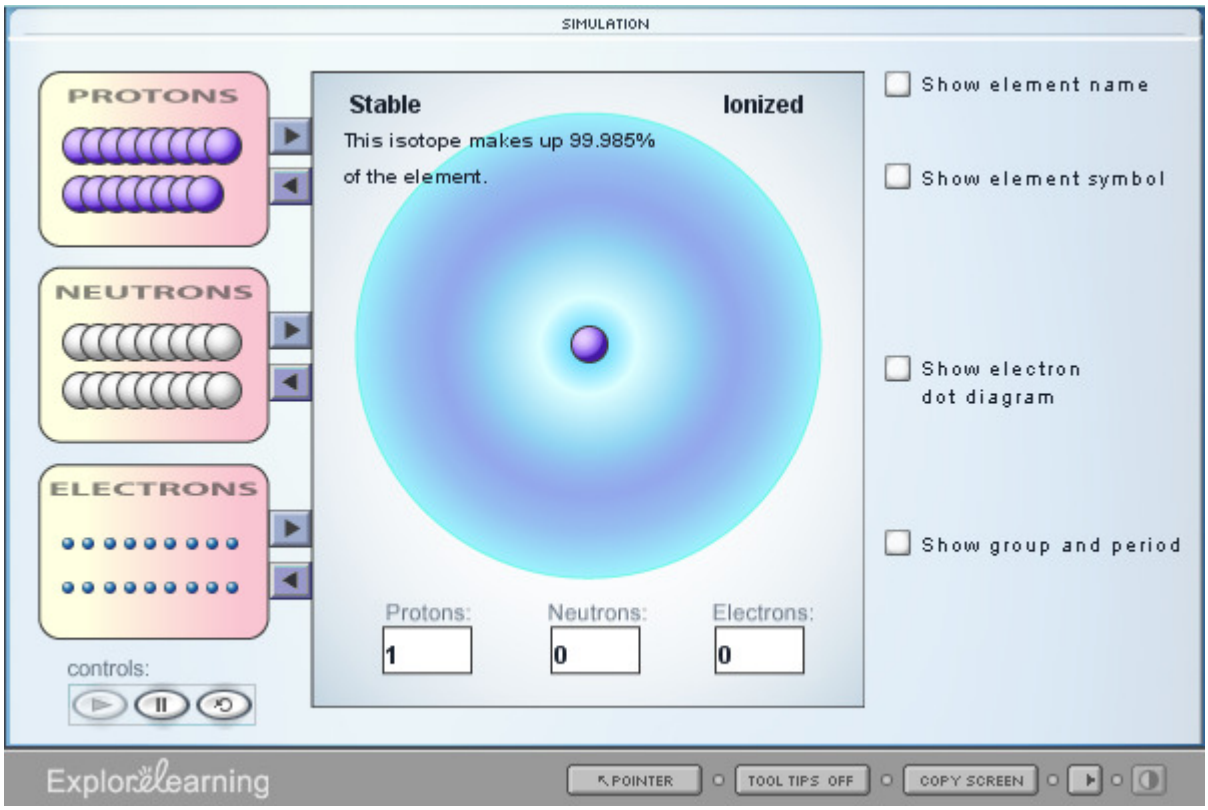

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Number of neutrons	Name of element	Atomic Number from Periodic Table
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3		
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Number of electrons	Name of element	Atomic Number from Periodic Table
2		
3		
1		

a. Does changing the number of electrons change the identity of the element you have built?

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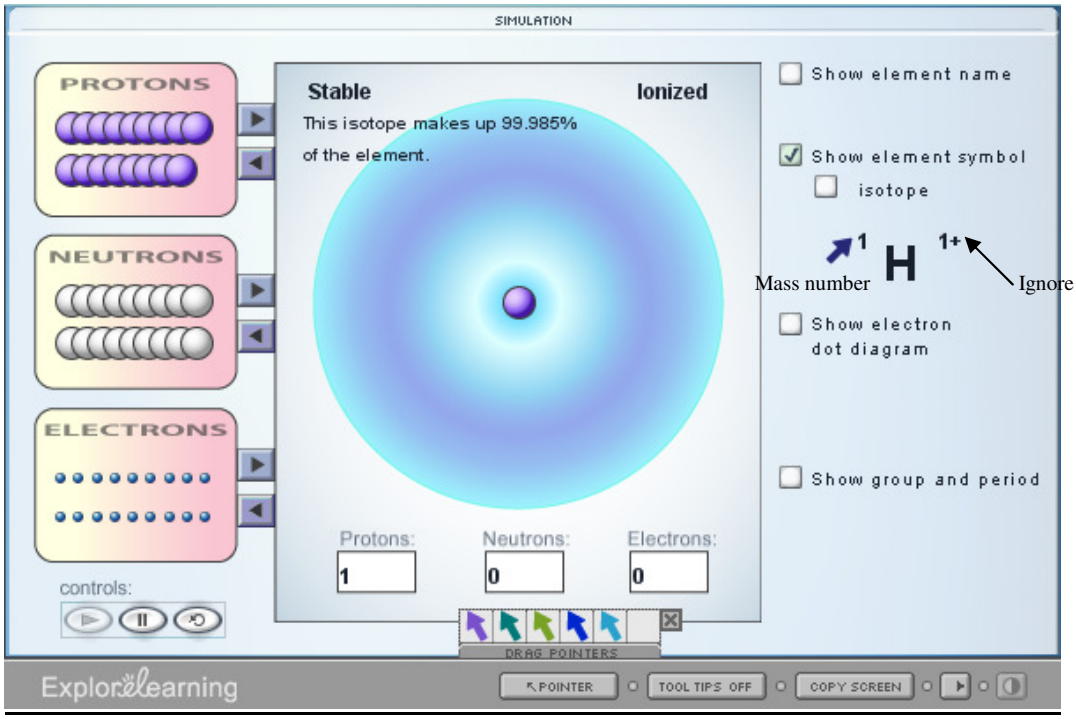

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Subatomic Particle Gizmo Name _____Sci # _____

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Once you log in, find the GIZMO named "Element Builder" Gizmo and select "Launch Gizmo."

Location of Subatomic Particles

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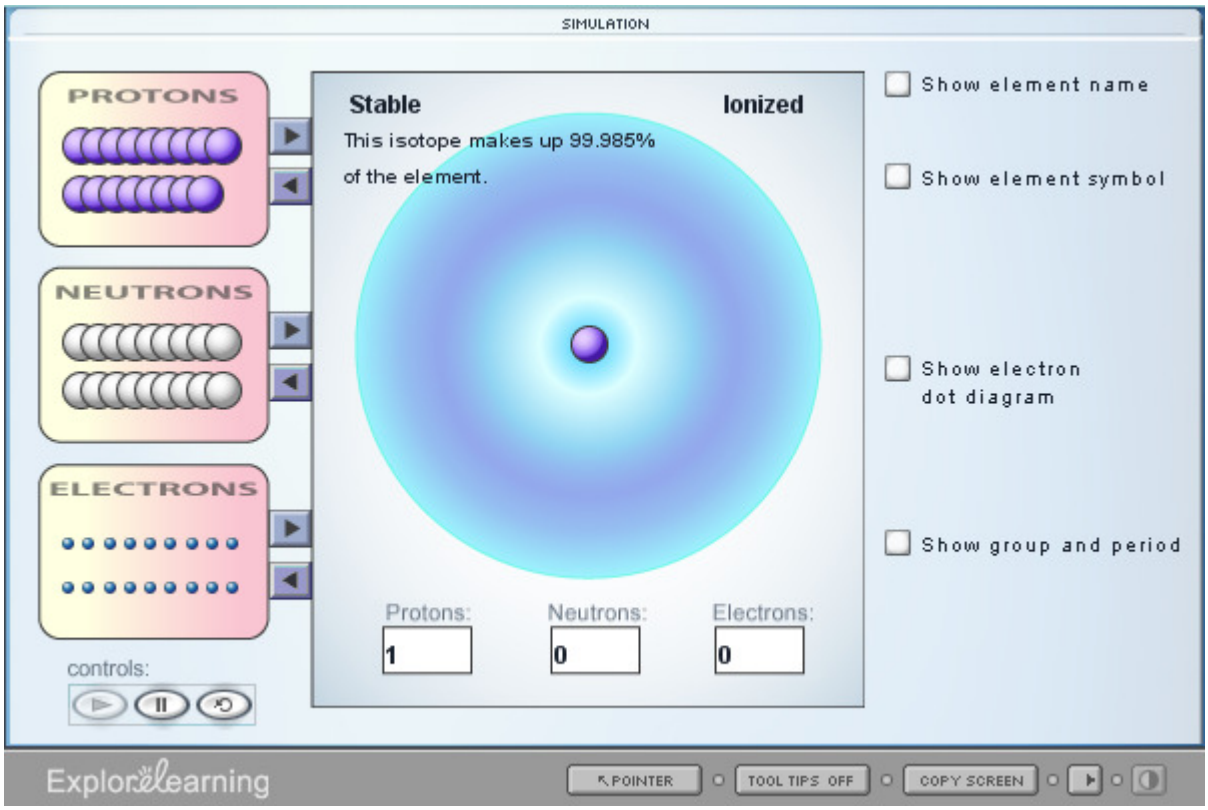


   a. Using the right arrows, add 1 proton, 2 neutrons, and 2 electrons to the atom so that there are 2 of each of the three particles located in the atom. Fill in the following chart.

Particle	Location
Proton	
Neutron	
Electron	

Identity of the Atom

2. Place a check in the "Show element name" box, which is in the top right portion of the gizmo. Manipulate the number of protons to achieve the number of protons in the data table. Do not worry about the number of neutrons or electrons. Experiment with adding one and removing one proton to and from the atom. Fill in the following table. Once you have the identity of the element, look at the periodic table and write down the atomic number for the element, this is the larger number located by the element symbol.

Number of protons	Name of element	Atomic Number from Periodic Table
2		
3		
1		

   a. **Does changing the number of protons change the identity of the element you have built?**

   b. **What is the relationship between the number of protons and the atomic number for an element?**

3. Now you will do the same thing as step 2 except you will be changing the number of neutrons. Make sure that you begin with 2 each for the protons, neutrons, and electrons. Add one neutron to the atom to place 3 neutrons in the atom. Record the name of the element and look at the periodic table to find the atomic number. Next, take 2 neutrons away (a total of 1 should now be in the atom.) Again record the name of the atom and the atomic number from the periodic table.

Number of neutrons	Name of element	Atomic Number from Periodic Table
2		
3		
1		

   a. **Does changing the number of neutrons change the identity of the element you have built?**

   b. **Does changing the number of neutrons change the affect the atomic number?**

4. Make sure that you have 2 each for the protons, neutrons, and electrons. Add one electron to the atom to place 3 electrons in the atom. Record the name of the element and look at the periodic table to find the atomic number. Next, take 2 electrons away (a total of 1 should now be in the atom.) Again record the name of the atom and the atomic number from the periodic table.

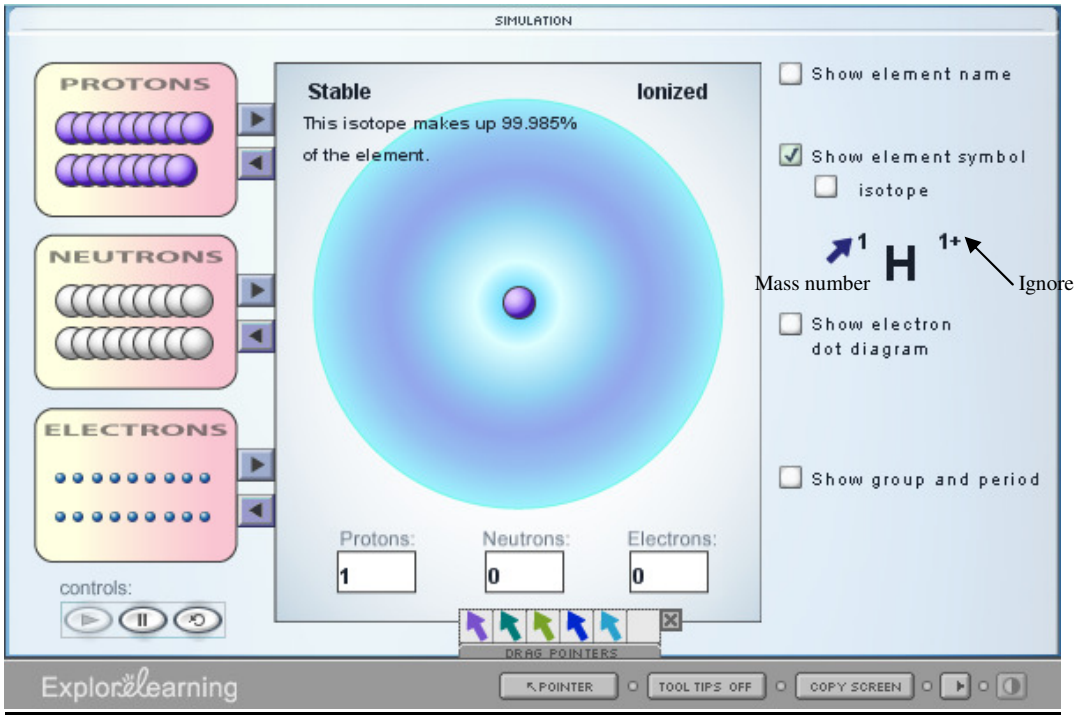
Number of electrons	Name of element	Atomic Number from Periodic Table
2		
3		
1		

a. Does changing the number of electrons change the identity of the element you have built?

KEY FACT: Now looking at questions 2a, 3a, and 4a, which subatomic particle is responsible for the identity of an atom?

Mass of an atom

5. Build an atom again with exactly 2 protons, 2 neutrons, and 2 electrons. Check "Show element symbol." Be sure "isotope" is not selected. Make adjustments to the atom to attain the number of protons, neutrons, and electrons as shown in the data table. Then finish filling in the table. ***The number to the upper left of the symbol indicates the mass of the atom.*** (See where the pointer is pointing in the screen shot.)



Number of protons	Number of neutrons	Number of electrons	Identity of atom (give name)	Mass of atom
2	2	2		
3	2	2		
2	3	2		
2	2	3		

a. Does the proton affect the mass of an atom? You MUST EXPLAIN by referring to an example or data from above .

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d. Looking at the atom in the Gizmo, where is most of the mass of an atom concentrated? Explain.

5. Which 2 subatomic particles affect the mass of an atom?

KEY FACT: Write a mathematical formula to show the relationship between the number of protons, the number of neutrons, and the mass number for an atom.

SUMMARY: Based on this gizmo, the number of protons equals the _____ _____ from the periodic table. The number of protons determines the _____ of an atom. The _____ and _____ determines the mass of an atom. The protons and neutrons are located in the _____ of an atom and electrons are in the _____ _____.

- How many protons are in the nucleus of an atom of Carbon (C)? _____
- What is the formula for finding the mass number of an atom? _____
- If an atom of C has 7 neutrons in the nucleus, then it would have a mass number of _____ (see previous 2 questions).
- How many electrons would be found in the nucleus? _____

Subatomic Particle Gizmo Name _____Sci # _____

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Location of Subatomic Particles

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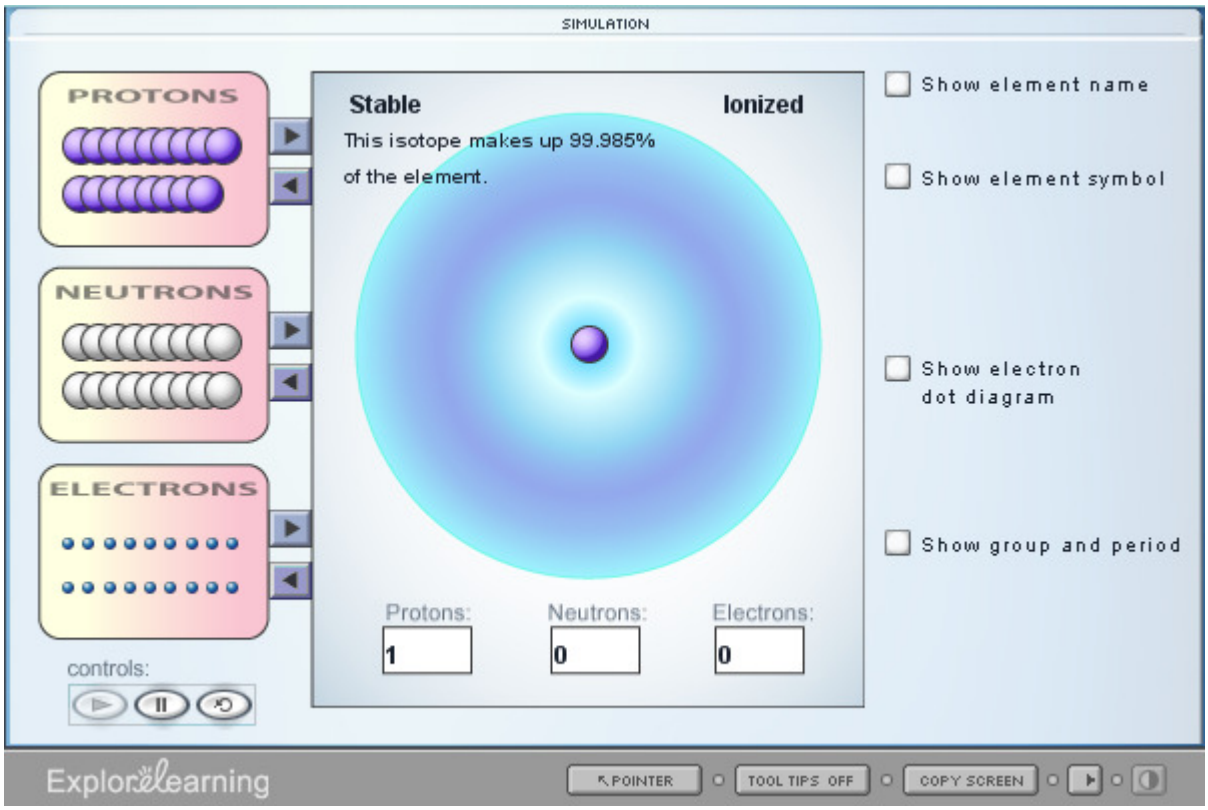

   a. Using the right arrows, add 1 proton, 2 neutrons, and 2 electrons to the atom so that there are 2 of each of the three particles located in the atom. Fill in the following chart.

Particle	Location
Proton	
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Identity of the Atom

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3		
1		

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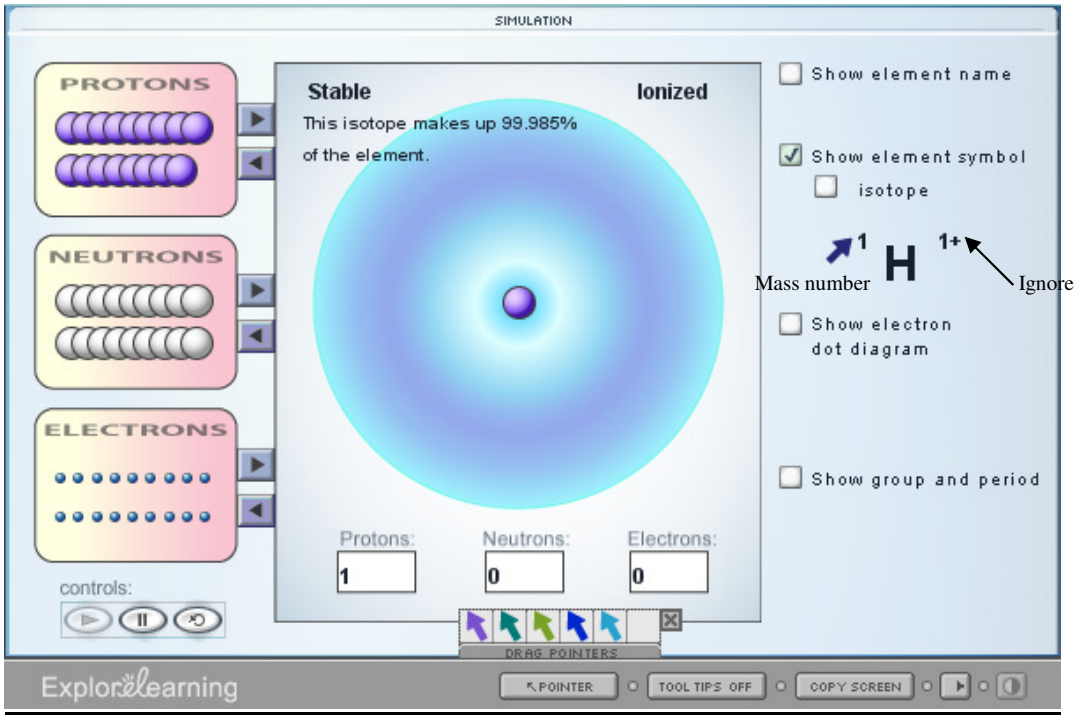

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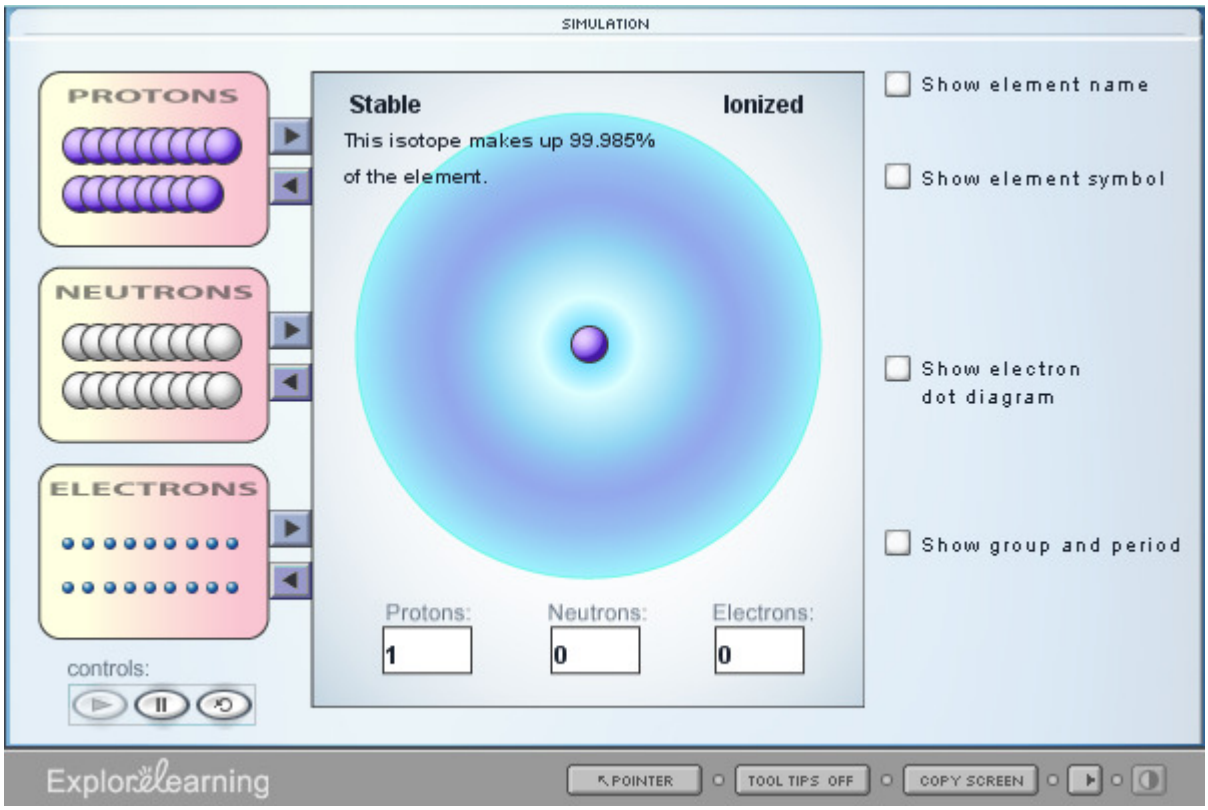

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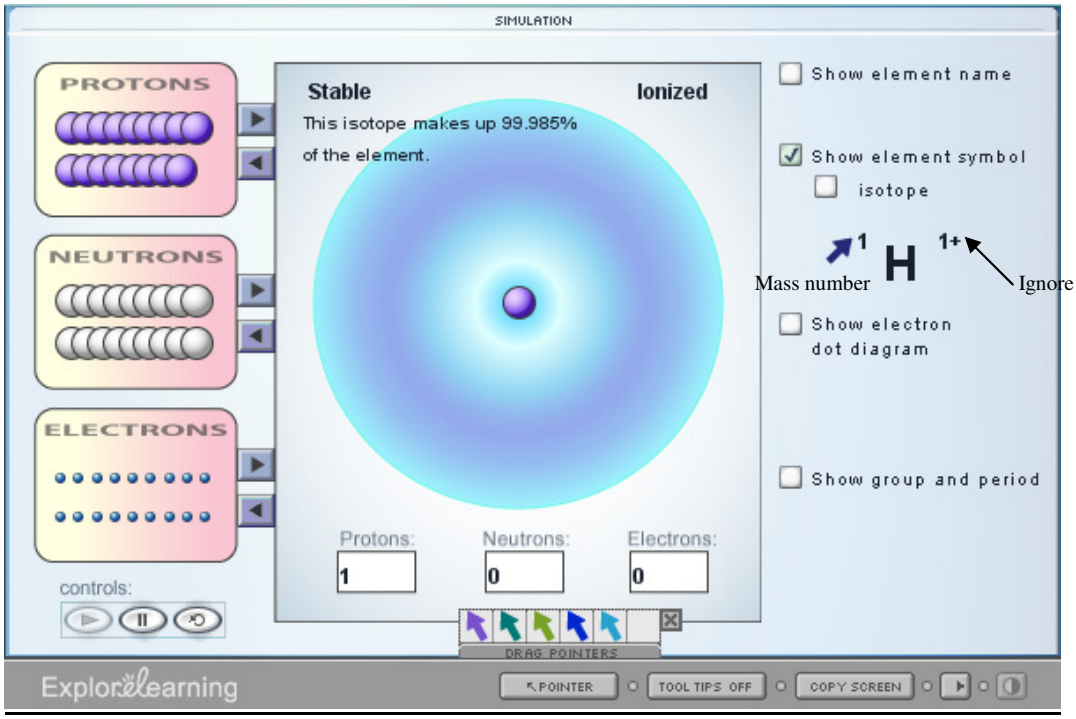

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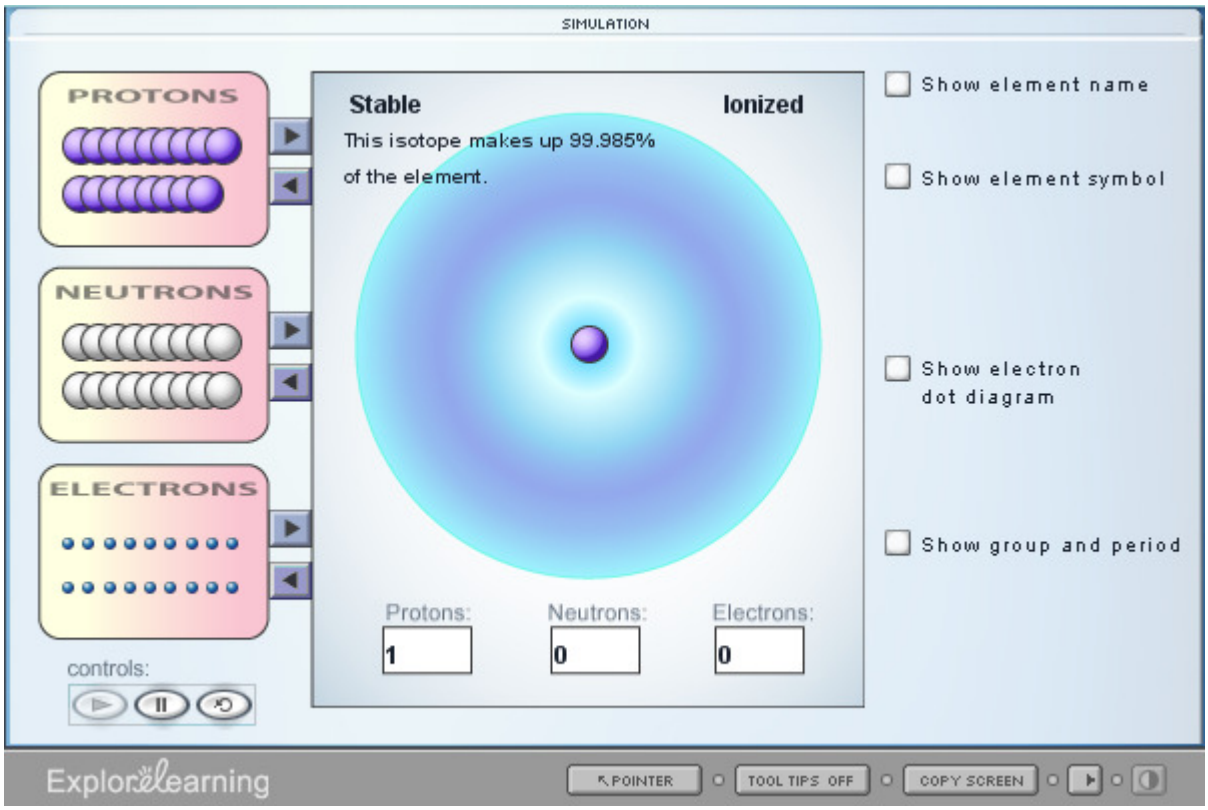

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Number of electrons	Name of element	Atomic Number from Periodic Table
2		
3		
1		

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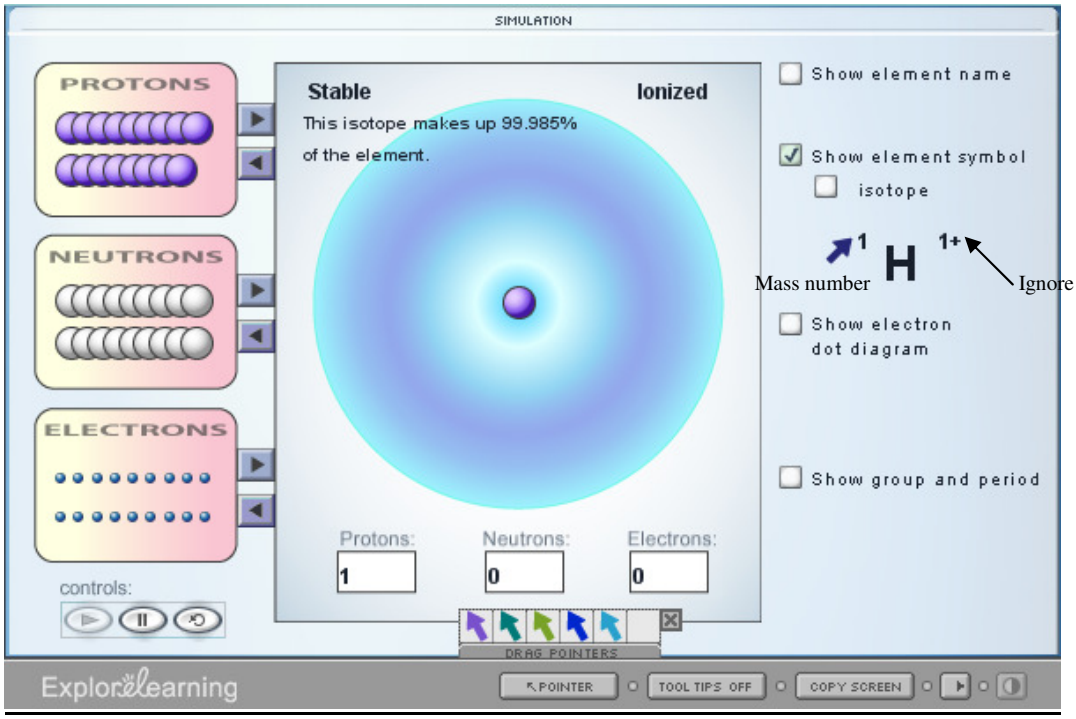

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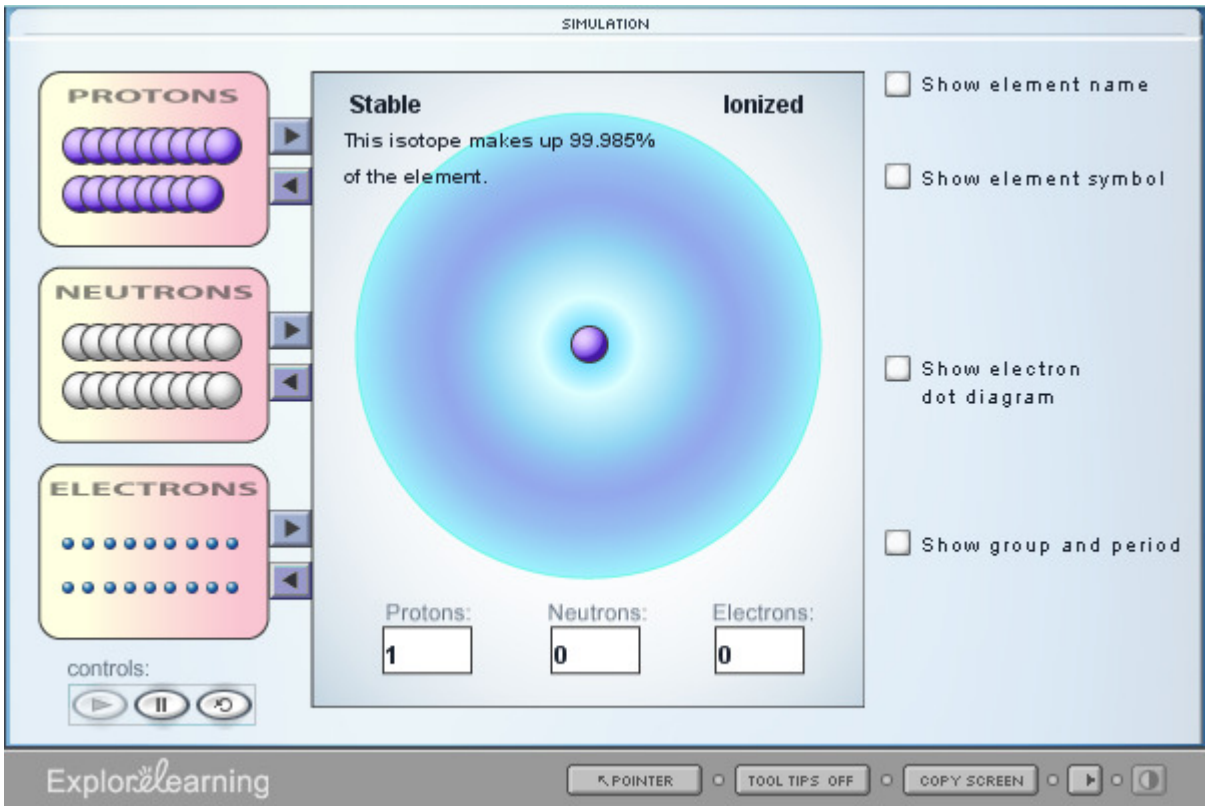

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2		
3		
1		

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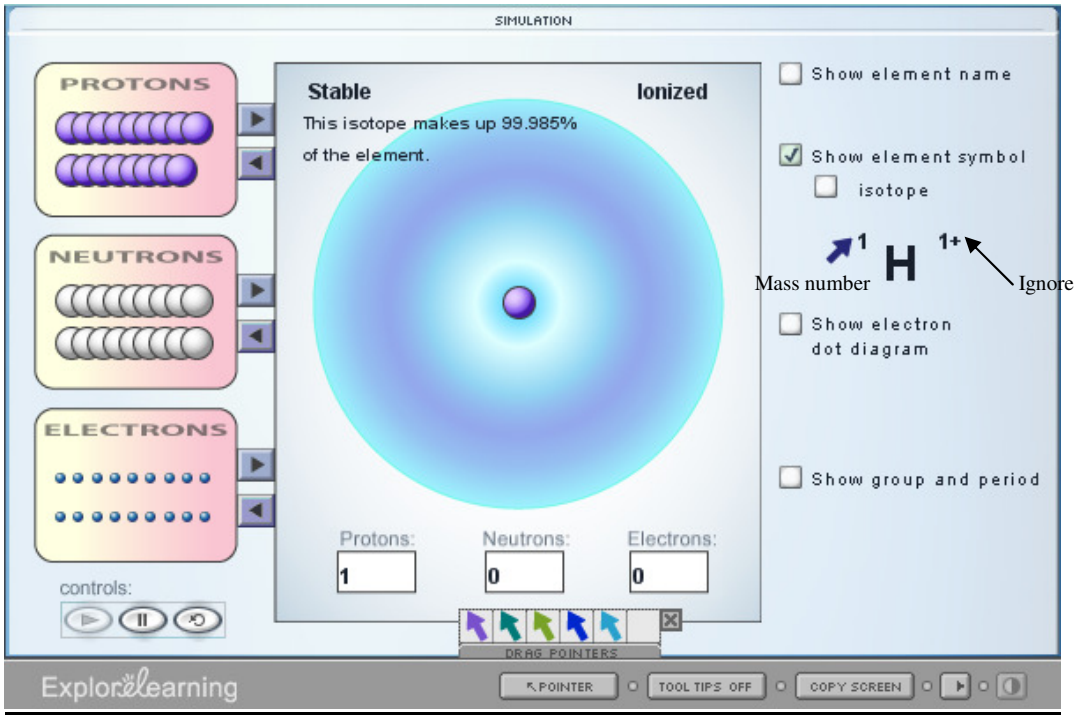

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Subatomic Particle Gizmo Name _____Sci # _____

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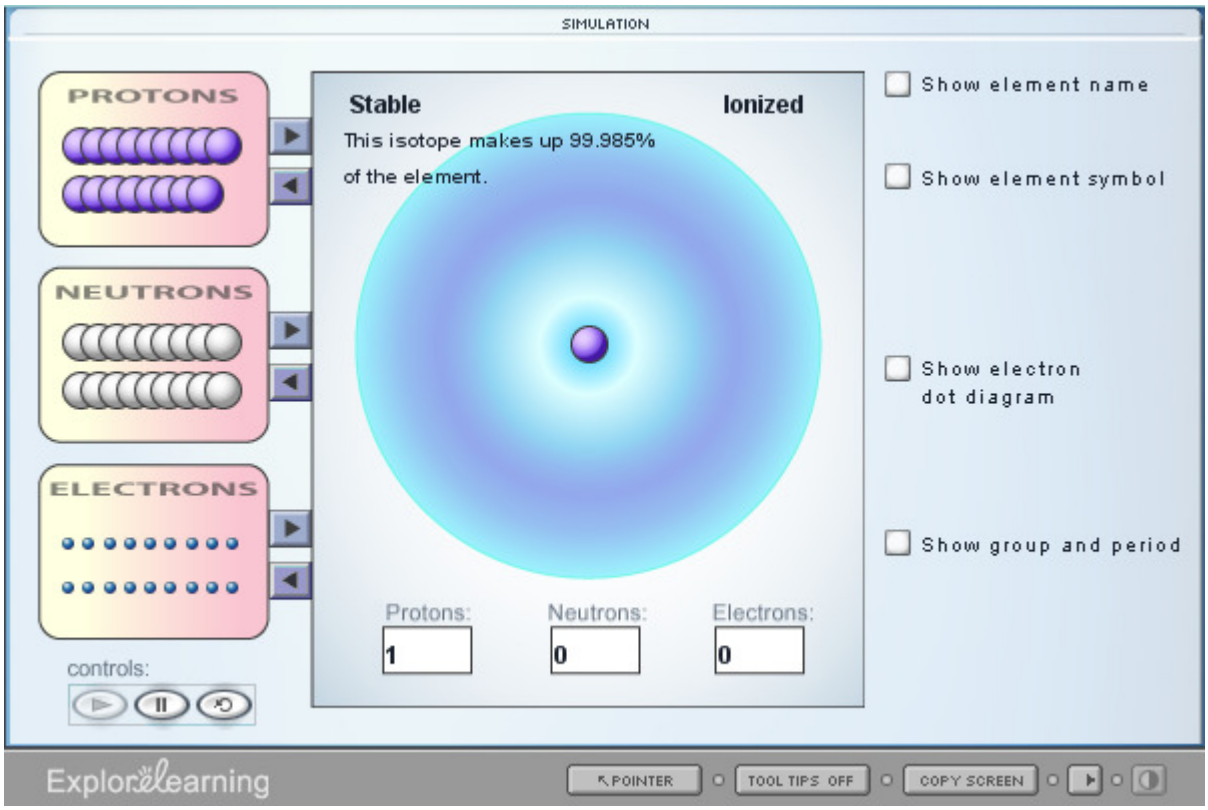
Once you log in, find the GIZMO named "Element Builder" Gizmo and select "Launch Gizmo."

Location of Subatomic Particles

1. In this Gizmo™, subatomic particles (protons, neutrons and electrons) can be added to an atom or removed from it by clicking the arrows next to each supply of particles. Remove any protons (the program will not let you remove the last proton), neutrons, or electrons that are currently in the atom by clicking the left arrows. You can also highlight the number with the cursor and change the numbers manually. Below is what the screen should look like when you begin. The center of the atom is the ***nucleus*** and the area around the nucleus is the ***electron cloud***.



   a. Using the right arrows, add 1 proton, 2 neutrons, and 2 electrons to the atom so that there are 2 of each of the three particles located in the atom. Fill in the following chart.

Particle	Location
Proton	
Neutron	
Electron	

Identity of the Atom

2. Place a check in the "Show element name" box, which is in the top right portion of the gizmo. Manipulate the number of protons to achieve the number of protons in the data table. Do not worry about the number of neutrons or electrons. Experiment with adding one and removing one proton to and from the atom. Fill in the following table. Once you have the identity of the element, look at the periodic table and write down the atomic number for the element, this is the larger number located by the element symbol.

Number of protons	Name of element	Atomic Number from Periodic Table
2		
3		
1		

   a. **Does changing the number of protons change the identity of the element you have built?**

   b. **What is the relationship between the number of protons and the atomic number for an element?**

3. Now you will do the same thing as step 2 except you will be changing the number of neutrons. Make sure that you begin with 2 each for the protons, neutrons, and electrons. Add one neutron to the atom to place 3 neutrons in the atom. Record the name of the element and look at the periodic table to find the atomic number. Next, take 2 neutrons away (a total of 1 should now be in the atom.) Again record the name of the atom and the atomic number from the periodic table.

Number of neutrons	Name of element	Atomic Number from Periodic Table
2		
3		
1		

   a. **Does changing the number of neutrons change the identity of the element you have built?**

   b. **Does changing the number of neutrons change the affect the atomic number?**

4. Make sure that you have 2 each for the protons, neutrons, and electrons. Add one electron to the atom to place 3 electrons in the atom. Record the name of the element and look at the periodic table to find the atomic number. Next, take 2 electrons away (a total of 1 should now be in the atom.) Again record the name of the atom and the atomic number from the periodic table.

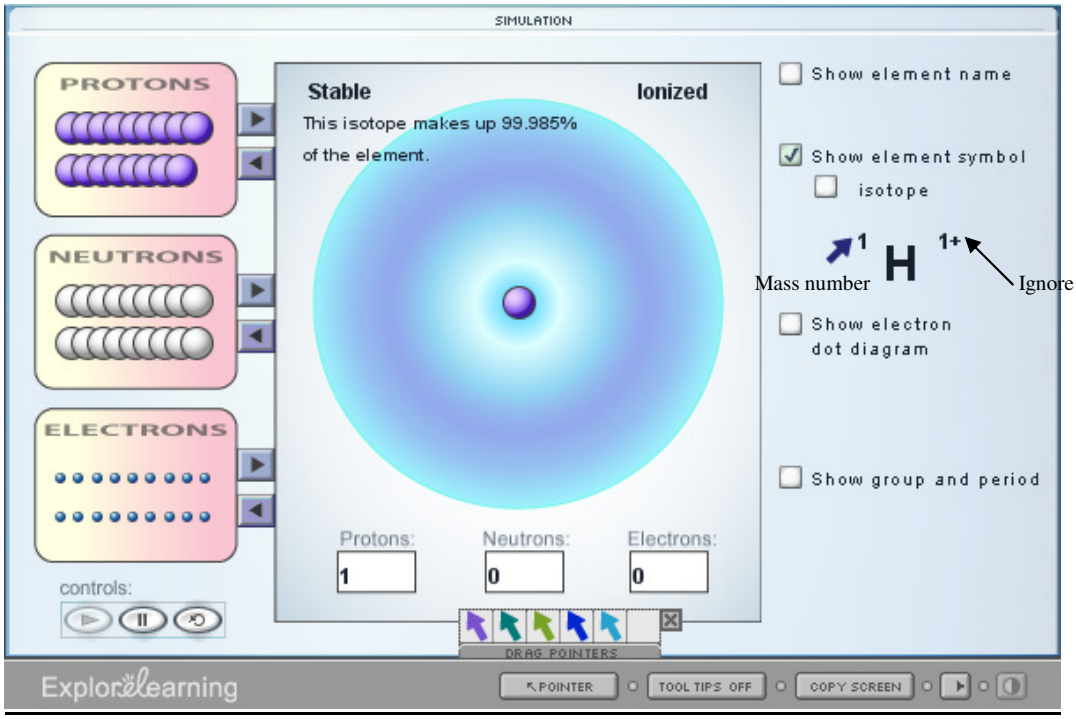
Number of electrons	Name of element	Atomic Number from Periodic Table
2		
3		
1		

a. Does changing the number of electrons change the identity of the element you have built?

KEY FACT: Now looking at questions 2a, 3a, and 4a, which subatomic particle is responsible for the identity of an atom?

Mass of an atom

5. Build an atom again with exactly 2 protons, 2 neutrons, and 2 electrons. Check "Show element symbol." Be sure "isotope" is not selected. Make adjustments to the atom to attain the number of protons, neutrons, and electrons as shown in the data table. Then finish filling in the table. ***The number to the upper left of the symbol indicates the mass of the atom.*** (See where the pointer is pointing in the screen shot.)



Number of protons	Number of neutrons	Number of electrons	Identity of atom (give name)	Mass of atom
2	2	2		
3	2	2		
2	3	2		
2	2	3		

a. Does the proton affect the mass of an atom? You MUST EXPLAIN by referring to an example or data from above .

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d. Looking at the atom in the Gizmo, where is most of the mass of an atom concentrated? Explain.

5. Which 2 subatomic particles affect the mass of an atom?

KEY FACT: Write a mathematical formula to show the relationship between the number of protons, the number of neutrons, and the mass number for an atom.

SUMMARY: Based on this gizmo, the number of protons equals the _____ _____ from the periodic table. The number of protons determines the _____ of an atom. The _____ and _____ determines the mass of an atom. The protons and neutrons are located in the _____ of an atom and electrons are in the _____ _____.

- How many protons are in the nucleus of an atom of Carbon (C)? _____
- What is the formula for finding the mass number of an atom? _____
- If an atom of C has 7 neutrons in the nucleus, then it would have a mass number of _____ (see previous 2 questions).
- How many electrons would be found in the nucleus? _____

Subatomic Particle Gizmo Name _____Sci # _____

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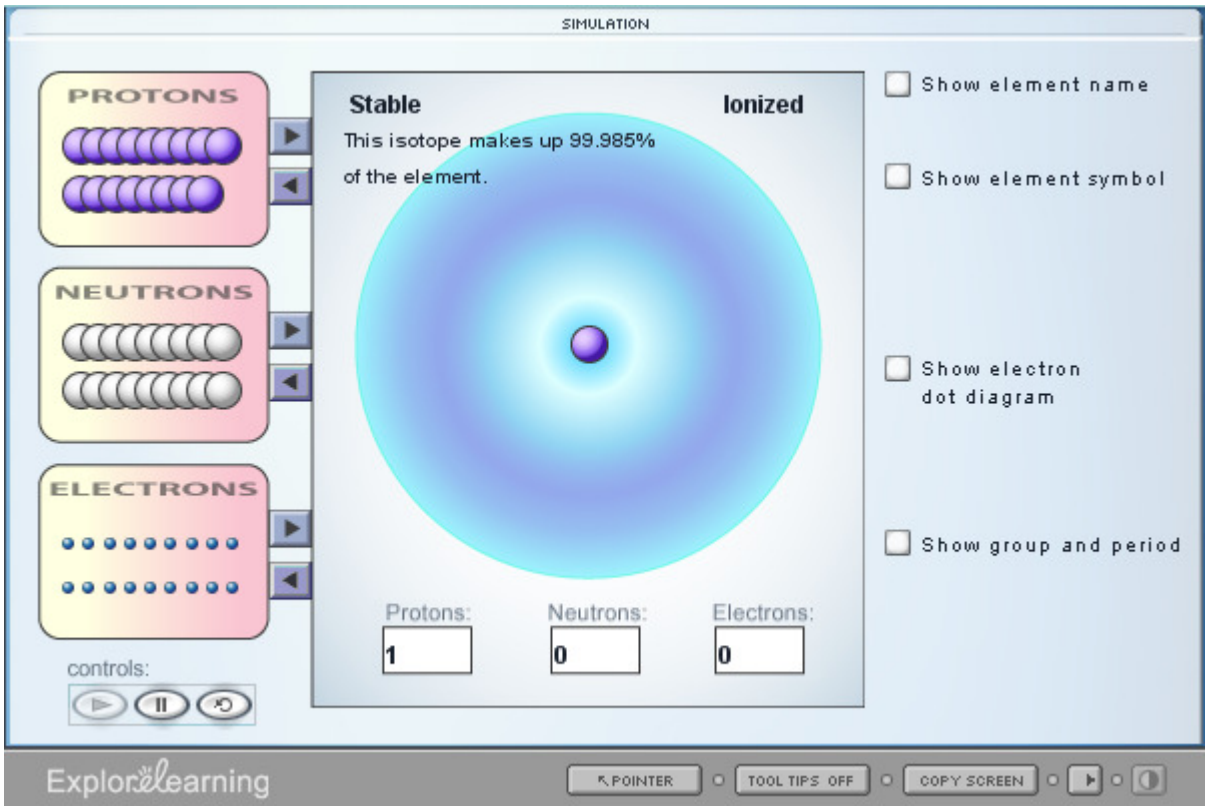

   a. Using the right arrows, add 1 proton, 2 neutrons, and 2 electrons to the atom so that there are 2 of each of the three particles located in the atom. Fill in the following chart.

Particle	Location
Proton	
Neutron	
Electron	

Identity of the Atom

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3		
1		

   a. **Does changing the number of neutrons change the identity of the element you have built?**

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Number of electrons	Name of element	Atomic Number from Periodic Table
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3		
1		

a. Does changing the number of electrons change the identity of the element you have built?

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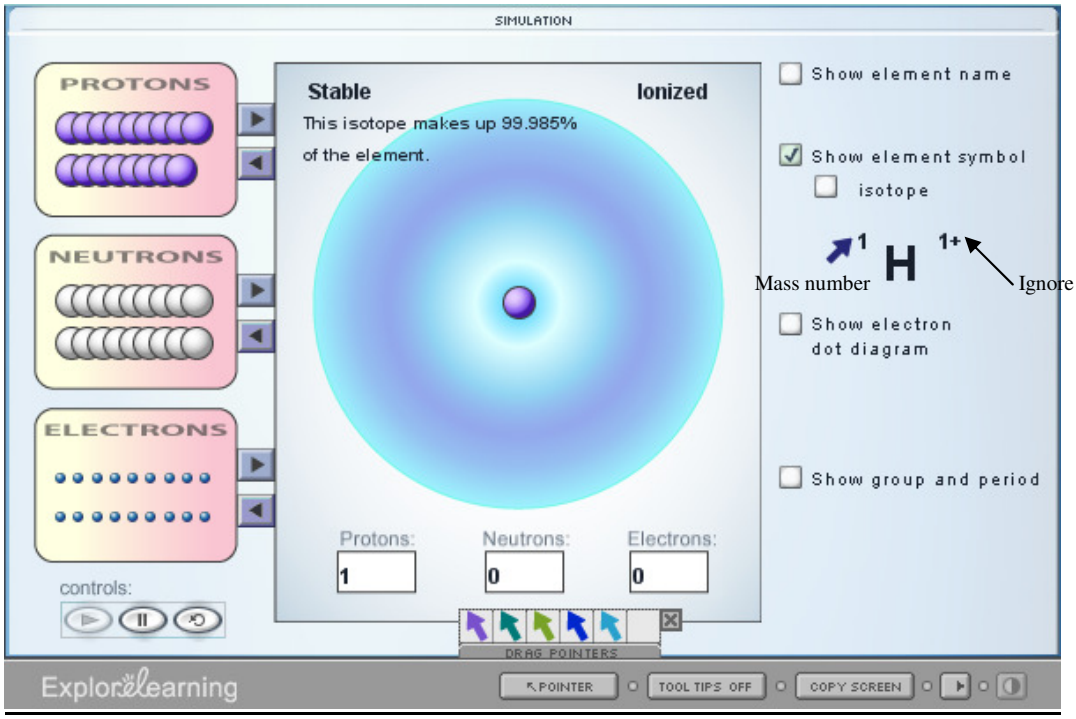
5. Build an atom again with exactly 2 protons, 2 neutrons, and 2 electrons. Check "Show element symbol." Be sure "isotope" is not selected. Make adjustments to the atom to attain the number of protons, neutrons, and electrons as shown in the data table. Then finish filling in the table. ***The number to the upper left of the symbol indicates the mass of the atom.*** (See where the pointer is pointing in the screen shot.)



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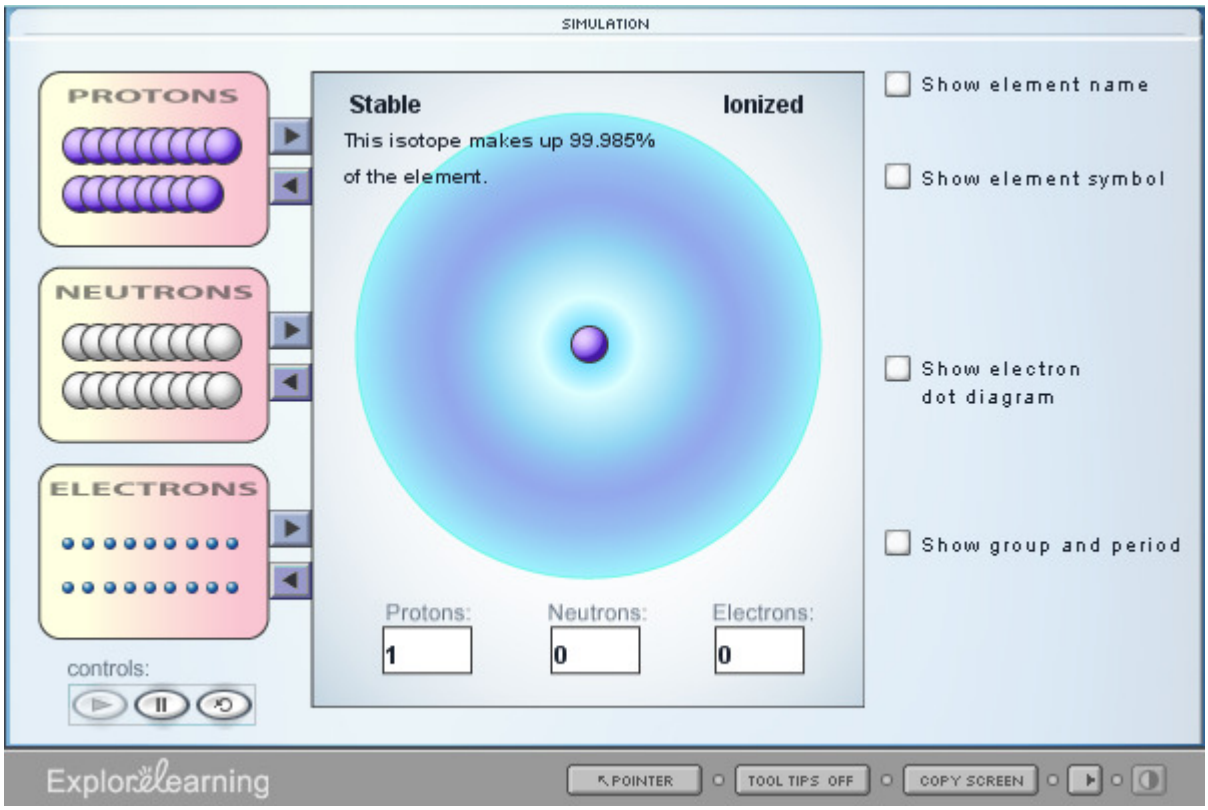

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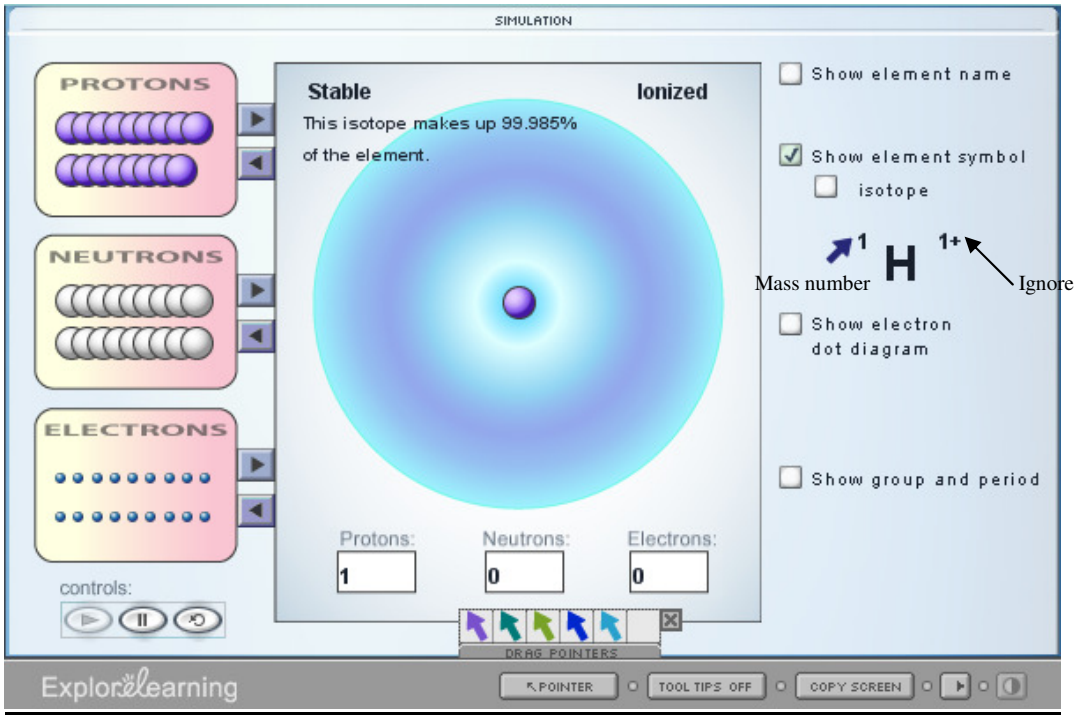

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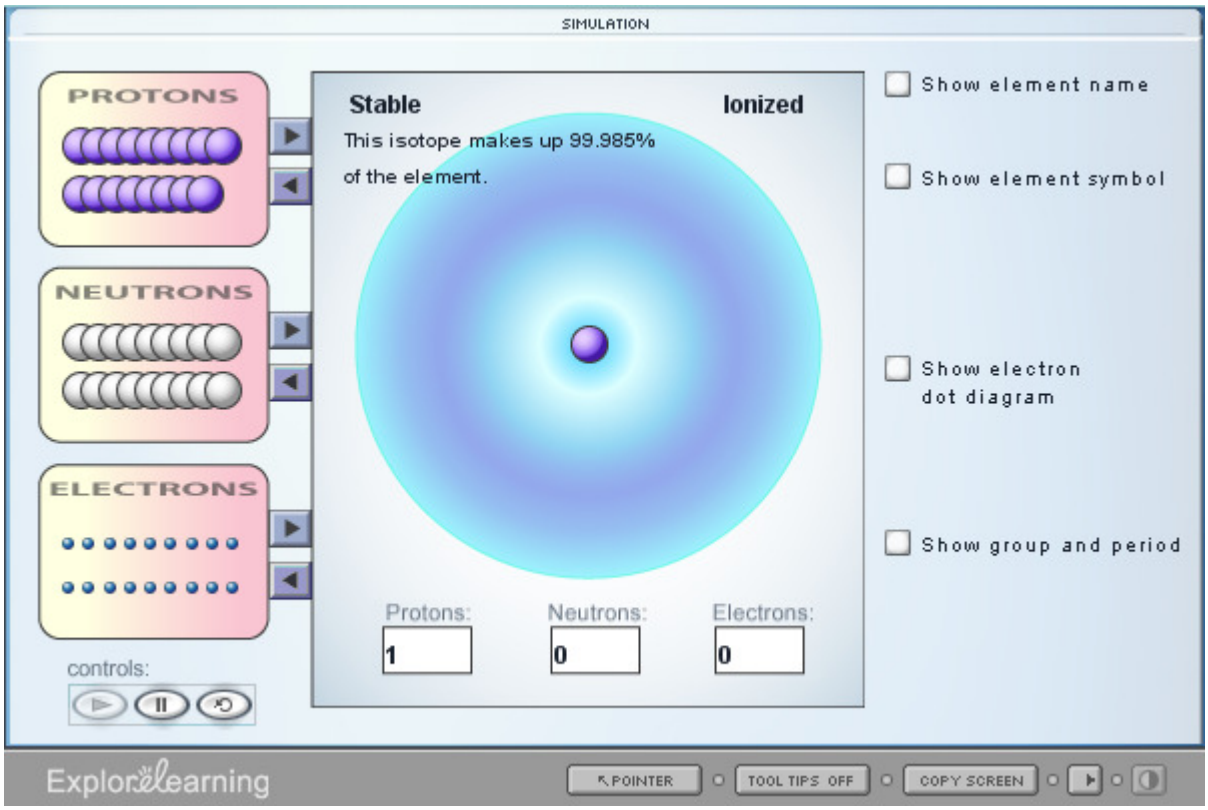

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3		
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Number of electrons	Name of element	Atomic Number from Periodic Table
2		
3		
1		

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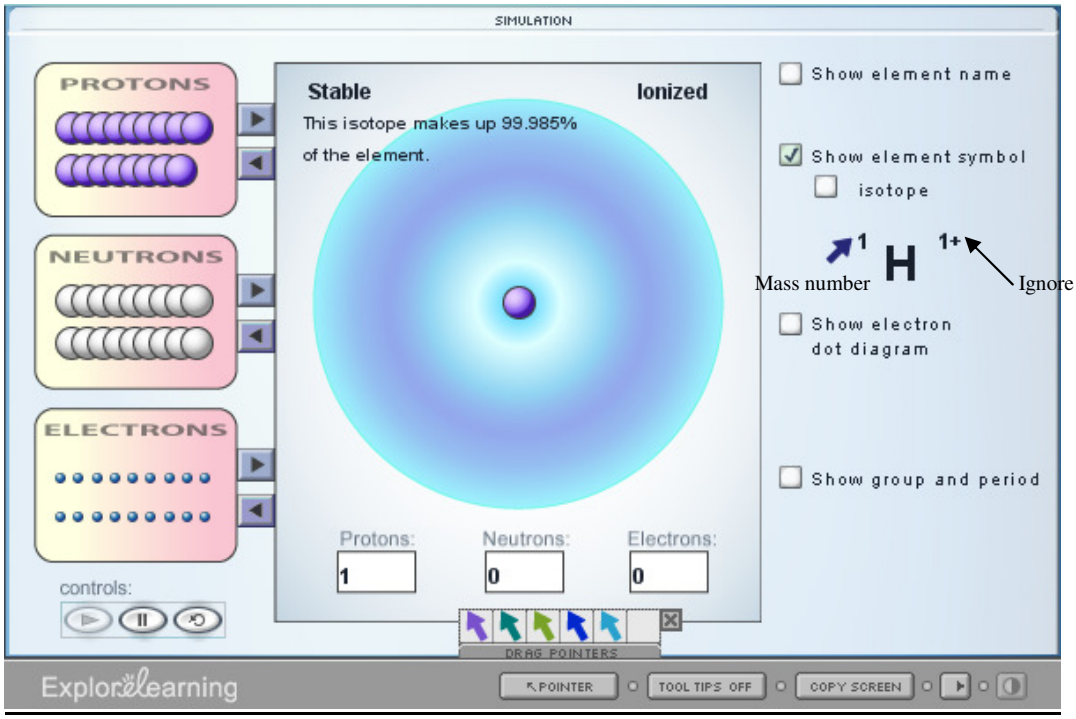

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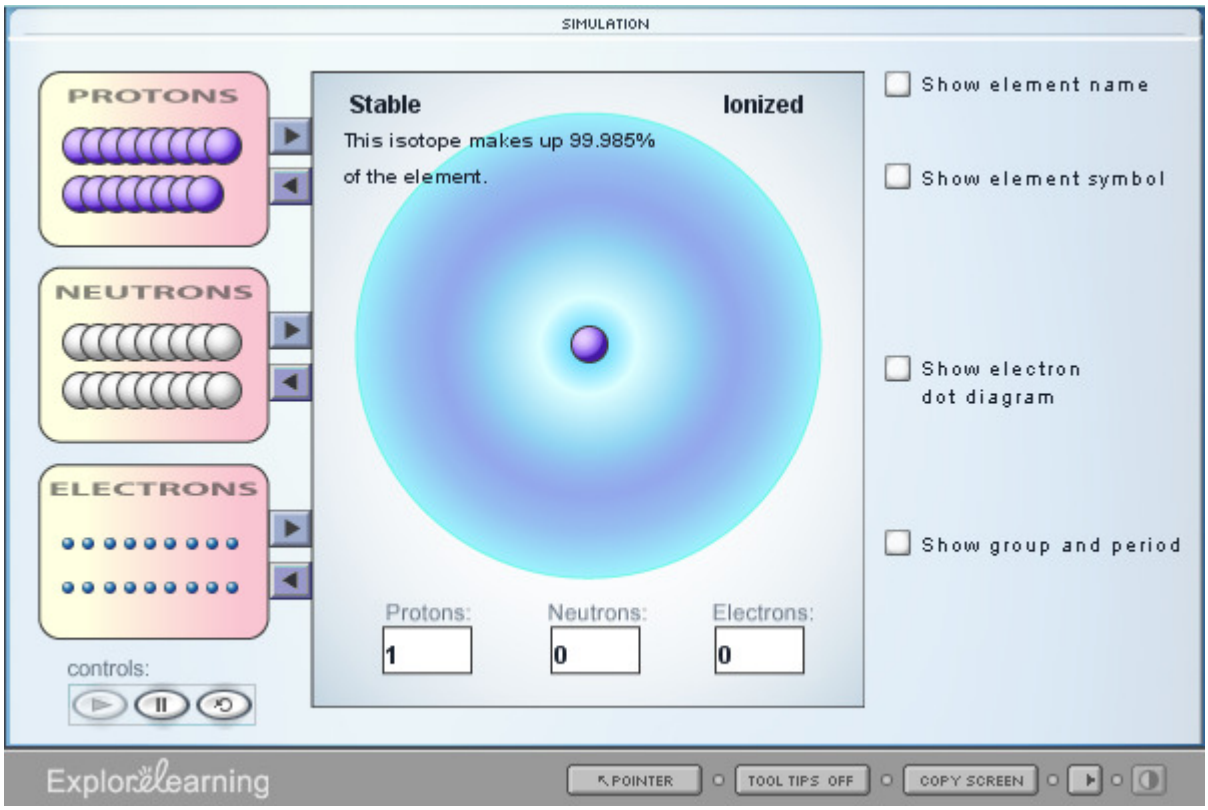

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Number of neutrons	Name of element	Atomic Number from Periodic Table
2		
3		
1		

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Number of electrons	Name of element	Atomic Number from Periodic Table
2		
3		
1		

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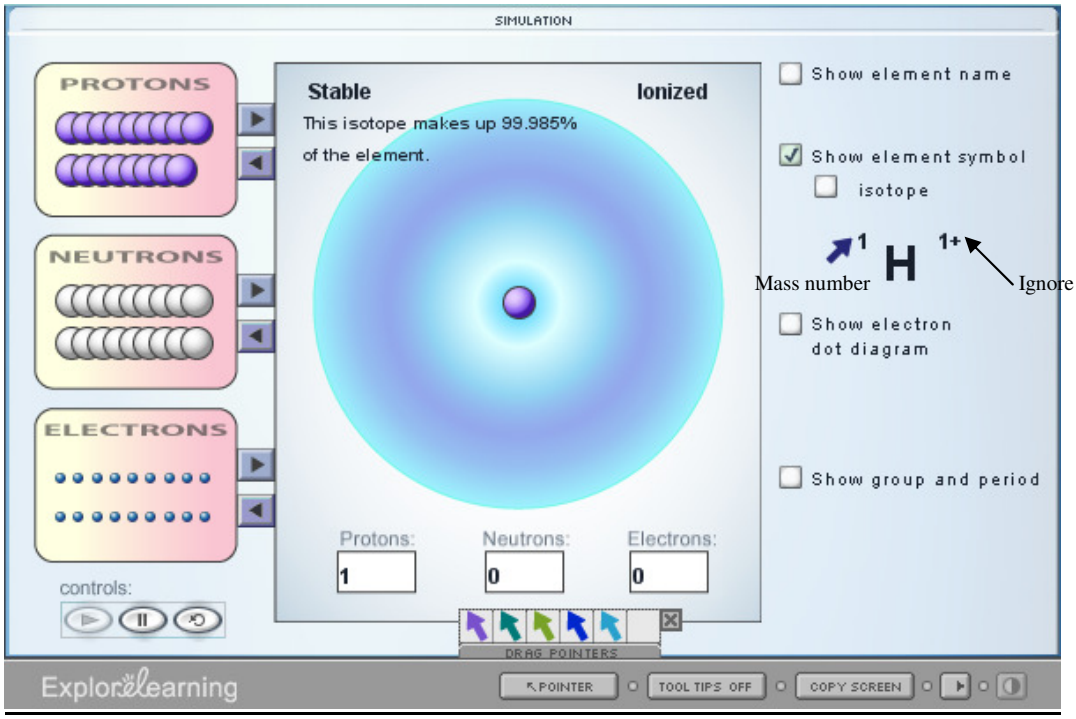

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Subatomic Particle Gizmo Name _____Sci # _____

Some of the greatest breakthroughs in understanding the structure of the atom were provided by J. J. Thompson during his time at the renowned Cavendish Laboratory in Cambridge, England. Thompson had a reputation for being rather clumsy with his hands, and he always needed to have assistants to set up equipment for him. Nevertheless, he was a brilliant experimental physicist. Work conducted under his watchful eye led to the first discovery of a subatomic particle, the electron.

Once you log in, find the GIZMO named "Element Builder" Gizmo and select "Launch Gizmo."

Location of Subatomic Particles

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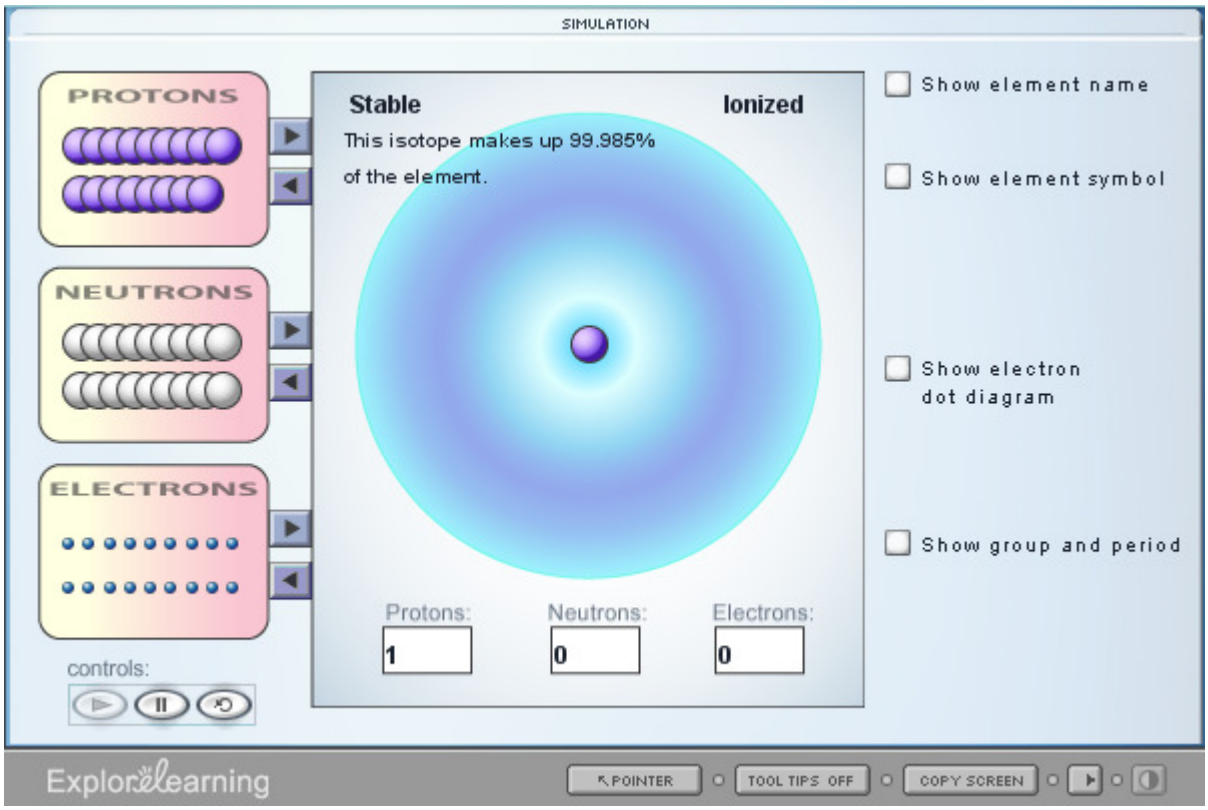


   a. Using the right arrows, add 1 proton, 2 neutrons, and 2 electrons to the atom so that there are 2 of each of the three particles located in the atom. Fill in the following chart.

Particle	Location
Proton	
Neutron	
Electron	

Identity of the Atom

2. Place a check in the "Show element name" box, which is in the top right portion of the gizmo. Manipulate the number of protons to achieve the number of protons in the data table. Do not worry about the number of neutrons or electrons. Experiment with adding one and removing one proton to and from the atom. Fill in the following table. Once you have the identity of the element, look at the periodic table and write down the atomic number for the element, this is the larger number located by the element symbol.

Number of protons	Name of element	Atomic Number from Periodic Table
2		
3		
1		

   a. **Does changing the number of protons change the identity of the element you have built?**

   b. **What is the relationship between the number of protons and the atomic number for an element?**

3. Now you will do the same thing as step 2 except you will be changing the number of neutrons. Make sure that you begin with 2 each for the protons, neutrons, and electrons. Add one neutron to the atom to place 3 neutrons in the atom. Record the name of the element and look at the periodic table to find the atomic number. Next, take 2 neutrons away (a total of 1 should now be in the atom.) Again record the name of the atom and the atomic number from the periodic table.

Number of neutrons	Name of element	Atomic Number from Periodic Table
2		
3		
1		

   a. **Does changing the number of neutrons change the identity of the element you have built?**

   b. **Does changing the number of neutrons change the affect the atomic number?**

4. Make sure that you have 2 each for the protons, neutrons, and electrons. Add one electron to the atom to place 3 electrons in the atom. Record the name of the element and look at the periodic table to find the atomic number. Next, take 2 electrons away (a total of 1 should now be in the atom.) Again record the name of the atom and the atomic number from the periodic table.

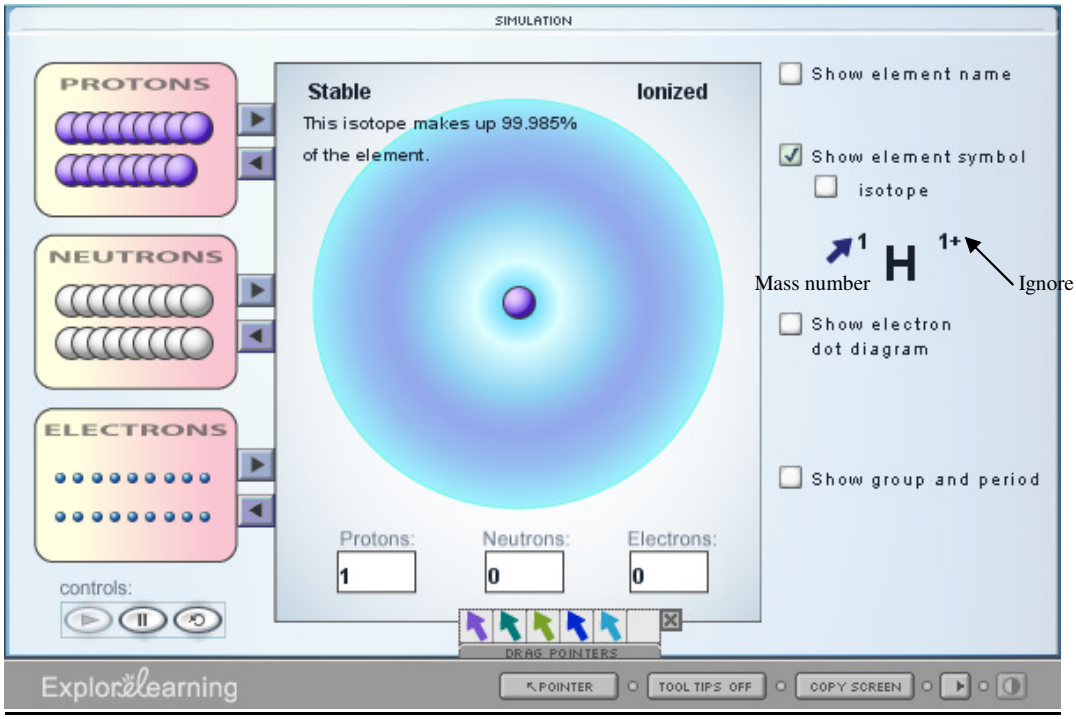
Number of electrons	Name of element	Atomic Number from Periodic Table
2		
3		
1		

a. Does changing the number of electrons change the identity of the element you have built?

KEY FACT: Now looking at questions 2a, 3a, and 4a, which subatomic particle is responsible for the identity of an atom?

Mass of an atom

5. Build an atom again with exactly 2 protons, 2 neutrons, and 2 electrons. Check "Show element symbol." Be sure "isotope" is not selected. Make adjustments to the atom to attain the number of protons, neutrons, and electrons as shown in the data table. Then finish filling in the table. ***The number to the upper left of the symbol indicates the mass of the atom.*** (See where the pointer is pointing in the screen shot.)



Number of protons	Number of neutrons	Number of electrons	Identity of atom (give name)	Mass of atom
2	2	2		
3	2	2		
2	3	2		
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a. Does the proton affect the mass of an atom? You MUST EXPLAIN by referring to an example or data from above .

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d. Looking at the atom in the Gizmo, where is most of the mass of an atom concentrated? Explain.

5. Which 2 subatomic particles affect the mass of an atom?

KEY FACT: Write a mathematical formula to show the relationship between the number of protons, the number of neutrons, and the mass number for an atom.

SUMMARY: Based on this gizmo, the number of protons equals the _____ _____ from the periodic table. The number of protons determines the _____ of an atom. The _____ and _____ determines the mass of an atom. The protons and neutrons are located in the _____ of an atom and electrons are in the _____ _____.

- How many protons are in the nucleus of an atom of Carbon (C)? _____
- What is the formula for finding the mass number of an atom? _____
- If an atom of C has 7 neutrons in the nucleus, then it would have a mass number of _____ (see previous 2 questions).
- How many electrons would be found in the nucleus? _____

Subatomic Particle Gizmo Name _____Sci # _____

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Location of Subatomic Particles

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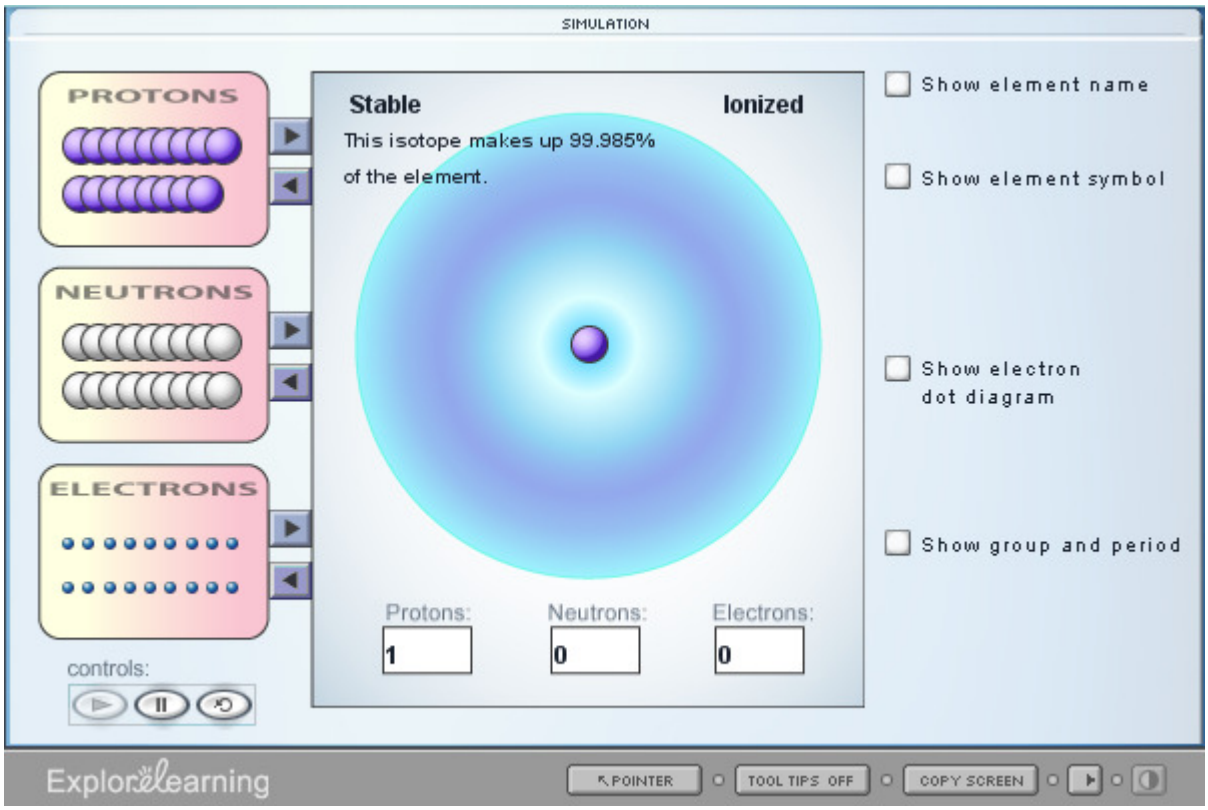

   a. Using the right arrows, add 1 proton, 2 neutrons, and 2 electrons to the atom so that there are 2 of each of the three particles located in the atom. Fill in the following chart.

Particle	Location
Proton	
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Electron	

Identity of the Atom

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Number of neutrons	Name of element	Atomic Number from Periodic Table
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3		
1		

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Number of electrons	Name of element	Atomic Number from Periodic Table
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3		
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a. Does changing the number of electrons change the identity of the element you have built?

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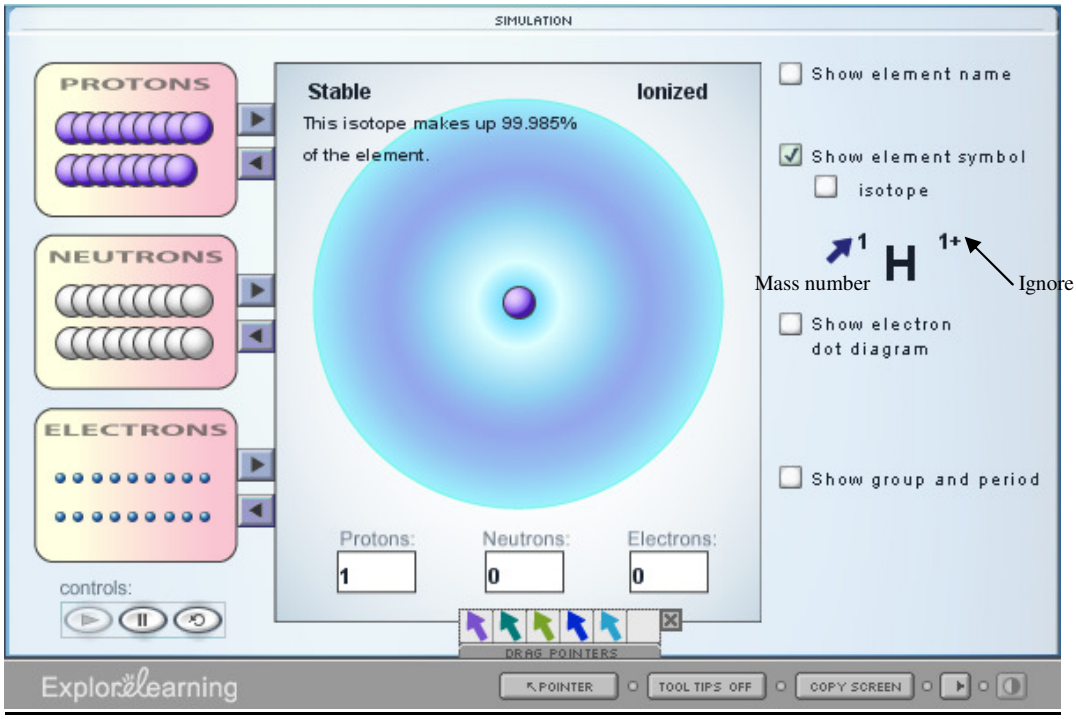

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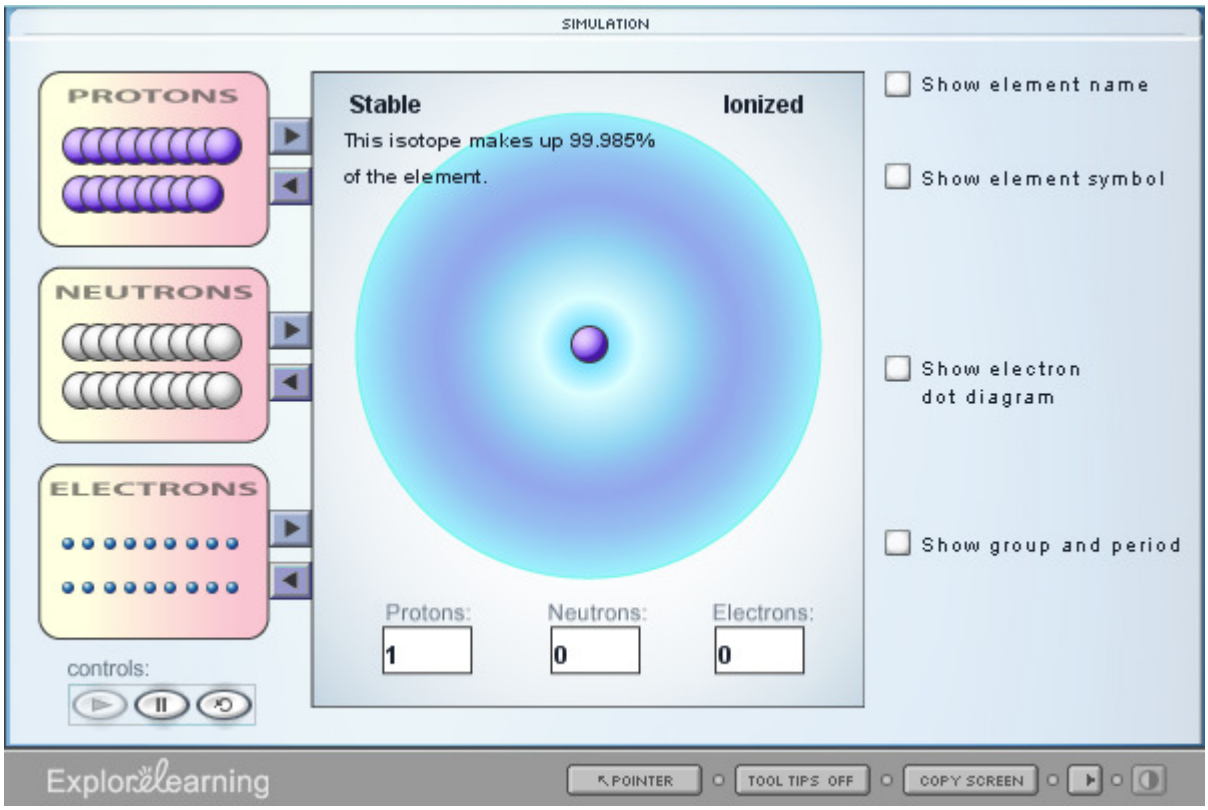

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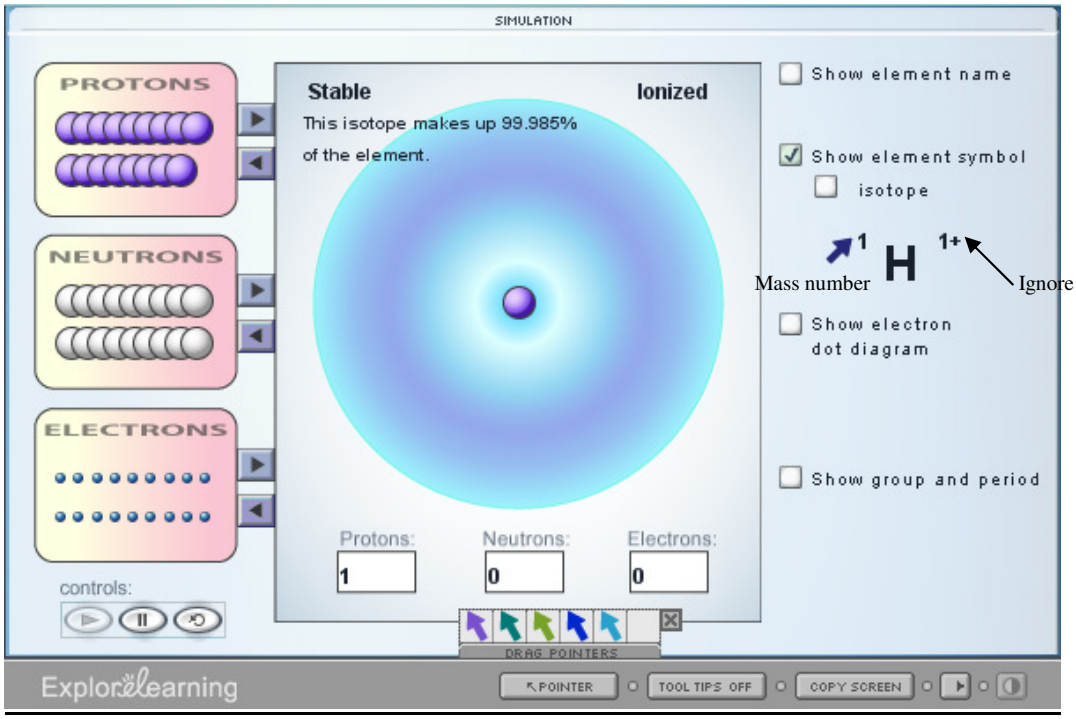

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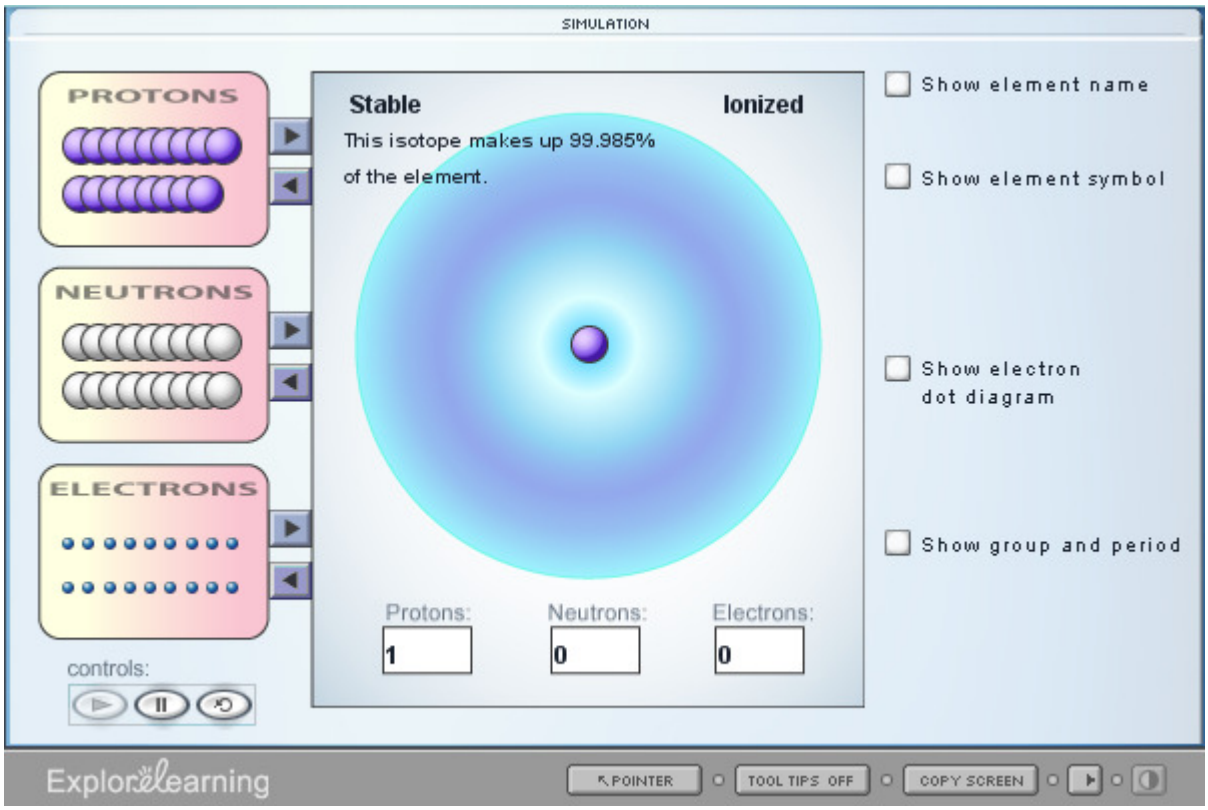

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Number of electrons	Name of element	Atomic Number from Periodic Table
2		
3		
1		

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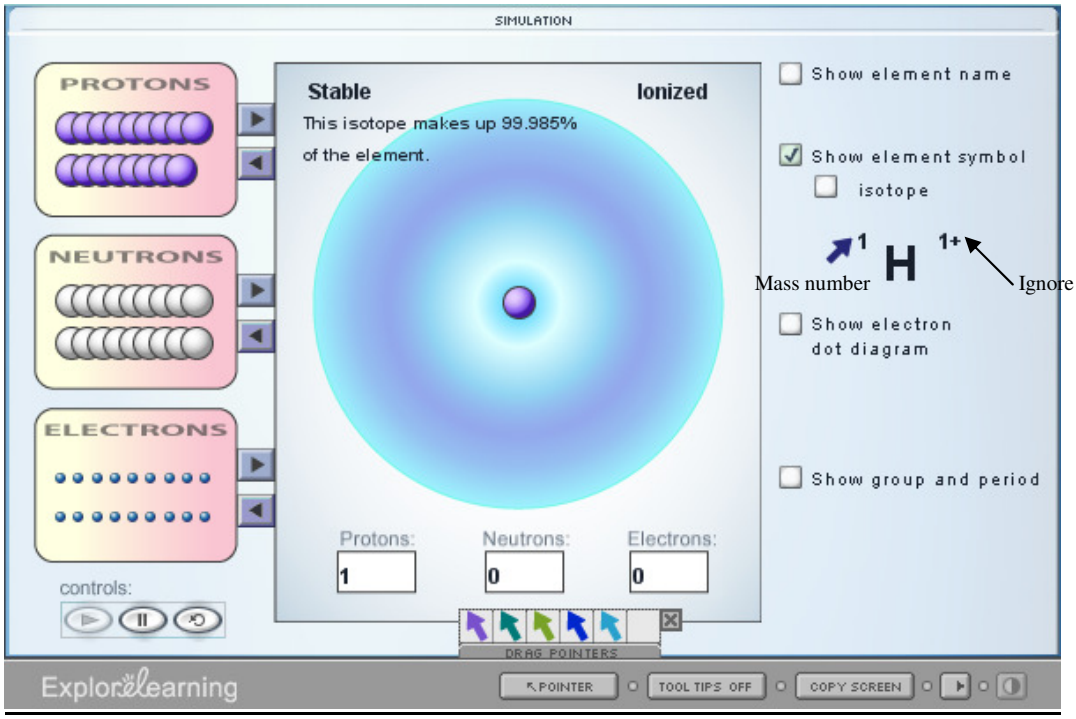

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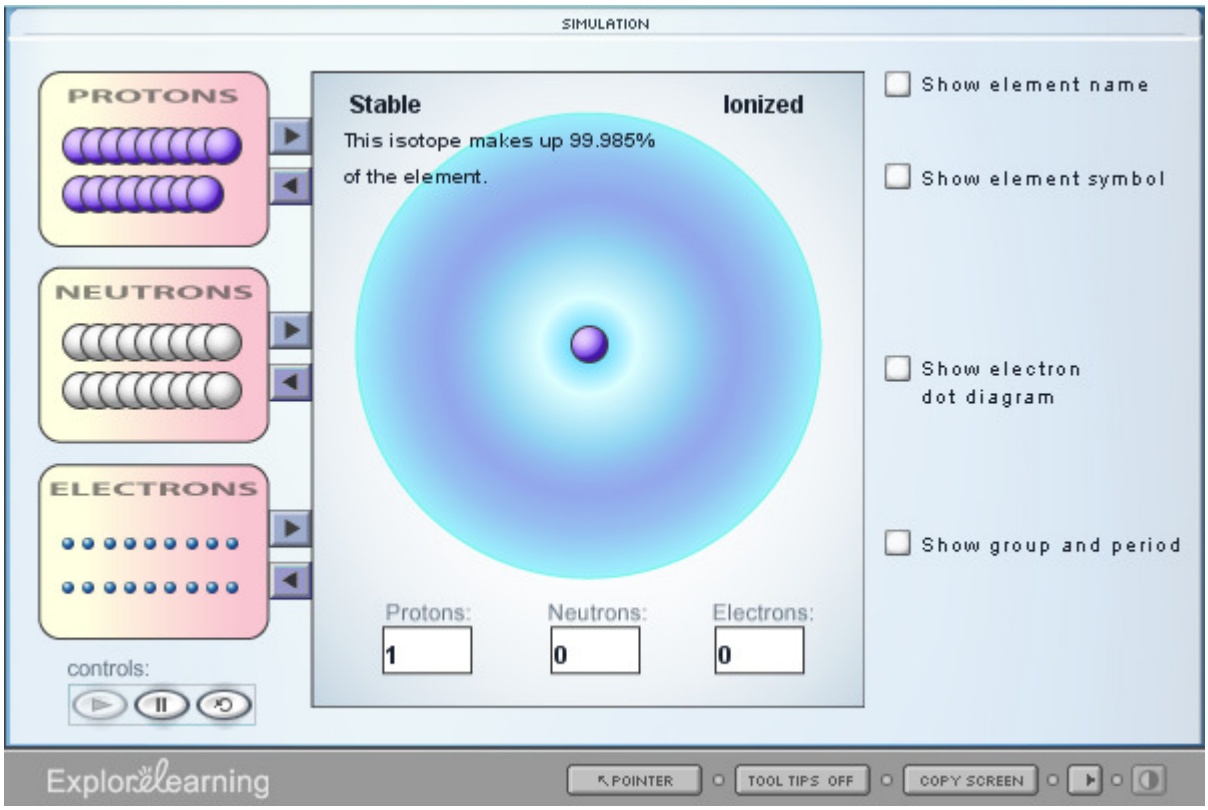

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Neutron	
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Number of electrons	Name of element	Atomic Number from Periodic Table
2		
3		
1		

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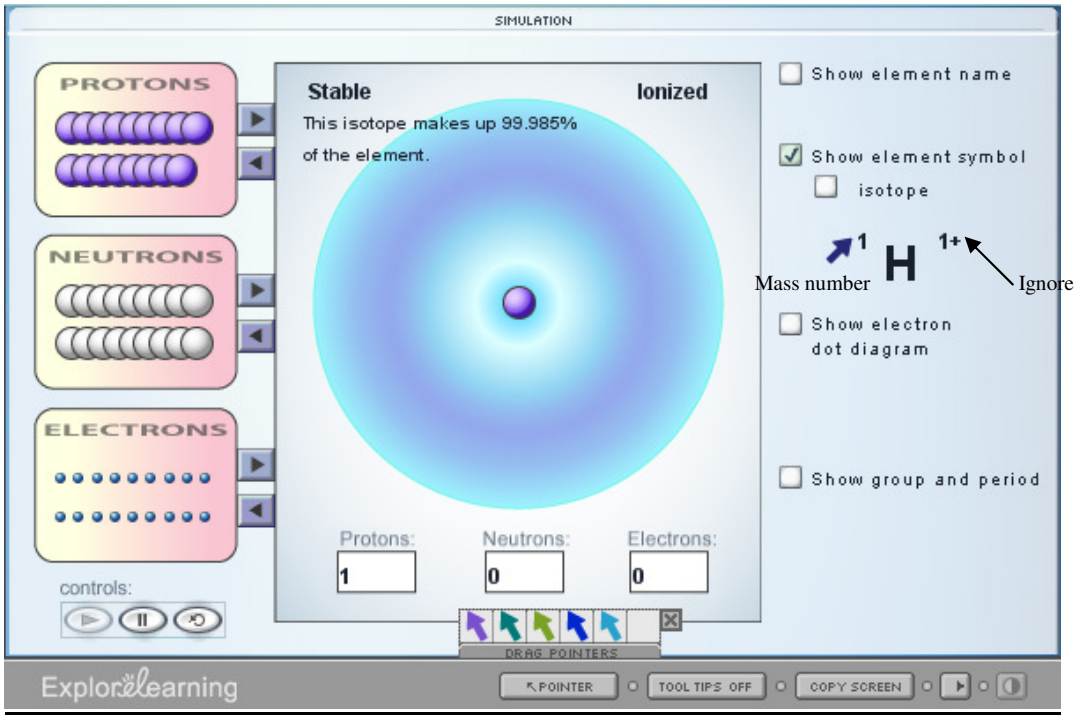

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Subatomic Particle Gizmo Name _____Sci # _____

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Once you log in, find the GIZMO named "Element Builder" Gizmo and select "Launch Gizmo."

Location of Subatomic Particles

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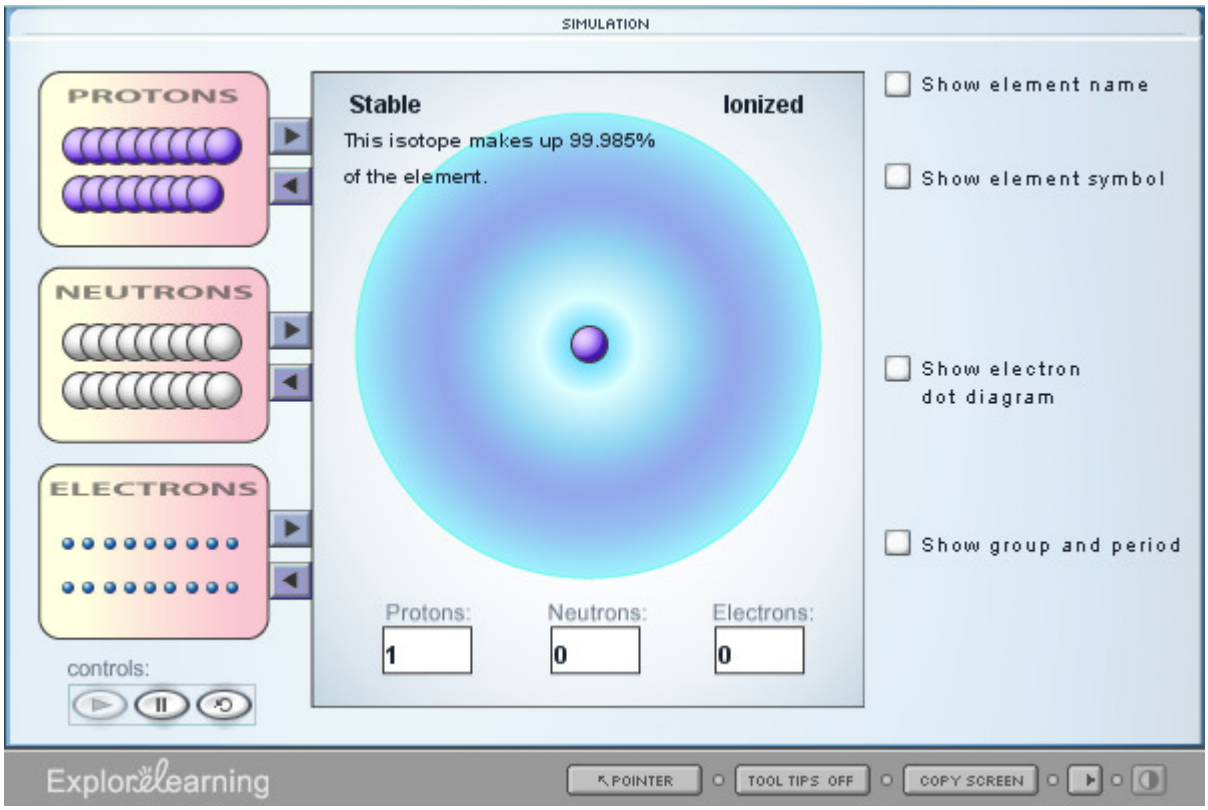


   a. Using the right arrows, add 1 proton, 2 neutrons, and 2 electrons to the atom so that there are 2 of each of the three particles located in the atom. Fill in the following chart.

Particle	Location
Proton	
Neutron	
Electron	

Identity of the Atom

2. Place a check in the "Show element name" box, which is in the top right portion of the gizmo. Manipulate the number of protons to achieve the number of protons in the data table. Do not worry about the number of neutrons or electrons. Experiment with adding one and removing one proton to and from the atom. Fill in the following table. Once you have the identity of the element, look at the periodic table and write down the atomic number for the element, this is the larger number located by the element symbol.

Number of protons	Name of element	Atomic Number from Periodic Table
2		
3		
1		

   a. **Does changing the number of protons change the identity of the element you have built?**

   b. **What is the relationship between the number of protons and the atomic number for an element?**

3. Now you will do the same thing as step 2 except you will be changing the number of neutrons. Make sure that you begin with 2 each for the protons, neutrons, and electrons. Add one neutron to the atom to place 3 neutrons in the atom. Record the name of the element and look at the periodic table to find the atomic number. Next, take 2 neutrons away (a total of 1 should now be in the atom.) Again record the name of the atom and the atomic number from the periodic table.

Number of neutrons	Name of element	Atomic Number from Periodic Table
2		
3		
1		

   a. **Does changing the number of neutrons change the identity of the element you have built?**

   b. **Does changing the number of neutrons change the affect the atomic number?**

4. Make sure that you have 2 each for the protons, neutrons, and electrons. Add one electron to the atom to place 3 electrons in the atom. Record the name of the element and look at the periodic table to find the atomic number. Next, take 2 electrons away (a total of 1 should now be in the atom.) Again record the name of the atom and the atomic number from the periodic table.

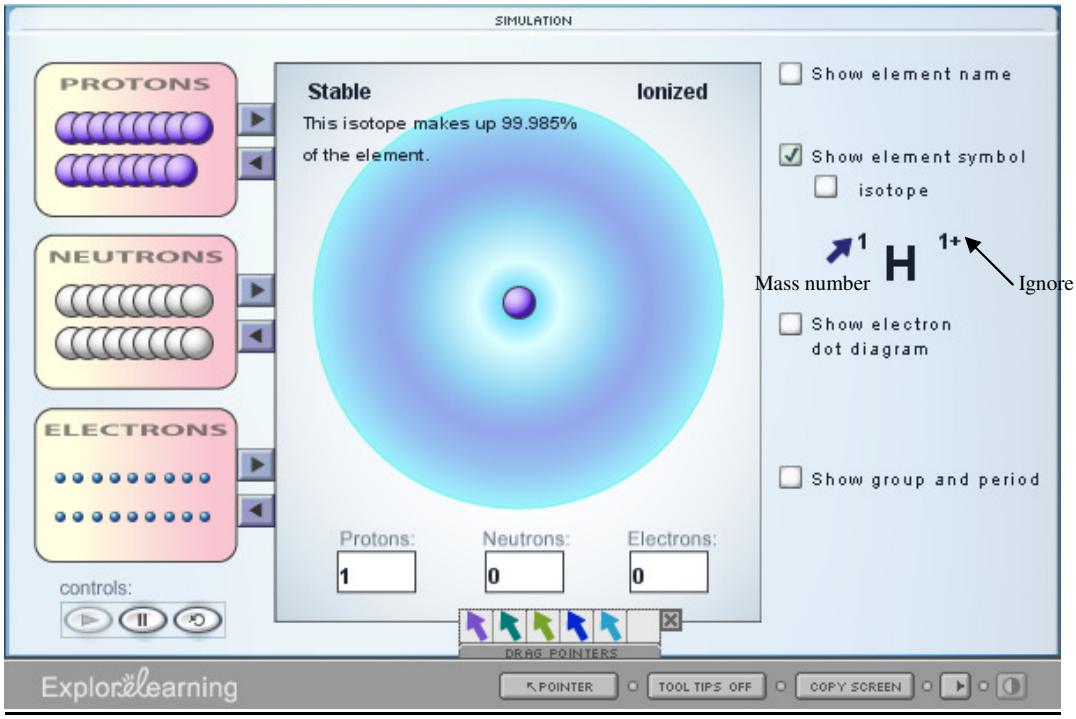
Number of electrons	Name of element	Atomic Number from Periodic Table
2		
3		
1		

a. Does changing the number of electrons change the identity of the element you have built?

KEY FACT: Now looking at questions 2a, 3a, and 4a, which subatomic particle is responsible for the identity of an atom?

Mass of an atom

5. Build an atom again with exactly 2 protons, 2 neutrons, and 2 electrons. Check "Show element symbol." Be sure "isotope" is not selected. Make adjustments to the atom to attain the number of protons, neutrons, and electrons as shown in the data table. Then finish filling in the table. ***The number to the upper left of the symbol indicates the mass of the atom.*** (See where the pointer is pointing in the screen shot.)



Number of protons	Number of neutrons	Number of electrons	Identity of atom (give name)	Mass of atom
2	2	2		
3	2	2		
2	3	2		
2	2	3		

a. Does the proton affect the mass of an atom? You MUST EXPLAIN by referring to an example or data from above .

b. Does the neutron affect the mass of an atom? You MUST justify your answer. You MUST EXPLAIN by referring to an example or data from above.

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d. Looking at the atom in the Gizmo, where is most of the mass of an atom concentrated? Explain.

5. Which 2 subatomic particles affect the mass of an atom?

KEY FACT: Write a mathematical formula to show the relationship between the number of protons, the number of neutrons, and the mass number for an atom.

SUMMARY: Based on this gizmo, the number of protons equals the _____ _____ from the periodic table. The number of protons determines the _____ of an atom. The _____ and _____ determines the mass of an atom. The protons and neutrons are located in the _____ of an atom and electrons are in the _____ _____.

- How many protons are in the nucleus of an atom of Carbon (C)? _____
- What is the formula for finding the mass number of an atom? _____
- If an atom of C has 7 neutrons in the nucleus, then it would have a mass number of _____ (see previous 2 questions).
- How many electrons would be found in the nucleus? _____

Subatomic Particle Gizmo Name _____Sci # _____

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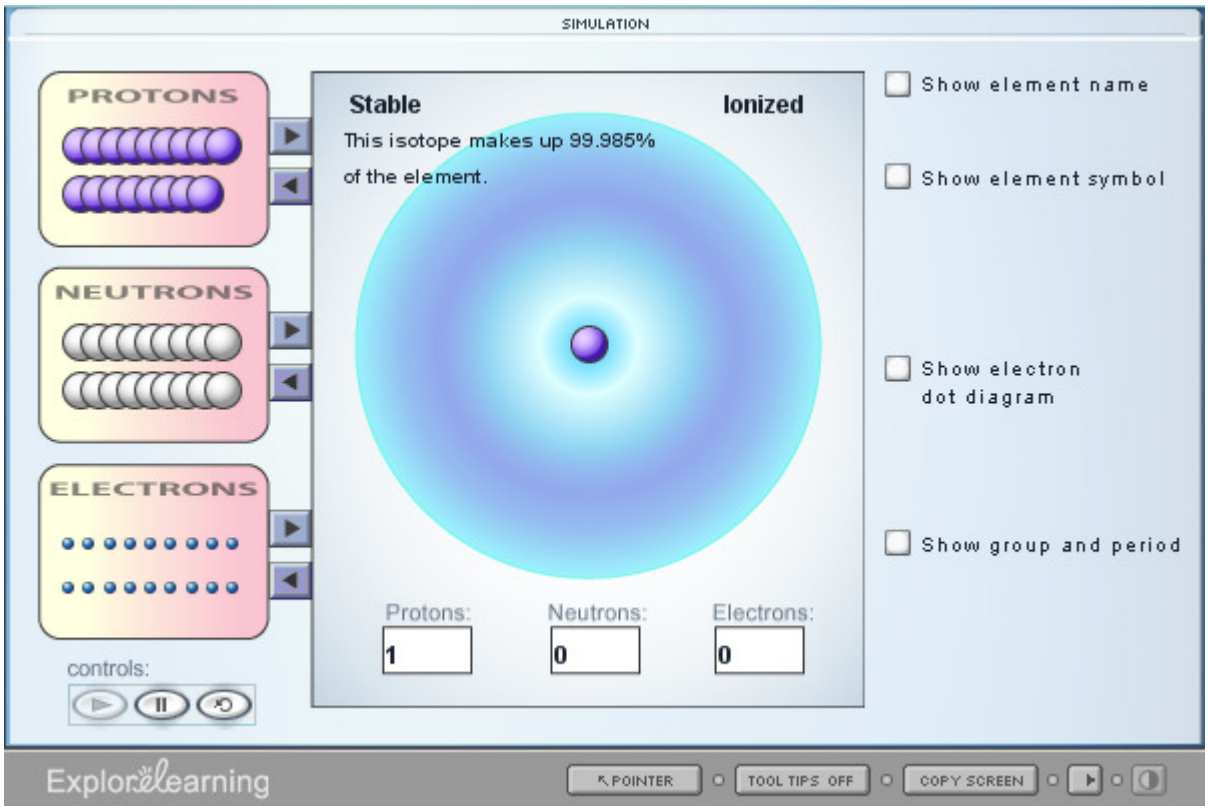

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Particle	Location
Proton	
Neutron	
Electron	

Identity of the Atom

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3		
1		

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Number of electrons	Name of element	Atomic Number from Periodic Table
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3		
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a. Does changing the number of electrons change the identity of the element you have built?

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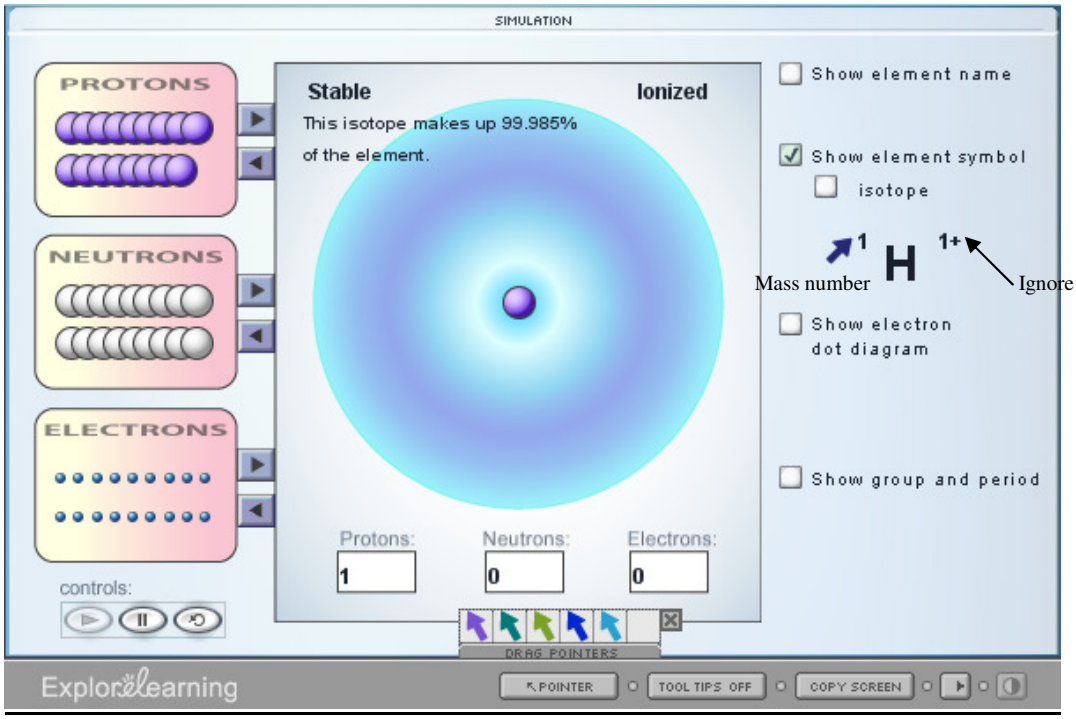

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Subatomic Particle Gizmo Name _____Sci # _____

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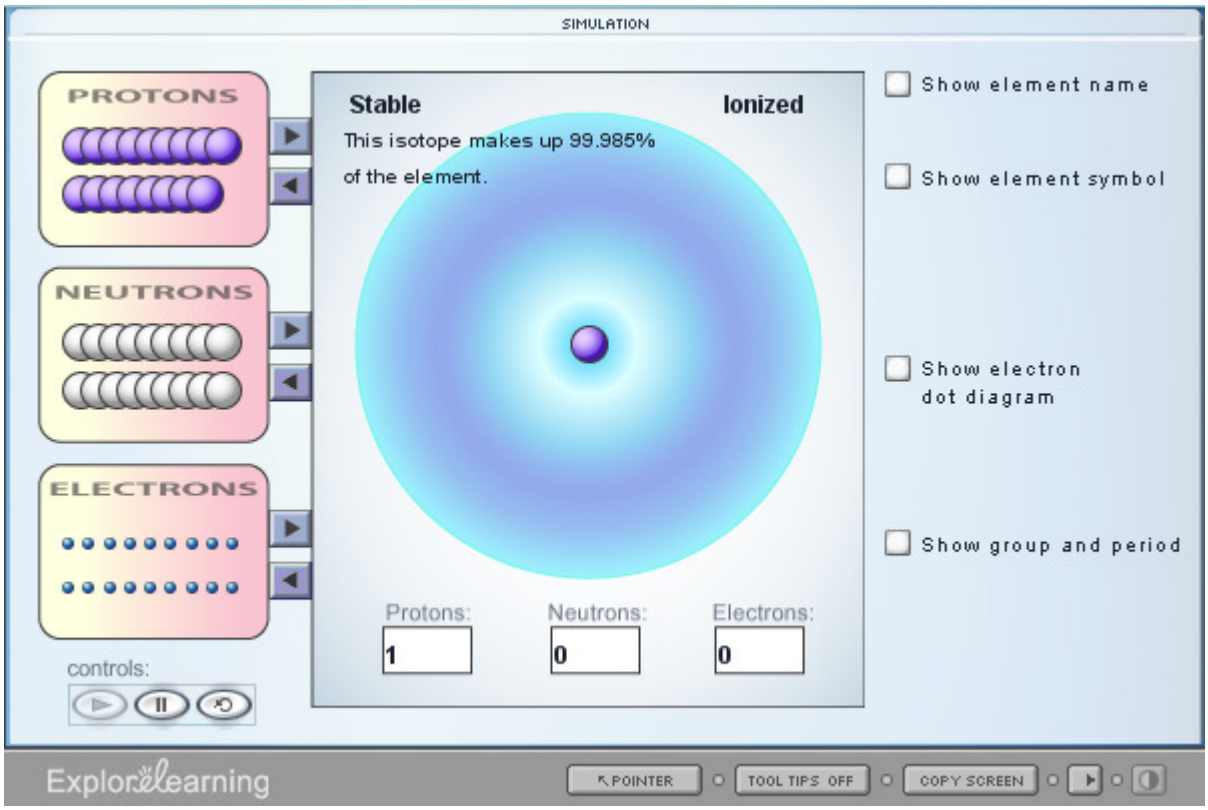

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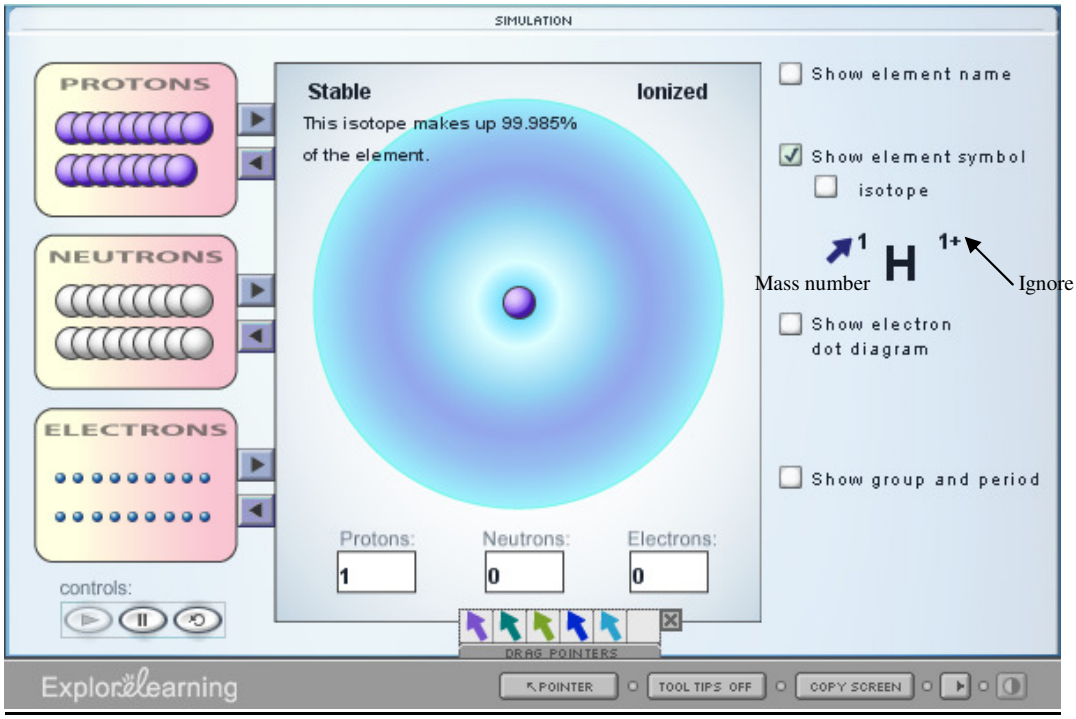

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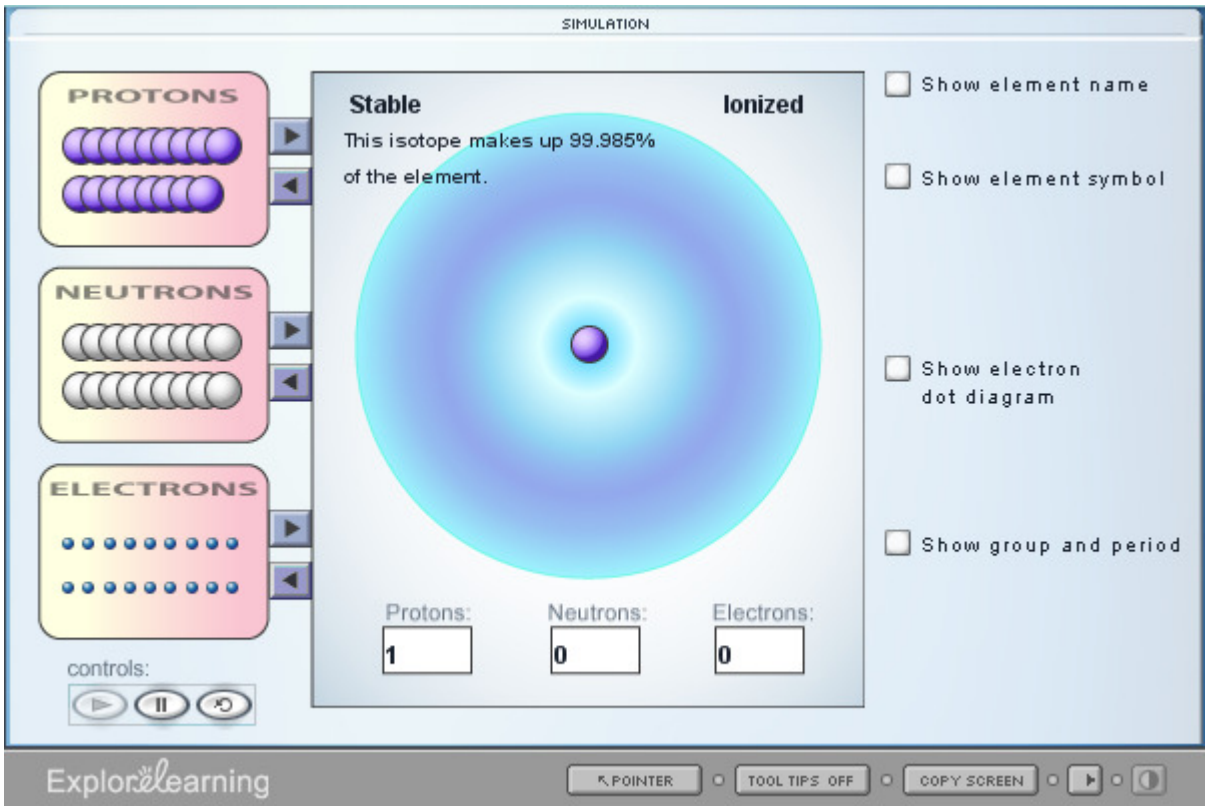

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Number of electrons	Name of element	Atomic Number from Periodic Table
2		
3		
1		

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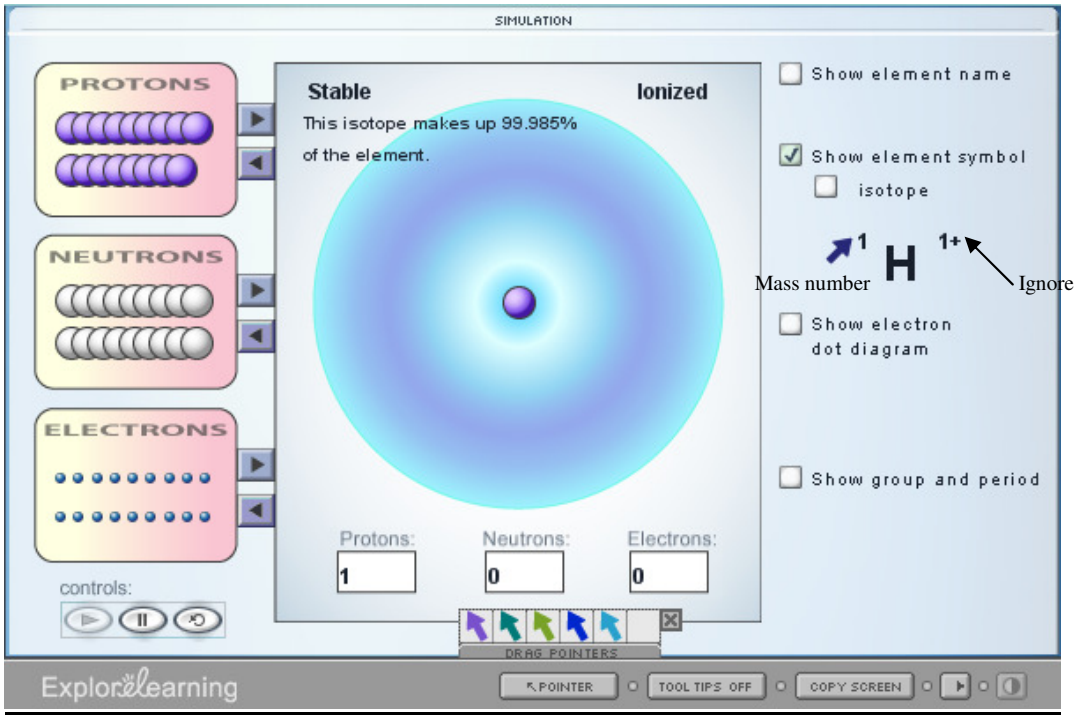

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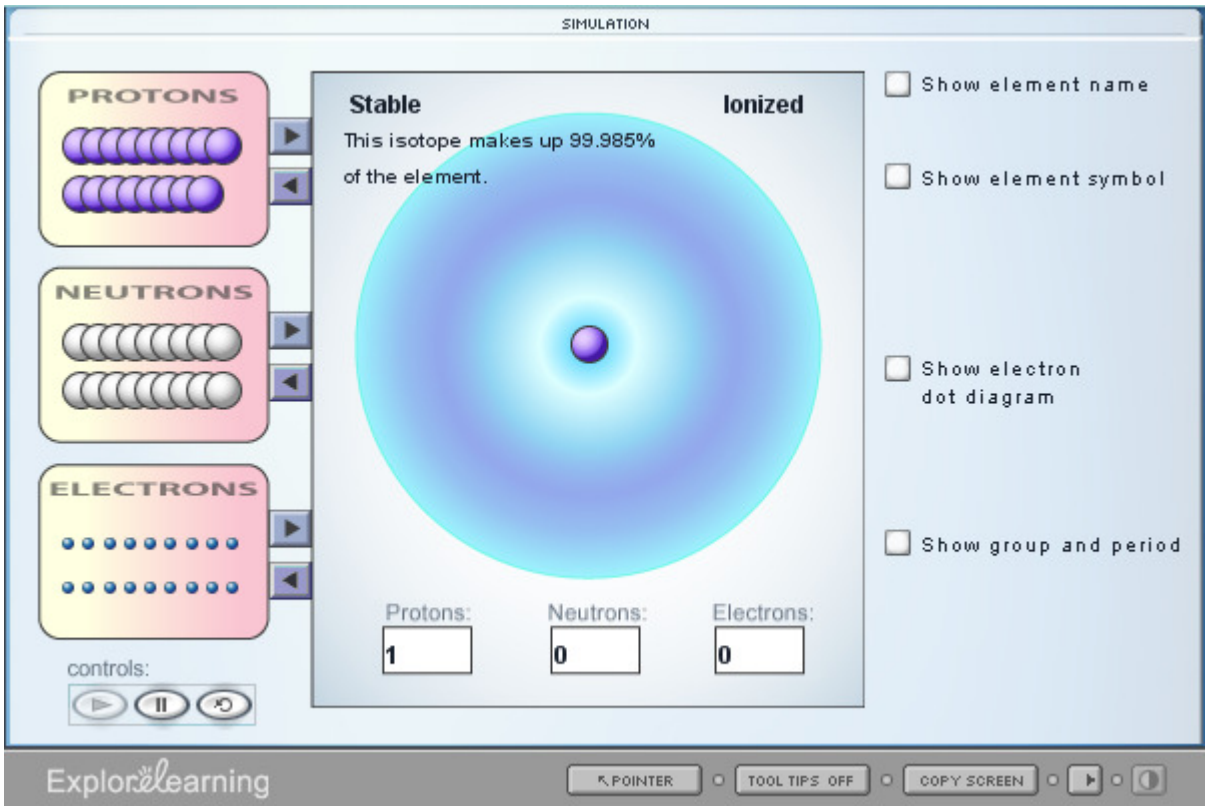

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3		
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2		
3		
1		

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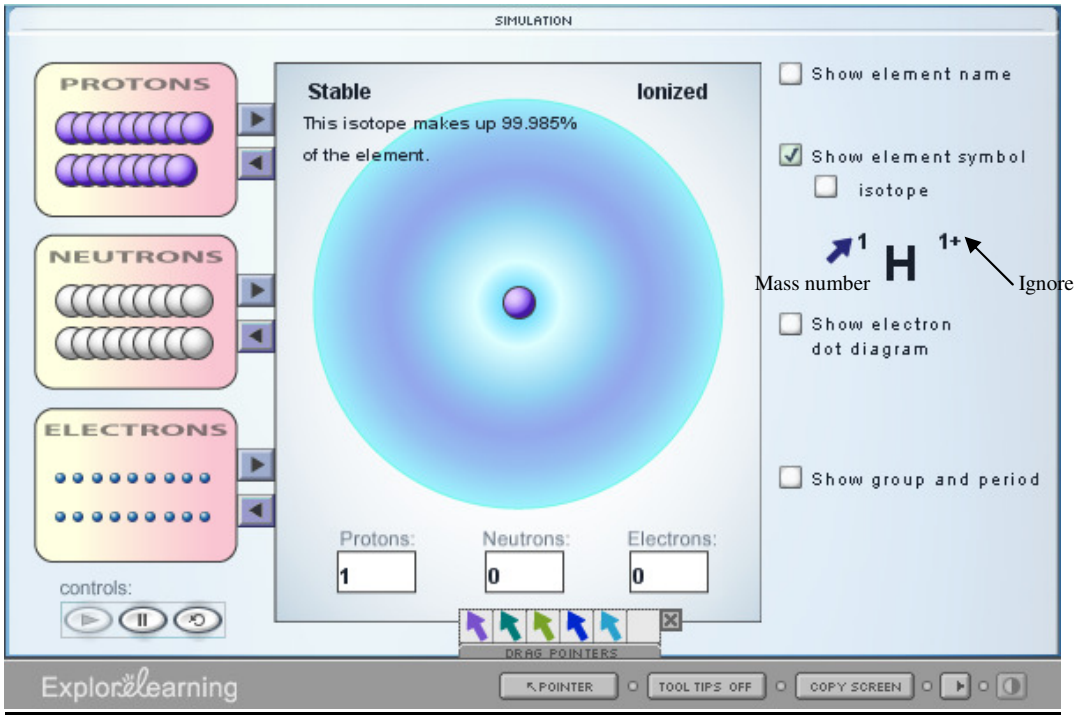

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