

PART E: VALENCE ELECTRONS

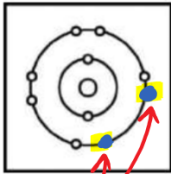
- The electrons in the outermost shell. These are the electrons that participate in chemical reactions + bonding.
- Valence electrons** can be shared or taken by another atom.
- Noble gases do not react unless under extreme conditions. This is because their valence shell is FULL (max. 8e⁻) => "stable".
- An atom that has lost valence electrons is a ⊕ positive ion. $p^+ > e^-$ chem part 2
- An atom that has gained valence electrons is a ⊖ negative ion. $p^+ < e^-$



For the following Bohr diagrams, answer the following questions:

Number of protons	<u>7</u>	Number of electron shells	<u>2</u>	
Number of electrons	<u>7</u>	Number of valence electrons	<u>5</u>	
Ion or Atom	<u>ATOMS</u>			
Number of protons	<u>6</u>	Number of electron shells	<u>2</u>	
Number of electrons	<u>6</u>	Number of valence electrons	<u>4</u>	
Ion or Atom	<u>ATOMS</u>			
Number of protons	<u>10</u>	Number of electron shells	<u>2</u>	
Number of electrons	<u>10</u>	Number of valence electrons	<u>8</u> (full shell) <u>stable</u>	
Ion or Atom	<u>ATOMS</u>			

The following Bohr model diagram represents an oxygen atom. Examine the diagram, then answer the following questions:



room for 2 more e⁻

- Why is this not a stable electron arrangement?
the valence shell is NOT full
- What would make this atom stable?
2 more e⁻ in the outer shell
- Use a different colored pen to adjust the diagram so that it shows a stable electron arrangement. (blue e⁻) (now it is "like" Neon, full shell)



Bohr Model Scavenger Hunt Answer Sheet

For each problem, write the name of the Bohr model in the boxes below.

You may need to reference a periodic table to help you.

*start here!

Oxygen

Potassium

Boron

Sulfur

Argon

Beryllium

Calcium

Hydrogen

Chlorine

Nitrogen

Aluminum

Neon

Helium

Sodium

Silicon

Lithium

Carbon

Magnesium

Homework

ASSIGNMENT #5: Bohr Model Practice, Worksheet pages 36-37
This assignment is to be completed below in the space provided.

Use the innermost circle as the nucleus, and fill the electron shells with the correct number of electrons for each of the first 20 elements in the Periodic Table.

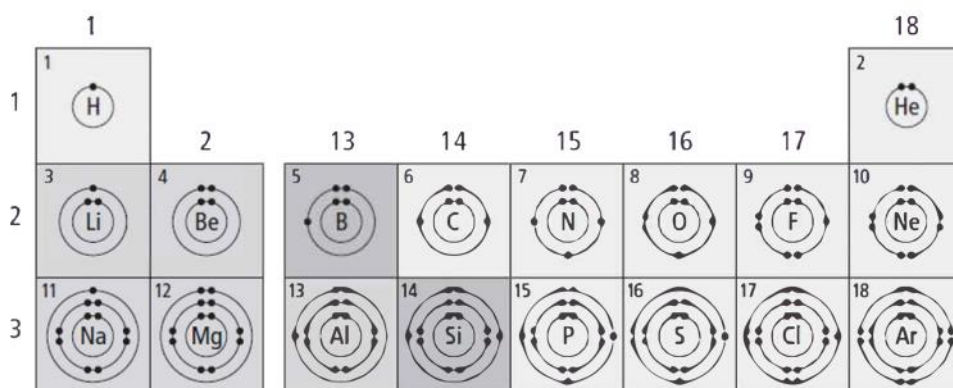
Group 1								Group 8
H								He
		Group 2	Group 3	Group 4	Group 5	Group 6	Group 7	
Li	Be	B	C	N	O	F	Ne	
Na	Mg	Al	Si	P	S	Cl	Ar	
K	Ca							

1. What is the pattern between the number of **valence electrons** and the group number of the periodic table?

The # of valence e⁻ = the group #
(all elements in group have 1 valence e⁻)

2. What is the pattern between the number of **electron shells** and the period number of the periodic table?

The period number = number of electron shells
(eg. all elements in period 3 have 3 electron shells)

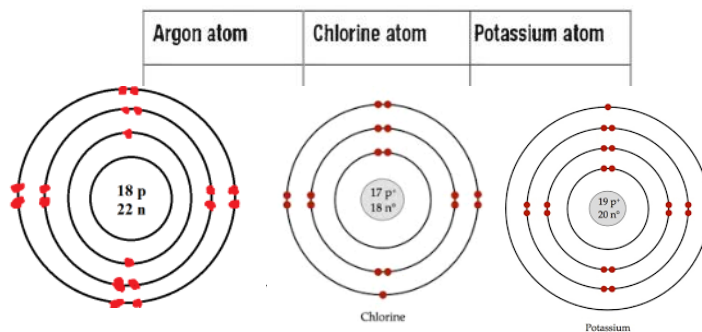


Drawing Bohr model diagrams

1. Refer to the Bohr model chart **ABOVE** to help you complete the following table. Some answers are provided for you. (Hint: Remember that the maximum number of electrons in the first three shells is 2, 8, and 8.)

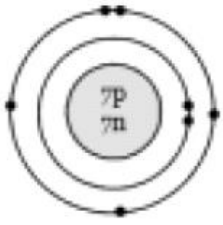
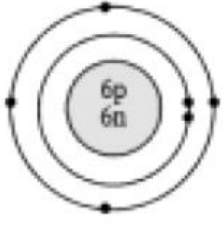
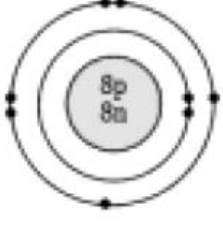
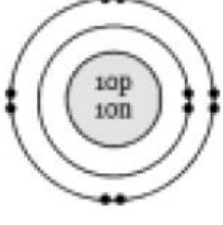
Atom/ion	Atomic number	Number of protons	Number of electrons	Number of electron shells
neon atom	10	10	10	2
fluorine atom	9	9	9	2
sodium atom	11	11	11	3
argon atom	18	18	18	3
chlorine atom	17	17	17	3
potassium atom	19	19	19	4

2. Use the table above to draw the Bohr model diagram for the following atoms and ions.



8

Use your periodic table to answer the following.

	<p>a. number of protons <u>7</u></p> <p>b. number of electron shells <u>2</u></p> <p>c. number of electrons <u>7</u></p> <p>d. number of electrons in outer shell <u>5</u></p> <p>e. element <u>Nitrogen</u></p>
	<p>a. number of protons <u>6</u></p> <p>b. number of electron shells <u>2</u></p> <p>c. number of electrons <u>6</u></p> <p>d. number of electrons in outer shell <u>4</u></p> <p>e. element <u>Carbon</u></p>
	<p>a. number of protons <u>8</u></p> <p>b. number of electron shells <u>2</u></p> <p>c. number of electrons <u>8</u></p> <p>d. number of electrons in outer shell <u>6</u></p> <p>e. element <u>Oxygen</u></p>
	<p>a. number of protons <u>10</u></p> <p>b. number of electron shells <u>2</u></p> <p>c. number of electrons <u>10</u></p> <p>d. number of electrons in outer shell <u>8</u></p> <p>e. element <u>Neon</u></p>

These four elements are all in the same horizontal row (period) of the periodic table. What is the same about electron shells for elements in the same period?

- Same number of energy shells

What is different about the electrons in the outer shell for elements in the same period?

- Different number of valence electrons