

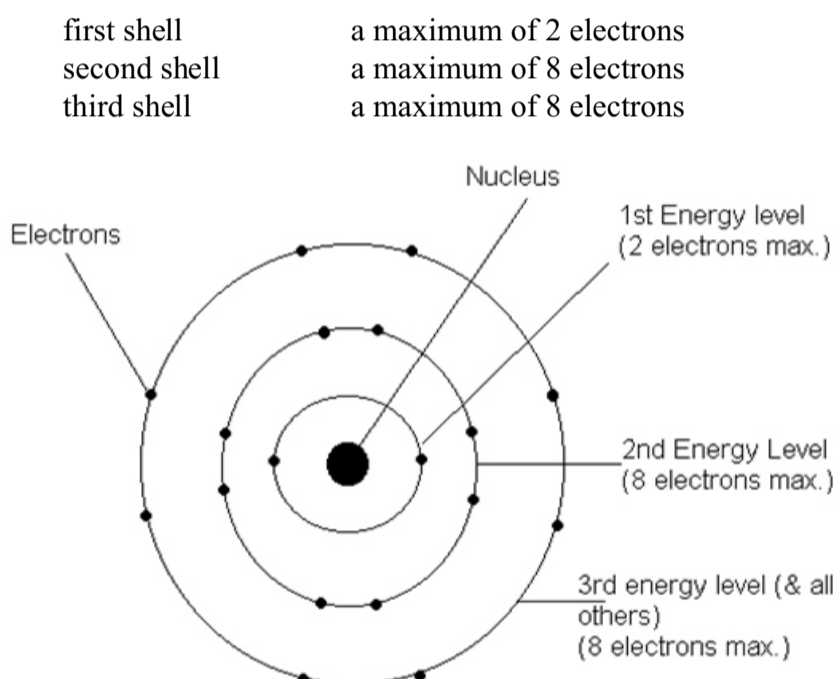
Science 9
Unit 2: Chemical Reactions
Worksheet 10: Bohr Model's of the Atom



You have learned that atoms are composed of protons, neutrons, and electrons. The electrons occupy energy levels that surround the nucleus. Niels Bohr created a visual model of the atom to make them easy to understand. You will only have to draw Bohr Model's for the first 18 elements on the periodic table.

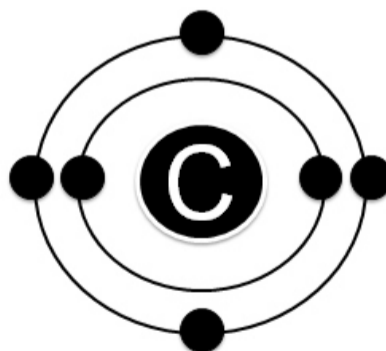
How to Draw a Bohr Model:

- 1) Find your element on the periodic table.
- 2) Determine the number of electrons – it is the same as the atomic number. This is how many electrons you will draw
- 3) Draw a nucleus with the element symbol inside
- 4) Draw the shells around the nucleus. Remember that electrons are arranged in Energy Levels or Shells around the nucleus of an atom and are filled in the following order:



- 5) Check your work. Only two electrons can fit in the 1st shell. The 2nd shell can hold up to 8 electrons. The 3rd shell can hold **18**, but the elements in the first few periods only use 8 electrons.

Example: Bohr Model for Carbon:



Terminology:

Valence shell : The shell containing electrons that is furthest from the nucleus.

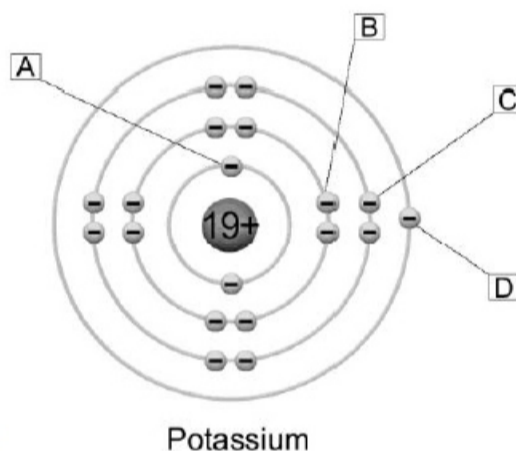
Valence electrons: The electrons in the outer most electron shell. For example, carbon has 4 valance electrons in its outer shell.

PART A: MULTIPLE CHOICE

1. What is the key idea of the Bohr Model?
(A) explained that there was a nucleus
(B) explained that atoms are hard to see with the naked eye
(C) that an atom was like a raisin bun
(D) there are electrons inside the atom that orbit the nucleus
2. How many electrons max. are allowed in the 1st, 2nd and 3rd shell in a Bohr Diagram?
(A) 1st: 2 2nd: 4 3rd: 4
(B) 1st: 2 2nd: 5 3rd: 7
(C) 1st: 3 2nd: 9 3rd: 9
(D) 1st: 2 2nd: 8 3rd: 8
3. Complete the following sentence with one of the options given: "The valence electrons are those electrons situated _____ of the atom".
(A) on the first energy level
(B) on the second energy level
(C) on the third energy level
(D) on the last energy level

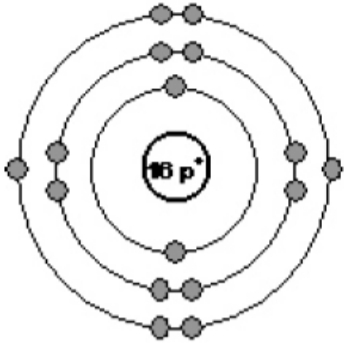
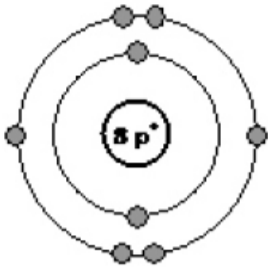
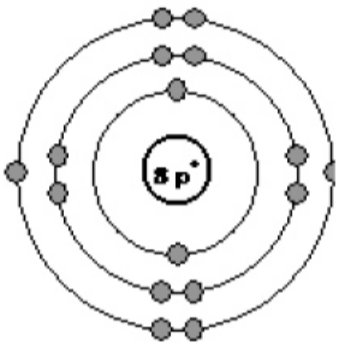
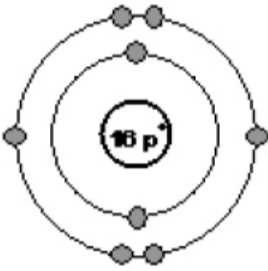
4. In the atomic model of potassium below, which letter represents a valence electron?

- (A)
- (B)
- (C)
- (D)



5. Consider the atomic numbers below. Which atomic number represents an atom with 3 valence electrons?
(A) 3
(B) 5
(C) 8
(D) 16
6. Which of the following would be the electron configuration for a fluorine atom?
(A) 2-6
(B) 2-7
(C) 2-6-1
(D) 2-5-2
7. Neon has 10 protons and 10 electrons. The electrons fill the energy levels in Neon like this:
(A) 2 in the first, 2 in the second, and 6 in the third
(B) 4 in the first, 4 in the second, and 2 in the third
(C) 2 in the first, 4 in the second, and 4 in the third
(D) 2 in the first, and 8 in the second

8. Which of the illustrations below best represents a Bohr diagram of an oxygen atom?

<p>(A)</p> 	<p>(B)</p> 
<p>(C)</p> 	<p>(D)</p> 

9. What do the elements situated on the same period have in common?

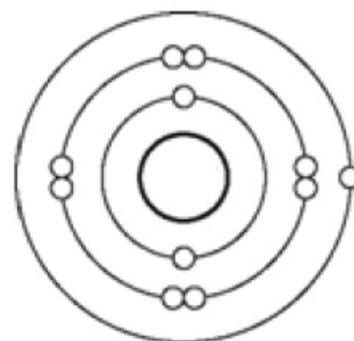
- (A) The same number of valence electrons
- (B) The same chemical reactivity
- (C) The same number of electron shells
- (D) The same number of electrons

10. What do the elements situated in the same group have in common?

- (A) The same number of valence electrons
- (B) The same number of protons
- (C) The same number of electron shells
- (D) The same number of electrons

11. The following diagram is a Bohr diagram of one element from the periodic table. To which group and period does this element belong?

- (A) Period 3 group 4
- (B) Period 4 group 4
- (C) Period 3 group 1
- (D) Period 1 group 3

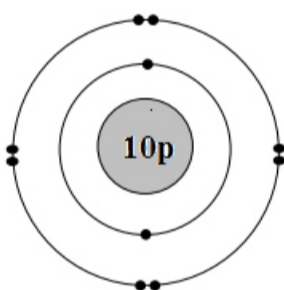


12. Elements situated in the same group display similar chemical properties because:

- (A) They have similar sizes
- (B) They have the same number of electron shells
- (C) They have the same number of valence electrons
- (D) They belong to the same period

13. An atom of an element belonging to the noble gas family has
- (A) one outer shell electron.
 - (B) two outer shell electrons.
 - (C) all outer shell electrons but one.
 - (D) all outer shell electrons.
14. An atom of an element belonging to the alkali metal family has
- (A) one outer shell electron.
 - (B) two outer shell electrons.
 - (C) all outer shell electrons but one.
 - (D) all outer shell electrons.
15. An atom of an element belonging to the halogen family has
- (A) one outer shell electron.
 - (B) two outer shell electrons.
 - (C) all outer shell electrons but one.
 - (D) all outer shell electrons.

Use the Bohr Model shown below to answer questions 16 to 21:



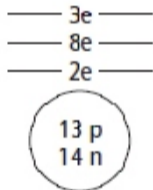
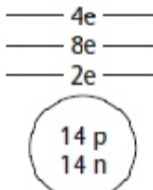
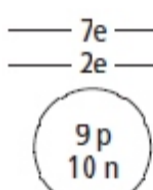
16. Which atom does this represent?
- (A) Argon
 - (B) Lithium
 - (C) neon
 - (D) sodium
17. How many energy shells does this atom have?
- (A) 1
 - (B) 2
 - (C) 3
 - (D) 4
18. What **period** on the periodic table would this atom be found?
- (A) 1
 - (B) 2
 - (C) 3
 - (D) 4

19. How many valence electrons shown ?
- (A) 10
 (B) 8
 (C) 6
 (D) 2
20. What group number does this element belong to?
- (A) 6
 (B) 8
 (C) 16
 (D) 18
21. What **group A** does this atom belong to?
- (A) 6
 (B) 8
 (C) 16
 (D) 18

PART B: WRITTEN RESPONSE

1. Complete the following chart

[12]

<p>A)</p>  <p>Atomic Mass Number: _____</p> <p>Atomic Number: _____</p> <p>Number of Neutrons: _____</p> <p>Element Name: _____</p>	<p>B)</p>  <p>Atomic Mass Number: _____</p> <p>Atomic Number: _____</p> <p>Number of Neutrons: _____</p> <p>Element Name: _____</p>	<p>C)</p>  <p>Atomic Mass Number: _____</p> <p>Atomic Number: _____</p> <p>Number of Neutrons: _____</p> <p>Element Name: _____</p>
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2. Draw a Bohr Diagram for the atoms for each of following atoms. Also complete the chart below [6]

	Silicon	Oxygen	Beryllium	Nitrogen	Argon
Chemical Symbol					
Period Number					
Number of Energy shells					
Group #					
Group A#					
# of valence electrons					

5. A) Draw a Bohr model of the element located in period three and group eighteen. [2]

B) What element does this represent? [1]

C) How many valence electrons does this contain? [1]

D) What group A does it belong to? [1]
