

# Atomic Model and Periodic Table Test Review

## A. Give the family name for each element described.

- I have 1 electron on my outer shell.
- One of my elements has 35 protons.
- I have 2 electrons on my outer orbit.
- We are unreactive stable elements.
- I can be used as a disinfectant.
- I have 1 valence electron.

alkali metals  
alkaline Earth metals  
halogens  
noble (inert) gases  
noble (inert) gases  
halogens  
alkali metals

if He.

## B. What element is described in each statement?

- I am found in period 2 and have 3 valence electrons.
- I am found in family III A and use 3 orbitals.
- I have 20 protons.
- I have 2 energy levels and each is full.
- I am a metalloid with three energy levels.
- I am an inert gas and have 1 energy level.
- I do not have a group I belong to.
- I have a +3 charge and 3 energy levels.
- I have a -2 charge and 4 orbits.

boron  
aluminum  
calcium  
neon  
silicon  
helium  
hydrogen  
aluminum  
selenium

## C. State whether the following are metals, non-metals or metalloids.

Element A	Malleable	Conducts electricity	Not ductile	metalloid
Element B	Conducts heat	Reacts with acids	Shiny	metal
Element C	3 states of matter	Accepts electrons	No conduction	non-metal

## D. True or False

- Elements in the same period have the same number of valence electrons.
- Elements in the same group have the same number of valence electrons.
- Aluminum is a metalloid.
- Na, Mg and Al all have the same number of energy levels.
- Cl has three valence electrons.
- Li and Be have the same number of energy levels.
- Mg has a charge of +2.

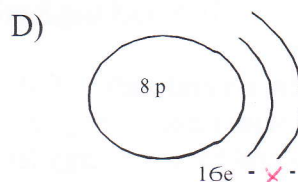
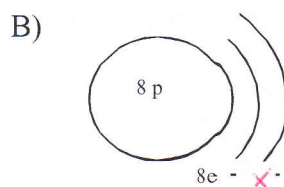
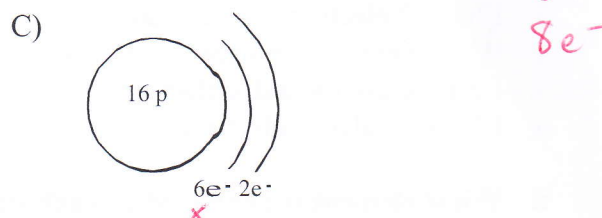
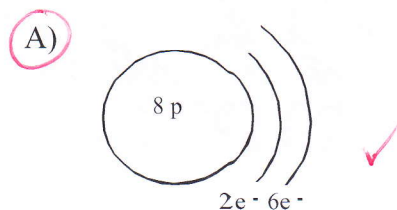
F  
T  
F  
T  
F  
T  
T

## E. Draw the elements using Lewis notation and give the ion for each element

	Li	He	N	F	Be	Ar
Lewis	Li <sup>•</sup>	He <sup>••</sup>	<sup>••</sup> N <sup>••</sup>	<sup>••</sup> F <sup>••</sup>	Be <sup>••</sup>	:Ar:
Ion	Li <sup>+1</sup>	∅	N <sup>-3</sup>	F <sup>-1</sup>	Be <sup>+2</sup>	∅

## F. Multiple Choice

1. The study of the behaviour of matter has made it possible to develop simple models such as the Bohr-Rutherford model of the atom. If the atomic number of oxygen is 8 and its mass number is 16, which diagram represents the oxygen atom according to the Bohr-Rutherford model?

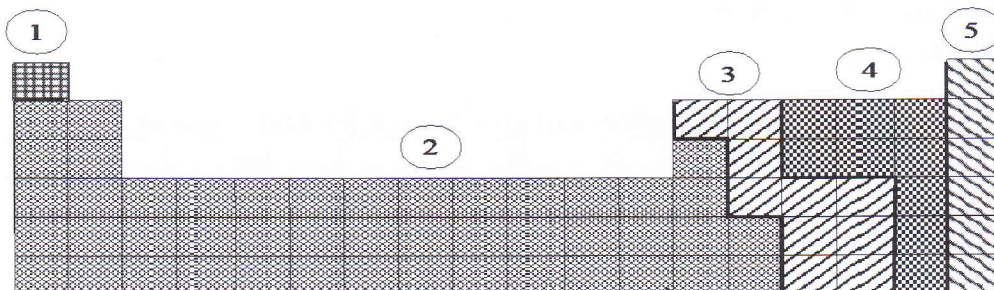


2. When Rutherford carried out his famous gold foil experiment, he noticed that very few alpha particles were deflected back at an angle greater than  $90^\circ$ .

Which of the following statements is NOT consistent with this observation?

- A) The atom is mostly empty space.      C) The nucleus has a positive charge.  
 B) The nucleus is very small.          D) Electrons move in orbitals.
3. After performing tests on several elements, you note that some of them have the following properties :
1. They are ductile and malleable.
  2. They are good conductors of electricity.
  3. They react with acids.
- $\}$  metals

In which region of the periodic table below are the elements with all **three** properties located?



- A) 2      B) 2 and 3      C) 1, 2 and 3      D) 4 and 5

4. Which of the following cannot be a property of a metal?
- A) It conducts electricity  
 B) It reacts to acids  
 C) It has metallic luster  
 D) It has a low melting point

5. Consider the five elements given in the simplified periodic table below.

IA							VIIIA
1							18
	IIA		III A	IV A	V A	VIA	VII A
	2		13	14	15	16	17
	2	.....					4
1		.....		3			5
		.....					

Which of the following statements is completely true?

- A) Element 1 is an alkali metal and element 5 is a chemically active gas.  
 B) Element 1 is an alkali metal and element 4 is a metal.  
 C) Element 2 is an alkaline earth metal and element 3 is a metalloid.  
 D) Element 4 is a halogen and can combine chemically with element 5.

6. Consider the four elements shown in the simplified periodic table below.

Li	Be					
					Cl	Ar

Which of the following statements is completely true?

- A) Lithium (Li) is an alkaline earth metal, and beryllium (Be) is an alkali metal.  
 B) Chlorine (Cl) is an inert gas, and argon (Ar) is a halogen.  
 C) Lithium (Li) is an alkali metal, and argon (Ar) is an inert gas.  
 D) Beryllium (Be) is an alkali metal, and chlorine (Cl) is a halogen.

7. An element in the halogen family has four electron shells. What is the name of this chemical element?

- A) Beryllium  
 B) Bromine  
 C) Iodine  
 D) Potassium

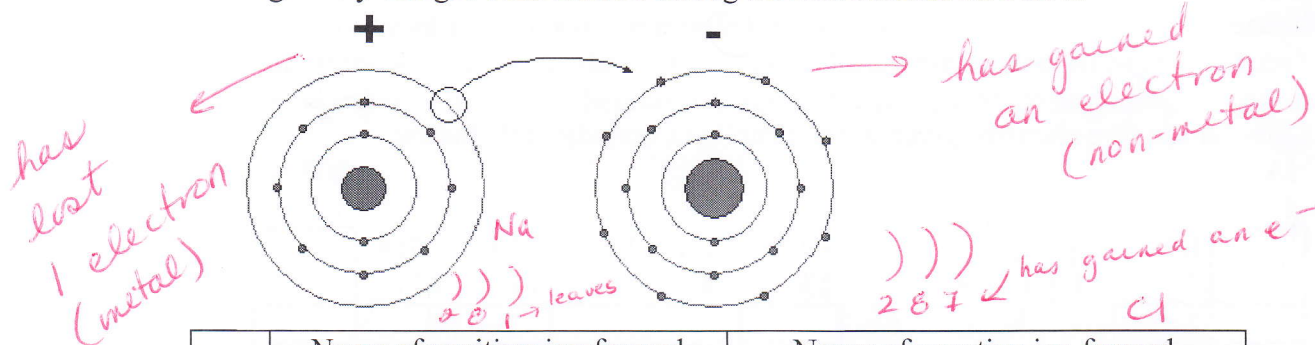
8. Which element below has the following properties?

- Has electrons in 2 electron shells → period 2
- Is completely non-reactive or is inactive → noble gas

- A) Li  
 B) F  
 C) He  
 D) Ne

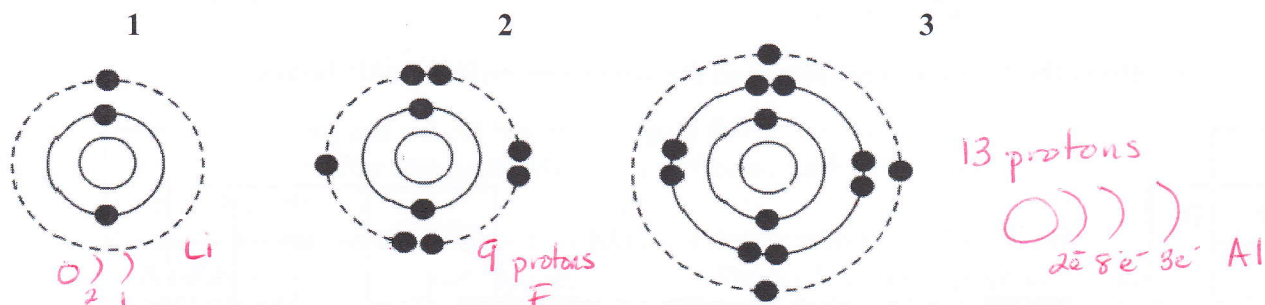


9. Choose the answer that correctly identifies the element name of the positively and negatively charged ions formed during the reaction shown below.



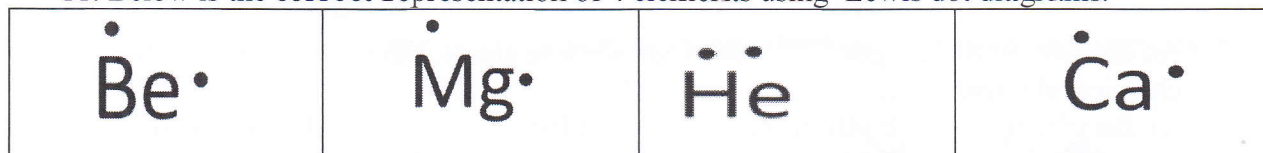
	Name of positive ion formed	Name of negative ion formed
<input checked="" type="radio"/> A	Sodium	Chlorine
<input type="radio"/> B	Sodium	Fluorine
<input type="radio"/> C	Lithium	Chlorine
<input type="radio"/> D	Lithium	Fluorine

10. Using the models below, choose the answer which correctly names the element shown by each model.



- A) 1 is hydrogen
- B) 1 is lithium ✓
- C) 1 is hydrogen
- D) 1 is lithium ✓
- 2 is nitrogen
- 2 is nitrogen ✗
- 2 is fluorine
- 2 is fluorine ✓
- 3 is lithium
- 3 is aluminum
- 3 is aluminum
- 3 is aluminum ✓

11. Below is the **correct** representation of 4 elements using Lewis dot diagrams.



Which statement correctly explains which group the elements belong to?

- A) All 4 elements are Alkaline Earth metals because they all have 2 valence electrons. ✗
- B) Be, Mg, and Ca are Alkaline Earth metals because they have 2 valence electrons, but He belongs to group 1 because it only has 1 energy level. ✗
- C) Be, Mg, and Ca are Alkaline Earth metals because they have 2 valence electrons, but He belongs to group 8 because the outermost energy levels of the Noble gases are filled when they have 2 electrons. ✗
- D) Be, Mg, and Ca are Alkaline Earth metals because they have 2 valence electrons, but He belongs to group 8 because it only has one energy level and it is filled with 2 electrons. ✓

12. Lewis notation is used to show valence electrons in an element. Which of the following combinations correctly represents the Lewis notation for an element, X, in group II A and an element, Y, in group VIA? *6 valence e<sup>-</sup>*

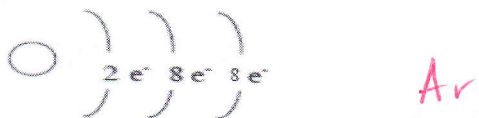
Lewis Notation

	GROUP II A	GROUP VI A
A)		
B)		
C)		
D)		

*2 valence e<sup>s</sup>*

### G. Short Answer

1. The following diagram shows the Rutherford-Bohr model of an atom.



Using the periodic table answer the following questions:

- To what group does this element belong? *noble gases*
- To what period does this element belong? *3rd*
- What is the name of this element? *argon*
- What is its charge? *∅*
- Represent the element using Lewis notation. *:Ar:*

2. The chemical symbols of four elements are given in the table below. Complete the table.

Element	# of valence electrons	Family name	# of orbits	Ion charge
Br	<i>7</i>	<i>halogen</i>	<i>4</i>	<i>Br<sup>-1</sup></i>
Ca	<i>2</i>	<i>alkaline earth metal</i>	<i>4</i>	<i>Ca<sup>+2</sup></i>
Na	<i>1</i>	<i>alkali metal</i>	<i>3</i>	<i>Na<sup>+1</sup></i>
Ne	<i>8</i>	<i>noble gases</i>	<i>2</i>	<i>∅</i>



3. The properties of four elements are listed below.

Element	Property
A	It has seven valence electrons. <i>halogens</i>
B	Its outermost energy level (orbit) contains two electrons. <i>alkali Earth metals</i>
C	It exists in the gaseous state and it does not react with other elements. <i>noble gases</i>
D	It has 11 protons and it is highly reactive. <i>alkali metals</i>

To which chemical group does each of these elements belong?

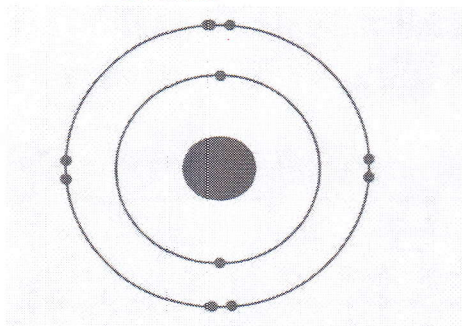
4. Consider the alkali metal in period 4 of the periodic table of the elements. *K*

a- Name the element *potassium*

b- Draw a diagram of the element according to the Rutherford- Bohr model



5. Consider the Rutherford-Bohr model shown below in which the number of protons is not indicated.



*originally had 10 + 2 = 12 electrons (12e- = 12 protons)*

A- In which period would the element be found? *2nd*

B- To which group does it belong? *Noble / Inert gases*

C- If the element was not neutral, but instead represented an ion with a +2 charge, what element would it represent? *magnesium*

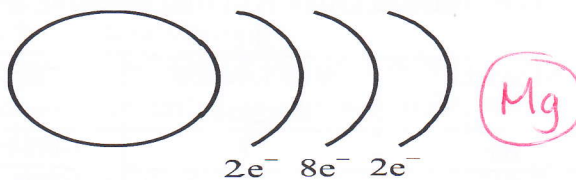
*has lost 2 electrons*

6. Four elements from the periodic table are described below.

Element A: It reacts vigorously with water and its electrons are among two energy levels. *(Li)*

Element B: It is located in Period 3 and used to disinfect or to kill bacteria. *(Cl)*

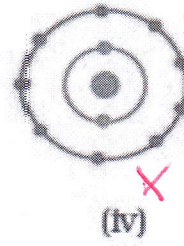
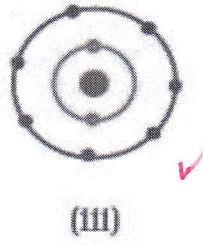
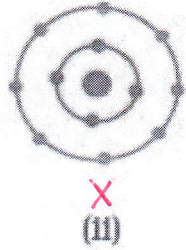
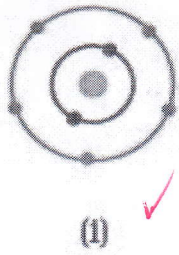
Element C: Its electron configuration is



Element D: Its outermost energy level is full and it has 2 orbits. *(Ne)*

Give the chemical symbol for each of the elements described above.

7. Looking at the picture below, **explain** which representation(s) of the Bohr-Rutherford models are not possible? Justify your answer.



only a max of 8 electrons in level 2 is possible.

→ only a max of 2 e<sup>-</sup>s are possible in level 1

8. In the diagram, the circles numbered 1 to 6 represent a characteristic shared by categories of elements in the periodic table. Each numbered circle is associated with one of the statements below concerning categories of elements. Place each letter below in the appropriate circle./3

- A – This space is used to indicate the number of energy levels.
- B – One of the elements in this family has 20 protons.
- C – The elements in this family have full orbits.
- D – The outermost energy level of these elements contains one electron,  $1e^-$ .
- E – The elements in this category are very malleable and are good conductors of electricity.
- F – This group is called the halogen family.

