

Atomic Model and Periodic Table Test Review

A. Give the family name for each description.

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

ALKALI
Halogen
Alkaline earth
Noble
Halogen
alkali

B. What element is described for each statement?

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

B
Al
Ca
Ne
Si
He
H
Al
Se

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

Element A	Malleable	Conducts electricity	Not ductile	<u>Metalloid</u>
Element B	Conducts heat	Reacts with acids	Shiny	<u>metal</u>
Element C	3 states of matter	Accepts electrons	No conduction	<u>N-metal</u>

D. True or False

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

F
T
F
T
F
F
T

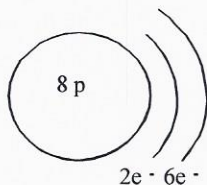
E. Make a Lewis notation and give the ion for each element

	Li	He	N	F	Be	Ar
Lewis	<u>Li[•]</u>	<u>He^{••}</u>	<u>•N^{••}</u>	<u>•F^{••}</u>	<u>•Be[•]</u>	<u>•Ar^{••}</u>
Ion	<u>Li⁺¹</u>	<u>X</u>	<u>N⁻³</u>	<u>F⁻¹</u>	<u>Be⁺²</u>	<u>X</u>

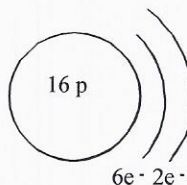
F. Multiple Choice

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?

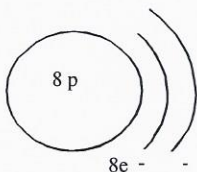
A)



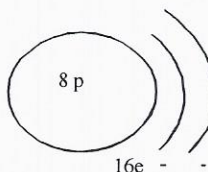
C)



B)



D)



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° .

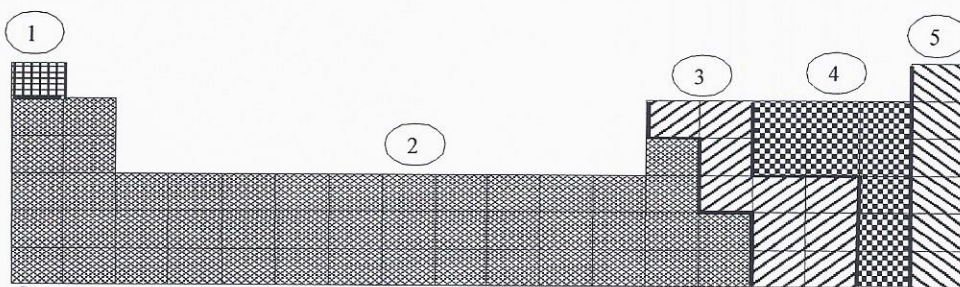
Which of the following statements is NOT consistent with this observation?

- 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.

In which region (1, 2, 3, 4 or 5) of the periodic table below are the elements with all these **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		IIIA	IVA	VA	VIA	VIIA
	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?

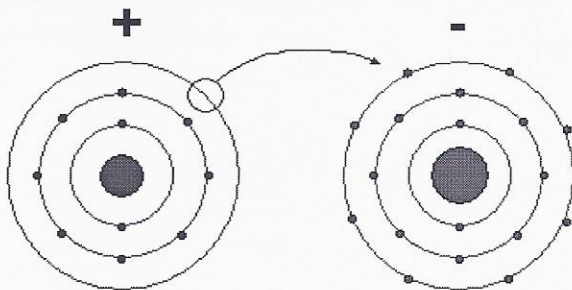
- A) Beryllium
 B) Bromine
 C) Iodine
 D) Potassium

8. Which element below has the following properties?

- Has electrons in 2 electron shells
- Is completely non-reactive or is inactive

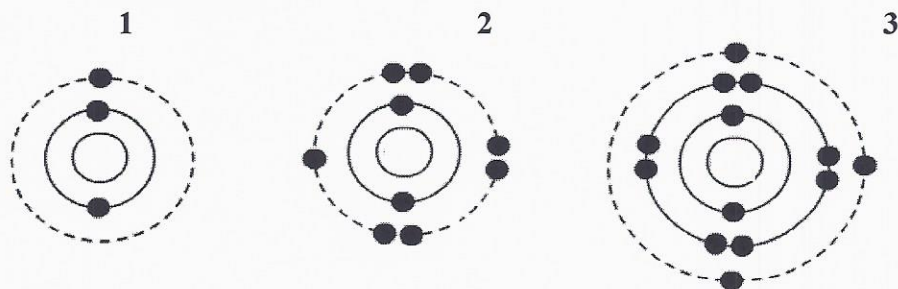
- A) Li
 B) F
 C) He
 D) Ne

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



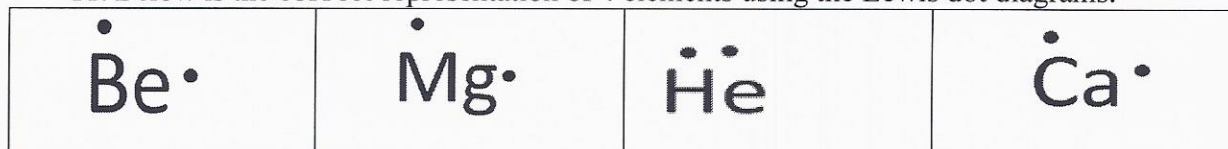
	Name of positive ion formed	Name of negative ion formed
<input checked="" type="radio"/> A	Sodium	Chlorine
<input type="radio"/> B	Sodium	Florine
<input type="radio"/> C	Lithium	Chlorine
<input type="radio"/> D	Lithium	Florine

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



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

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

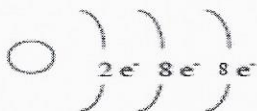
12. Lewis notation is used to show valence electrons in an element. Which of the following combinations correctly represents the Lewis notation for an element, X, in group II A and an element, Y, in group VIA?

Lewis Notation

	GROUP II A	GROUP VI A
A)	• X •	•• • Y • •
B)	• X •	•• Y • ••
C)	X ••	•• • Y • •
D)	X ••	•• Y •• ••

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 gas*
- To what period does this element belong? *3*
- What is the name of this element? *Argon*
- What is its charge? *X*
- Make a Lewis notation for this element. *Ar*

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

Element	Number of valence electrons	Family name	Number of orbits	Ion charge
Br	<i>7</i>	<i>Halogen</i>	<i>4</i>	<i>-1</i>
Ca	<i>2</i>	<i>alkaline earth</i>	<i>4</i>	<i>+2</i>
Na	<i>1</i>	<i>alkali</i>	<i>3</i>	<i>+1</i>
Ne	<i>8</i>	<i>Noble</i>	<i>2</i>	<i>X</i>

3. The properties of four elements are listed below.

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

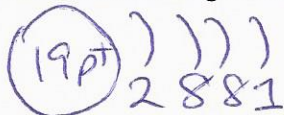
To which chemical group does each of these elements belong? **Give full name**

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

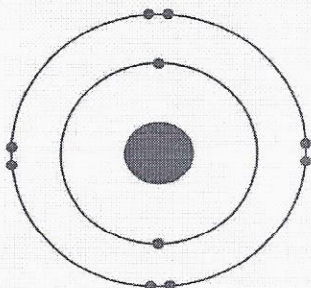
a- Name the element

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. /4



A- In which period would the element be found?

Mg 2

B- To which group does it belong (Give group name)?

Noble or inert

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

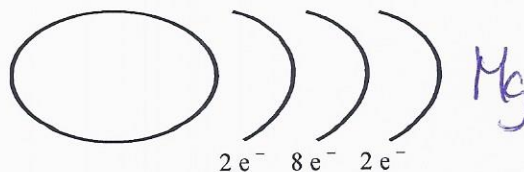
Mg

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*

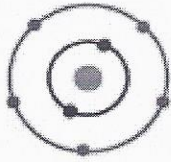
Element C: Its electron configuration is



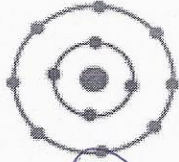
Element D: Its outermost energy level is full and it has 2 orbits. *Ne*

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

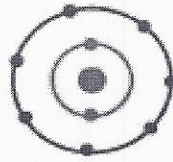
7. Looking at the picture below, **explain** which representation(s) of the Bohr-Rutherford models are not possible?



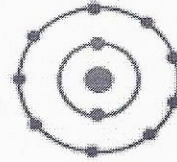
(i)



(ii)



(iii)



(iv)

1st orbit can only hold $2e^-$

2nd orbit can only hold max $8e^-$

8. In the diagram on your answer sheet, 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.

~~12/13~~

