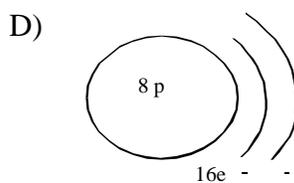
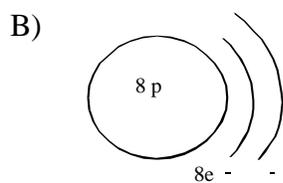
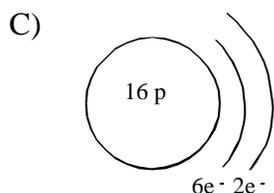
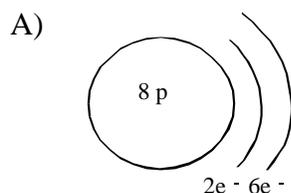


Topic 1: Atomic model and Periodic Table

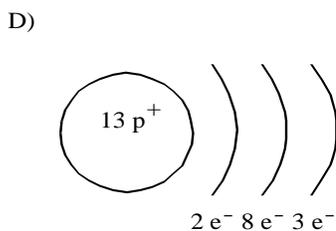
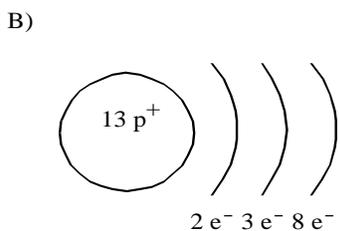
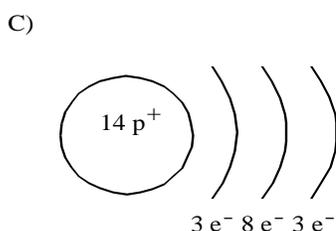
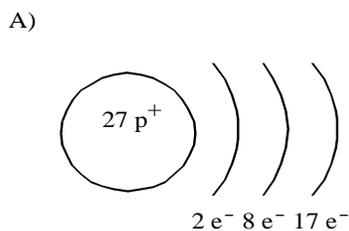
Atomic model

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?



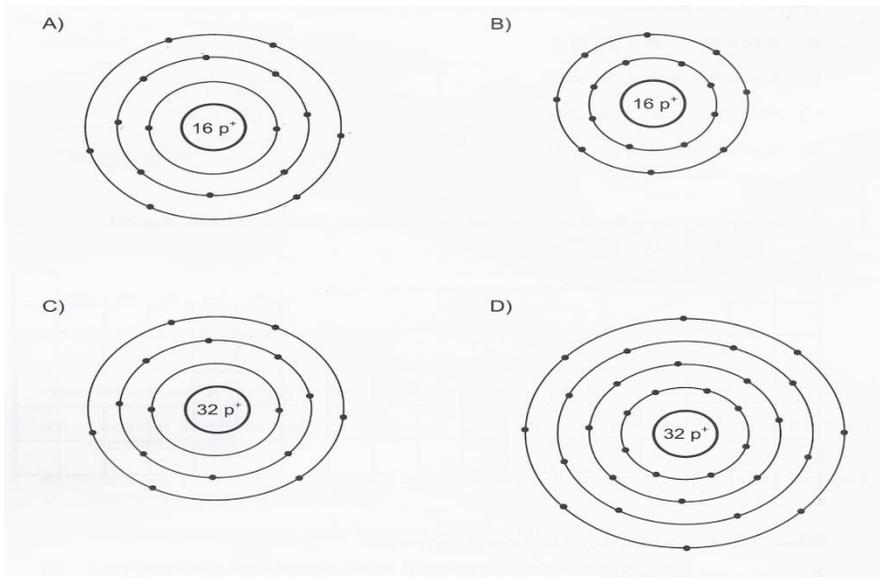
Answer: A

2. Which of the following best represents the aluminum (Al) atom according to the Rutherford-Bohr model?



Answer: D

3. Which of the following diagrams correctly represents the sulphur (S) atom according to the Rutherford-Bohr model?



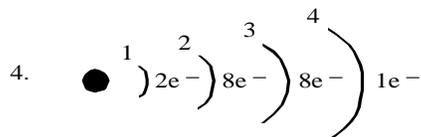
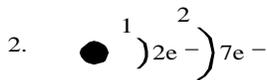
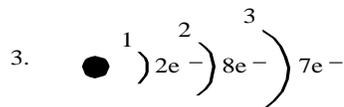
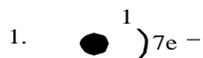
Answer: A

4. What ion does lithium (Li) form and why?

- A) Li^+ , since it gains a proton
 B) Li^+ , since it loses an electron
 C) Li^- , since it loses a proton
 D) Li^- , since it gains an electron

Answer: B

5. Which of the following atomic models represent elements from the halogen family?



A) 1 and 2

B) 3 and 4

C) 2 and 3

D) 1 and 4

Answer: C

6. Listed below are the characteristics of an element from the periodic table.

- It is a nonmetal.
- Its outermost energy level has seven electrons.
- It is used to purify and disinfect water.

To which group in the periodic table does this element belong?

- A) Alkali metals B) Alkaline earth metals C) Halogens D) Inert gas

Answer: C

7. The following table gives some information about four elements (E₁, E₂, E₃ and E₄).

Element	Protons	Electrons
E ₁	19	
E ₂		18
E ₃	12	
E ₄		9

Which of these elements is an alkaline earth metal?

- A) Element E₁ B) Element E₂ C) Element E₃ D) Element E₄

Answer: C

8. The following are properties of two elements belonging to two different chemical families:

Element X: A gas which has 7 valence electrons

Element Y: A metal that reacts violently with water

To which families do these two elements belong?

- A) Element X is an alkali metal and element Y is a halogen.
B) Element X is a halogen and element Y is an alkali metal.
C) Element X is an inert gas and element Y is an alkaline earth metal.
D) Element X is a halogen and element Y is an alkaline earth metal.

Answer: B

9. Which of the following is the Lewis structure for magnesium?

- A) Mg : B) •Mg C) •Mg• D) :Mg:

Answer: B

10. 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.

Answer: C

11. Which one of these characteristics alone provides the information you need to represent an atom using the Lewis notation?

- A) The group number
- B) The period number
- C) The atomic mass
- D) The number of protons

Answer: A

12. The following are statements about certain elements in the periodic table. Which statement is true?

- A) Nitrogen (N) is a noble gas located in period 5.
- B) Bromine (Br) is a halogen located in period 4.
- C) Hydrogen (H) is an alkali metal located in period 1
- D) Magnesium (Mg) is an alkaline earth metal located in period 2.

Answer: B

13. During ionization, an atom can become a positive ion. How does an atom become a positive ion?

- A) It gains one or more electrons
- B) It gains one or more protons
- C) It loses one or more electrons
- D) It loses one or more protons

Answer: C

14. 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

Answer: B

15. The following table gives the electron configurations of four different elements.

ELEMENT	ELECTRON CONFIGURATION
1	●)2e ⁻
2	●)2e ⁻)2e ⁻
3	●)2e ⁻)8e ⁻)4e ⁻
4	●)2e ⁻)8e ⁻)2e ⁻

Which of these elements belong to the same chemical family?

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

Answer: C

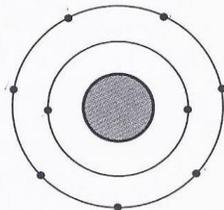
16. Which of the following correctly matches elements with their location on the periodic table?

A)	<table border="1"> <tr><td>Halogens</td></tr> <tr><td>lithium and potassium</td></tr> </table>	Halogens	lithium and potassium	<table border="1"> <tr><td>Period 1</td></tr> <tr><td>hydrogen and helium</td></tr> </table>	Period 1	hydrogen and helium
Halogens						
lithium and potassium						
Period 1						
hydrogen and helium						
B)	<table border="1"> <tr><td>Alkaline earth metals</td></tr> <tr><td>calcium and magnesium</td></tr> </table>	Alkaline earth metals	calcium and magnesium	<table border="1"> <tr><td>Period 2</td></tr> <tr><td>beryllium and oxygen</td></tr> </table>	Period 2	beryllium and oxygen
Alkaline earth metals						
calcium and magnesium						
Period 2						
beryllium and oxygen						
C)	<table border="1"> <tr><td>Alkali metals</td></tr> <tr><td>sodium and hydrogen</td></tr> </table>	Alkali metals	sodium and hydrogen	<table border="1"> <tr><td>Period 3</td></tr> <tr><td>aluminum and boron</td></tr> </table>	Period 3	aluminum and boron
Alkali metals						
sodium and hydrogen						
Period 3						
aluminum and boron						
D)	<table border="1"> <tr><td>Noble gases</td></tr> <tr><td>argon and neon</td></tr> </table>	Noble gases	argon and neon	<table border="1"> <tr><td>Period 4</td></tr> <tr><td>carbon and silicon</td></tr> </table>	Period 4	carbon and silicon
Noble gases						
argon and neon						
Period 4						
carbon and silicon						

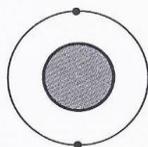
Answer: B

17. Information about four elements in the periodic table are given below.

- Element 1 has the following electron configuration according to the Rutherford-Bohr model:



- Element 2 has the following electron configuration according to the Rutherford-Bohr model:



- Element 3 is the alkali metal that has the fewest electrons.
- Element 4 has 17 electrons distributed among 3 electron shells.

Which of these elements belong to the same period?

- A) Elements 1 and 3
- B) Elements 1 and 4

- C) Elements 2 and 3
- D) Elements 2 and 4

Answer: A

Short Answer

18. In a laboratory, a scientist noted the following facts about an element:

1. It is a solid.
2. It is a poor conductor of heat and electricity
3. The nucleus of the atom of this element contains less than 18 protons.
4. The outermost electron shell contains 5 electrons.

What is this element?

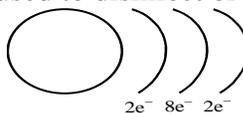
Answer: Phosphorus

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

Element A: It reacts vigorously with water and its electrons are among three energy levels.

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

Element C: Its electron configuration is



Element D: Its outermost energy level is full and it has 18 protons.

Give the chemical symbol and the name of the chemical family for each of these elements.

Answer: Element A = Sodium (Na) Element C = Magnesium (Mg)
Element B = Chlorine (Cl) Element D = Argon (Ar)

20. After a forest fire, we collected the ashes that were left on the ground. An analysis of these ashes enabled us to determine their composition. The table below lists the different elements that were found.

NAME OF ELEMENT	CHEMICAL SYMBOL
Calcium	Ca
Chlorine	Cl
Iron	Fe
Magnesium	Mg
Phosphorus	P
Potassium	K
Silicon	Si
Sodium	Na
Sulphur	S

a) Choose two elements that are found in the same period in the periodic table of the elements. Explain your choice by using scientific concepts.

Answer: Mg and Na because their electron configuration needs three orbits.
K and Ca because their electron configuration needs four orbits.

b) Choose two elements that are found in the same group in the periodic table of the elements.

Answer: Mg and Ca because they both have 2 two valance electrons
Na and K because they both have 1 valence electron

Explain why these elements have the same chemical reactivity using the Rutherford-Bohr model.

21. While doing a research project, you noted the following information about five elements.

Element A :
· is a solid;
· conducts electricity;
· has 2 electrons in its outermost shell;
· has a low density.

Element B :
· is not malleable
· does not conduct electricity;
· has 7 electrons in its outermost shell;
· is light green in colour.

Element C :
· has all its outer orbits full
· does not form compounds with other elements;
· is in a gaseous state;
· has a very low boiling point.

Element D :
· is a poor conductor of heat;
· is non-ductile and non-malleable;
· conducts electricity.

Element E :
· is ductile and malleable;
· is a good conductor of heat and electricity;
· has a high melting point.

Classify the elements above as metals, non-metals or metalloids

Answer: Element A= metal Element B= non-metal
 Element C= non-metal Element D= metalloid
 Element E = metal