This is a Class 1 exam

Lebanon Evangelical School for Boys and Girls

Loueizeh - Baabda

SE02 Exam

15DEC2025

Do NOT write in this box. Your MARK will be placed here.

Subject :	Chemistry	
Class :	10C and 10E	
Teacher :	Mrs. Mirella Freige	
Duration :	1 hour	
You are to answer the questions to this exam on : Lined paper		
Your name :		*Time taken to complete exam*
Your Class :		
Exam Room :		
How many sheets, including cover sheet :		

- Do not open this paper until the teacher in charge instructs you to do so.
- The most important thing to remember in taking an exam is NEVER PANIC.
- If you are caught cheating in this exam, you will be awarded zero for ALL exams that are taken on this day.

Exercise I (16 points)

Identify the letter of the choice that best answers the statement.

1. **Based on the symbol of chlorine atom, what can be concluded about the chlorine atom?**

$$^{35}_{17}Cl$$

A. There are 17 protons and 35 neutrons in the nucleus of a chlorine atom.
B. There are 17 protons and 18 neutrons in the nucleus of a chlorine atom.
C. There are 17 protons and 17 neutrons in the nucleus of a chlorine atom.
D. There are 17 electrons and 17 neutrons in a chlorine atom.

2. **Which statement describes isotopes?**

A. Isotopes of the same chemical element have different electron configurations.
B. Isotopes of the same chemical element have the same number of protons.
C. Isotopes of the same chemical element have different nuclear charges.
D. Isotopes of the same chemical element have the same nuclear mass.

3. **Which of the following statements is true about subatomic particles?**

A. Electrons are negatively charged and are the heaviest subatomic particles.
B. Protons are positively charged and the lightest subatomic particles.
C. The mass of a proton nearly equals the mass of a neutron.
D. Neutrons are negatively charged and are the heaviest subatomic particles.

4. **The modern periodic table is arranged in the order of:**

A. Increasing atomic mass
B. Increasing atomic number
C. Increasing density
D. Increasing valence

5. Elements in the same group have

A. Different valence electrons
B. Similar chemical properties
C. No similarity
D. Same atomic mass

6. What determines the period number of an element?

A. Number of neutrons
B. Number of electron shells
C. Number of valence electrons
D. Nuclear charge

7. Helium is placed in group VIII because:

A. It has two protons
B. Its valence is 1
C. It has a stable electron configuration
D. It reacts vigorously

8. Which of the following elements is irregular in the periodic table?

A. Lithium (Z) = 3
B. Hydrogen (Z) = 1
C. Helium (Z) = 2
D. Chromium (Z) = 24

9. Which element has the electron configuration:
$1s^2\ 2s^2\ 2p^6\ 3s^2\ 3p^6\ 4s^1$?

A. Calcium (Z) = 20
B. Sodium (Z) = 11
C. Potassium (Z) = 19
D. Magnesium (Z) = 12

10. The configuration of an element ends in $3p^4$. In the periodic table, the element is in:

A. Period 3, Group IV
B. Period 3, Group III
C. Period 4, Group IV
D. Period 3, Group VI

11. Which electron configuration corresponds to a d-block element?

A. [Ar] $4s^2\ 3d^5$
B. [Ne] $3s^2\ 3p^3$
C. [He] $2s^2\ 2p^6$
D. [Kr] $5s^2\ 5p^5$

12. An element has the configuration ending in $4s^2$. Which group does it belong to?

A. Group I
B. Group II
C. Group IV
D. Group VI

13. The electron configuration of an element ends in $5p^3$. Which period is the element located in?

A. Period 3
B. Period 4
C. Period 5
D. Period 6

14. An element has the configuration ending in $4s^2\ 3d^{10}\ 4p^5$. Which group does it belong to ?

A. V
B. IV
C. VII
D. III

15. An atom has a nuclear charge of +17e. Which statement is correct?

A. It has 17 electrons and is fluorine (Z=9).
B. It has 17 protons and is chlorine (Z=17).
C. It has 17 neutrons and is argon (Z=18).
D. It has a mass number of 17.

16. An element in Group 1, Period 4 is expected to:

A. Be a noble gas with very low reactivity
B. Be a very reactive alkali metal
C. Be a transition metal forming colored compounds
D. Be a metalloid with variable conductivity

Exercise II (7 points) **Iron**

Given : elementary charge of a proton $e = +1.6 \times 10^{-19}\,C$

mass of a nucleon $= 1.67 \times 10^{-27}\,Kg$

Iron (Fe) is one of the most important elements on Earth. It is used in construction, machinery, and even in the human body, where it helps transport oxygen in blood.

Iron has an atomic number of 26, meaning each atom contains 26 protons. One of its common isotopes has 30 neutrons.

1. Nuclear Charge

a) Calculate the charge of the nucleus of an iron atom?

b) Explain why the nuclear charge depends only on the number of protons, not neutrons.

2. Mass of the Atom

a) Determine the mass number of this iron isotope.

b) Calculate the approximate mass of this iron atom.

3. Electron Configuration (s, p, d, f)

a) Write the full electron configuration of iron using s, p, d, f notation.

b) Indicate the position of iron atom in the periodic table.

4. An atom X is located just before iron in the periodic table.

Write the electron configuration of X and justify your answer.

Exercise III (5 points) Electron configuration and periodic classification

Write the electron configuration of the following atoms:

a- An alkaline earth metal X that belongs to the third row of the periodic table.
b- A halogen that belongs to the second row of the periodic table.
c- An atom X that is located in column 9 and row 4 of the periodic table.
d- The first alkali metal.
e- The first noble gas.

Exercise IV (7 points) **Everyone in their place!**

The aim of this exercise is to study the properties of some chemical elements. To do this, we refer to the extract from the periodic table below:

$_1$H																	He
Li	Be											B	C	N	O	F	Ne
?	Mg											Al	Si	P	S	Cl	?
K	Ca										Zn						

Given : Mass of a nucleon, m(nucleon) = 1.67×10^{-27} Kg

Elementary charge, e = $+ 1.6 \times 10^{-19}$ C

1- Referring to the table, reproduce the 1st and 18th columns of the periodic table, and complete the two empty boxes in these two columns with the symbols of elements chosen from the list below, providing justification.

$_{20}$Ca; $_{29}$Cu; $_{22}$Ti; $_{18}$Ar; $_{11}$Na; $_{24}$Cr.

2- The potassium atom has the same chemical properties as the lithium atom Li.

2.1- Name the family to which these two elements belong.

2.2- Write, justifying, the electronic configuration of the potassium atom.

2.3- Determine the atomic number of potassium, then calculate the charge of its nucleus.

3- The nuclear charge of the zinc atom is 4.8×10^{-18} C.

3.1- Determine the value of its atomic number Z.

3.2- Check if zinc is an irregular metal.

I - 1 - B 9 - C (1pt each)
2 - B 10 - D
3 - C 11 - A
4 - B 12 - B
5 - B 13 - C
6 - B 14 - C
7 - C 15 - B
8 - D 16 - B

II - 1. a - Charge of nucleus = charge of protons (charge of n° = 0)
= Z × e where: Z: number of p+
= 26 × 1.6 × 10^{-19} = 4.16 × 10^{-18} C. (1)

b - Charge of neutrons = 0 (1/2)

2. a - Mass number A = Z + N = 26 + 30 = 56. (1/2)

b - Approximate mass = A × 1.67 × 10^{-27}
= 56 × 1.67 × 10^{-27}
= 8.96 × 10^{-26} kg. (1)

3. a - In a neutral atom, number of p^+ = number of e^- = Z
= 26.

Configuration $_{26}Fe$: $1s^2 2s^2 2p^6 3s^2 3p^6 4s^2 3d^6$ (1)

b - Period 4 - Column 8. (1)

4 - X is located before Fe : X : Period 4 - col. 7 (1)
Configuration: $1s^2 2s^2 2p^6 3s^2 3p^6 4s^2 3d^5$. (1)

III - a - GII - P.3 ⇒ $1s^2 2s^2 2p^6 3s^2$. (1)
b - Halogen: G VII - P.2 ⇒ $1s^2 2s^2 2p^5$. (1)
c - Col. 9 - row 4 ⇒ $1s^2 2s^2 2p^6 3s^2 3p^6 4s^2 3d^7$ (1)
d - First alkalimetal: GI - row 2 ⇒ $1s^2 2s^1$. (1)
e - First noble gas: $1s^2$. (1)

IV 1. Col. 1 Col. 18

H
Li
Na
K

He
Ne
Ar

Elements are classified in the table according to an increasing order of their atomic number Z.
Box n° = 11 is occupied by $^{11}_{}Na$.
Box n = 18 is occupied by $^{}_{18}Ar$ (1)

2-2.1. Alkali Metal. (1)
2.2. K: Col. 1 - P. 4 $\Rightarrow 1s^2 2s^2 2p^6 3s^2 3p^6 4s^1$ (1)
2.3. Number of $\bar{e} = 2+2+6+2+6+1 = 19$ electrons
In a neutral atom, number of $\bar{e}$ = number of $p^+ = Z = 19$ (1)
$Q_{nucleus} = Z \times e = 19 \times 1.6 \times 10^{-19} = 3.04 \times 10^{-18} C$. (1)

3.3.1) $Z(Zn) = \frac{Q_{nucleus}}{e} = \frac{4.8 \times 10^{-18}}{1.6 \times 10^{-19}} = 30$. (1)

3.2) Configuration $(Zn) = 1s^2 2s^2 2p^6 3s^2 3p^6 4s^2 3d^{10}$
So Zn is in Column 12, Irregular Metal.
(or its configuration ends with d) (1)