MINISTRY OF EDUCATION AND HIGHER EDUCATION

FORM FOUR EXAMS, 2019

CHEMISTRY

2019

P/LAND NATIONAL EXAMINATION BOARD

MINISTRY OF EDUCATION AND HIGHER EDUCATION
PUNTLAND NATIONAL EXAMINATIONS BOARD

Code Number

FORM FOUR EXAMINATION 2019
TIME 2 HOURS AND 10 MINUTES FOR READING

CHEMISTRY

Instructions to candidates

- Answer all the questions
- This paper consists of 11 pages, count it and if any is missing inform your invigilator
- Do not write your **name and roll number** on the exam paper
- Make sure that **student's profile** is attached to the exam paper, if not, inform you invigilator.
- No extra paper is allowed.
- If you make a mistake, **cross out the incorrect** answer and **write your correct answer.**

This exam paper consists of following parts

Parts	Marks
Part one: Multiple Choice	15 marks
Part two: Structured Questions	85 marks
	Total: 100 Marks

For the markers only

PARTS	MARKS
Part one	
Part two	
TOTAL	%

PART ONE: MULTIPLE CHOICE QUESTIONS (15 MARKS)

Instructions for this section: **Circle** the correct answer from A, B, C, D.
For each question there is **only one** correct answer.

1- The mass of an atom is determined by the number of:

A) Neutrons and protons
B) Electrons and protons
C) Neutrons and electrons
D) Neutrons only

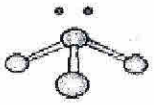
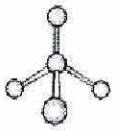
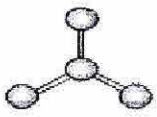
2- Which of the following is an endothermic reaction?

A) Quicklime with water
B) Neutralization
C) Making magnesium Oxide
D) Ammonium chloride in water

3- The chemical formula of sodium sulphate is:

A) $NaSO_4$
B) Na_2SO_4
C) $Na(SO)_2$
D) $NaSO_2$

4- Which of the following molecules have a **trigonal** planar shape?

A)  B)  C)  D) 

5- Which of the following formulae is the molecular formula of heptane?

A) C_7H_{14} B) C_7H_{15} C) C_7H_{16} D) C_7H_{18}

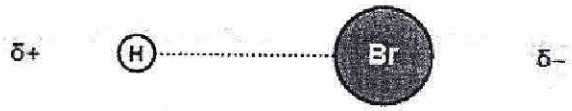
6- What is the concentration of a solution containing 0.025moles of sodium hydroxide in 25 cm^3 of solution?

A) 0.025 mol/dm^3
B) 0.25 mol/dm^3
C) 0.1 mol/dm^3
D) 1 mol/dm^3

7- Ethane and ethene are both hydrocarbons. When they reacts with chlorine, which row describes the type of reaction that each undergoes?

	Ethane	Ethene
A	Addition	Addition
B	Substitution	Addition
C	Substitution	Substitution
D	Addition	Substitution

8- Which of the following statements best describes the polarity of the bond between hydrogen bromide molecules?



A) The shared pair of electrons are shared equally
B) Hydrogen is more electronegative than bromine
C) The bond between hydrogen and bromine is non polar.
D) The shared pair of electrons are not shared equally

9- The method which is used to separate colored substance is known as:
A) Chromatography
B) Simple distillation
C) Filtration
D) Fractional distillation

10-In the electrolysis of molten lead bromide, using carbon electrodes, the products formed are:
A) Hydrogen gas and oxygen gas
B) Lead atoms and bromine vapor
C) Lead atoms and oxygen gas
D) Oxygen gas and bromine vapor

10- The alloy brass is made from:
A) Copper and Tin
B) Copper and magnesium
C) Copper and Zinc
D) Copper and Nickel

11- The molecule 2- methylbuta-2-ol is an example of:

A) Primary alcohol
B) Primary halogenoalkanes
C) Tertiary alcohol
D) Tertiary halogenoalkanes

12- Which one of the following is a property of an acid?

A) Turns the red litmus to blue
B) Have a PH number less than 7
C) Have PH greater than 7
D) Have PH number exactly 7

13- The process of coating one metal with another to make it look better or to prevent corrosion by using electricity is called:

A) Galvanizing
B) Electroplating
C) Sacrificial
D) Painting

14- The electronic configuration for a neutral atom of Calcium is:

A) $1s^2\ 2s^2\ 2p^6\ 3s^2\ 3p^6\ 4s^2$
B) $1s^2\ 2s^2\ 2p^6\ 3s^2\ 3p^6\ 4s^1$
C) $1s^2\ 2s^2\ 2p^6\ 3s^2\ 3p^6\ 3d^1$
D) $1s^2\ 2s^2\ 2p^6\ 3s^2\ 3p^5$

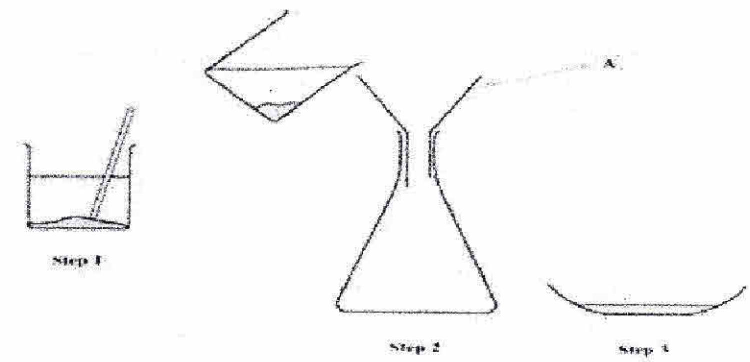
15- As you move from left to right across the periodic table:

A) Electro negativity decrease
B) First ionization energy decrease
C) Atomic radius increase
D) Atomic radius decreases

PART TWO: STRUCTURED QUESTIONS (85 MARKS)

Question 1: (12 marks)

A) Salt is soluble in water, but sand in insoluble in water. This difference allows a mixture of salt and sand to be separated using this apparatus.



Use the word from the box to complete the sentences. Each word may be used once, more than once or not at all. (6M)

Bunsen burner	**Beaker**	**Burette**	**Conical flask**
Funnel	**Water**	**Glass rod**	**Thermometer**

In step 1, the mixture of salt and sand is placed in a ____________________

containing ____________________ and stirred with a ____________________

In step 2, the mixture in **step 1** is poured through a __________ Into a ____________________

In step 3, the liquid is transferred to a basin to allow the ______________ to be removed.

B) Name the piece of apparatus labeled **A** on the above diagram.

____ (1M

C) Potassium has an atomic number 19, is in the fourth period of the periodic table, it belongs to group 1. So Ptassium atom has: (3M)

i) __________ Electrons ii) __________ Protons iii) __________ shells of electrons.

D) Define these terms

i) Atomic number ____

____ (1M)

ii) Mixture ____ (1M)

Question 2: (13 marks)

A) This question refers to lithium fluoride, it is made up of lithium ion and fluoride ion **(Li^+ and F^-)** ions.

i) Complete the table below (4M)

Ions	Number of protons	Number of electrons
Li^+		
F^-		

ii) Write the electronic configuration of the two ions in terms of (spdf).

Lithium ion (Li^+) _____ (1M)

Fluoride ion (F^-) _____ (1M)

iii) Name the bond formed when lithium ions and fluoride ions react together.

_____ (1M)

i) What kind of structure do you think that lithium fluoride has?

_____ (1M)

B) Write the chemical formulae of the following compounds:

i) Magnesium nitrate _____ (1M)

ii) Calcium sulphate _____ (1M)

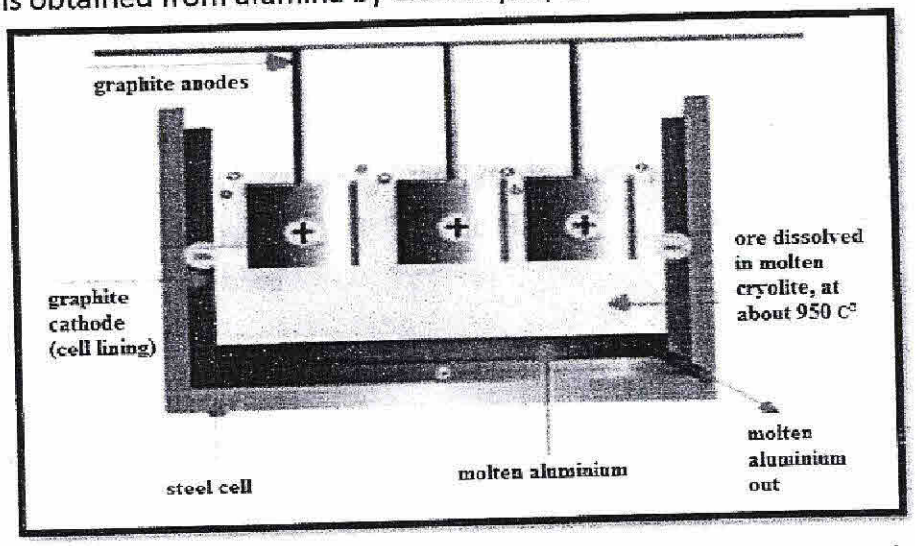
iii) Lithium suphide _____ (1M)

iv) Sodium carbonate _____ (1M)

v) Aluminum chloride _____ (1M)

Question 3: (12 marks)

Aluminum is obtained from alumina by electrolysis; this is the tank for electrolysis.



A) During electrolysis, molten alumina breaks down into aluminum and oxygen.

i) Write a word equation for the above reaction.

_____ (1M)

ii) What happens at the cathode?

_____ (1M)

iii) Write an equation for the reaction at the cathode? Is it oxidation or reduction?

_____

_____ (3M)

iv) Why the anodes replaced from time to time regularly?

_____

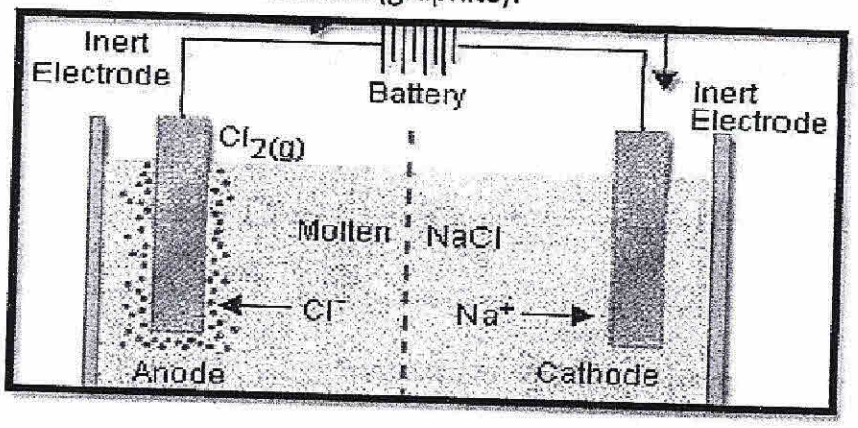
_____ (1M)

v) Alumina melts at 2045°C. It would be impossible to keep the tank that hot. Instead, the alumina is dissolved in molten **cryolite**. Explain why?

_____

_____ (1M)

B) The diagram below shows molten sodium chloride decomposes during electrolysis using carbon electrodes (graphite).



i) Explain why carbon electrodes (graphite) conduct electricity?

_____

_____ (1M)

ii) Write the balanced equation for overall decomposition of concentration sodium chloride.

_____ (2M)

C) Write the half-equation for the reaction at:

Anode _____ (1M)

Cathode _____ (1M)

Question 4: (10 marks)

Match the terms in the box on the left with their definitions on the right. Write the answer in the space provided (middle). The first one is done for you.

Terms	Answer	Definitions
1- Atom	D	A- Substance made of one type of atom
2- Hydrocarbon		B- Is a measure of how fast or slow something
3- Monomer		C- Separating an insoluble substance from a liquid
4- Catalyst		D- The smallest unit of an element
5- Filtering		E- Is a charged particle
6- Exothermic		F- Substance containing very large molecules
7- Endothermic		G- Substance that increases the rate of reaction without being used up.
8- Element		H- Compounds containing carbon and hydrogen only
9- Polymer		I- Takes in heat energy
10-Ion		J- The small starting molecule in polymerization
11-Rate		K- Gives out heat

Question 5: (11 marks)

A) Below is an equation for the reaction of ethene and bromine.

i) What name is given to this type of reaction?

_____ (1M)

ii) Name the product of the above reaction.

_____ (1M)

iii) Write a chemical test that can be used to test for unsaturated hydrocarbons.

_____

_____

_____ (2M)

B) Ethene molecules can add on to each other to form a long chain called polyethene.

i) Write a balanced equation for the formation polyethene using displayed formula; show the repeat unit in **brackets**.

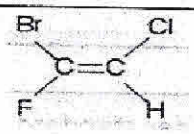
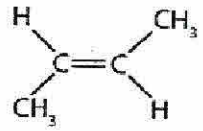
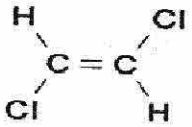
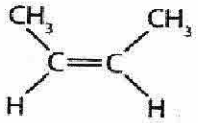
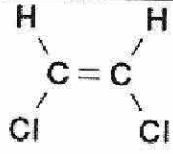
_____

_____ (2M)

ii) Which family of organic compounds does ethene belong?

_____ (1M)

C) The following molecules are geometric (cis and trans) isomerism, Name them. The first one is done for you. (4M)

No	Molecule	Name
i)		Cis-1-bromo-2-chloroethene
ii)		
iii)		
iv)		
v)		

Question 6: (10 marks)

A) i) 50 cm^3 of hydrochloric acid are added to 50 cm^3 of sodium hydroxide solution, both of concentration 1 mol/dm^3 in an insulated beaker. The temperature rises by 6.2 ^{0}C. The acid and the alkali completely neutralized.
Calculate the molar enthalpy change of neutralization? (4M)

____

____

____

____

____

____

____

____

____

____

____

ii) A standard enthalpy change for a reaction takes place under standard conditions. What are the standard conditions of:

Temperature ______________________________ (1M)

Pressure ______________________________ (1M)

iii) Define the term standard enthalpy change of formation?

____

____

____ (2M)

iv) Write a balanced equation for the formation of ethane (C_2H_6) from carbon and hydrogen. $\Delta H_f^{\circledR}$ = − 84.7 KJ/mol

____ (2M)

Question 7: (12 marks)

A) The reaction of magnesium with different concentrations of hydrochloric acid is often used to investigate how concentration affects the rate of reaction.

i) Write a balanced chemical equation for the reaction of magnesium and hydrochloric acid, include state symbols.

____ (3M)

ii) When you are changing the concentration of the reaction, what variables do you need to keep constant?

_____

_____ (2M)

B) Ali performed two separate experiments of magnesium with different concentration hydrochloric acid. He measured and recorded the volume of hydrogen produced per minute. Below are the results from the two experiments.

Time/minute	0	1	2	3	4	5	6	7	8	9	10	11
Experiment 1 Volume of hydrogen produced minute	0	11	22	33	44	54	63	71	77	79	80	80
Experiment 2 Volume of hydrogen produced minute	0	19	38	55	68	75	78	80	80	80	80	80

i) Which experiment was the acid more concentrated?

_____ (1M)

ii) How can you tell that the reactions have stopped?

_____ (1M)

C) i) Explain why the reaction goes faster when the temperature is raised?

_____

_____ (2M)

iii) Which has the largest surface area: 1 gram of large marble chips and 1 gram of small marble chips?

_____ (1M)

D) The equation for the reaction between $H_2 + Cl_2 \longrightarrow 2HCL$,

Different names are used for the product, depending on its state symbol.

i) What are the names used for:

HCl (g) _____ (1M)

HCl (aq) _____ (1M)

Question 8: (5 marks)

A) The successive ionization energies of an element **Y** are shown below.

Ionization	1st n	2nd	3rd	4th	5th
energy/KJ/mol	800	2420	3660	25000	32800

i) Identify element **Y**?

_____ (1M)

ii) Suggest the group of the periodic table to which **Y** element belong?

_____ (1M)

iii) Why there is a big difference between the 3rd and the 4th ionization energies of element **Y**?

_____

_____ (1M)

iv) Define the term ionization energy.

_____

_____ (2M)

END.