

Name Index No.....

Candidate signature.....

Date:

233/1

CHEMISTRY

Paper 1(THEORY)

July / August – 2018

Time: 2 Hours

INSTRUCTIONS TO CANDIDATES

- Write your name and index number in the spaces provided above.
- Sign and write the date of examination in the spaces provided.
- Answer **all** the questions in the spaces provided.
- KNEC mathematical tables and non-programmable electronic calculators may be used.
- All working **must** be clearly shown where necessary
- Candidates should check whether the question paper to ascertain that all the pages are printed and that no questions are missing.
- Candidates should answer the questions in **English**

FOR EXAMINER'S USE ONLY

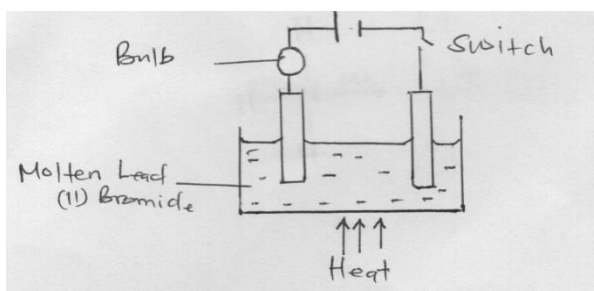
Questions	Maximum Score	Candidates Score
1 – 30	80	

1. a) When the air hole is fully opened, the Bunsen burner produces a non-luminous flame.
Explain (1mks)

b) Draw a labeled diagram of a non-luminous flame (2mks)

2. Describe an experimental procedure that can be used to extract oil from nuts seeds (2mks)

3. Study the diagram below and use it to answer the questions that follow



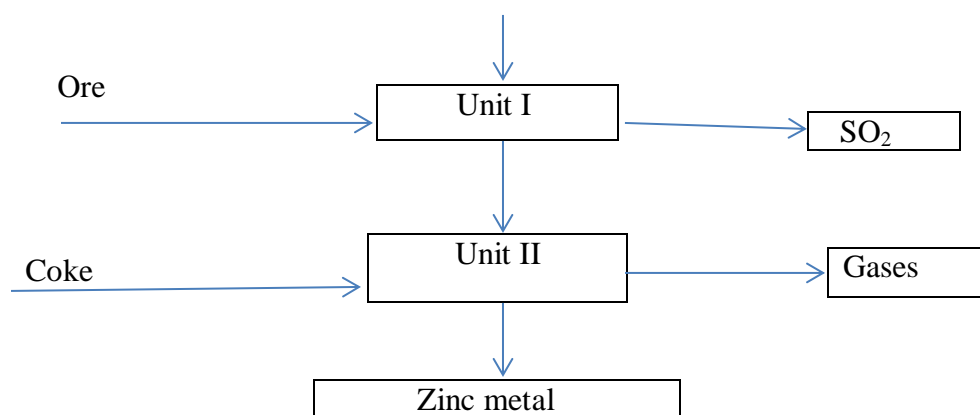
a) Write the equations for the reactions taking place at the;
I. Anode (1mks)

II. Cathode (1mks)

b) Name one application of electrolysis (1mks)

4. In a titration experiment, 25cm^3 of a solution of sodium hydroxide containing 8 g per litre was required for complete neutralization of 0.245 g of a dibasic acid. Calculate the relative molecular mass of the acid (Na = 23.0, O = 16.0, H = 1) (3mks)

5. The flow chart below shows processes involved in the industrial extraction of Zinc metal



- a) Name **one** ore from which zinc is extracted (1mks)
- b) Write the equation of the reaction taking place in unit II (1mks)
- c) Name **two** uses of zinc metal (1mks)

6. The table below shows the pH values of solutions P, R, Q and S

Solution	P	R	Q	S
pH	2	7	6.5	13.5

- a) Which solution represents:
- i) Strong base (1mks)
- ii) Weak acid (1mks)
- b) Give an example of solution S (1mks)

7. The electron arrangement of ions of a certain elements represented by letters P, Q, R and S are:

P²⁻ -2.8.8

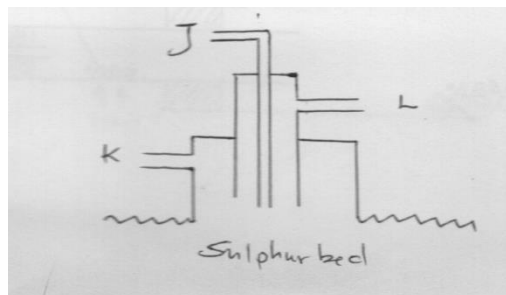
Q²⁺ -2.8

R⁺ - 2.8

S -2.8.8

- a) Explain why S is not represented as an ion (1mks)
- b) Which element has the largest atomic radius? Explain. (2mks)

8. Sulphur is extracted from underground deposits by a process in which three concentric pipes are sunk down to the deposits as shown



- a) Name the process represented above (1mks)
- b) What is passed down through pipe J? (1mk)

c) Name the **two** allotropes of sulphur (1mk)

9. Element **A** has atomic mass 23 and element **B** has atomic mass 7 and also have 12 neutrons and 4 neutrons respectively.

a) Write the electronic arrangement of **A** and **B**. (1mk)

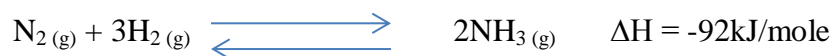
b) Which element has higher ionization energy? Explain (2mks)

10. W grammes of a radioactive isotope decayed to 5 grammes in 100 days. The half life of the isotope is 25 days.

a) What is meant by half life? (1mk)

b) Calculate the initial mass W of the radioactive isotope (3mks)

11. Haber process (the manufacture of ammonia gas) is given by the following equation



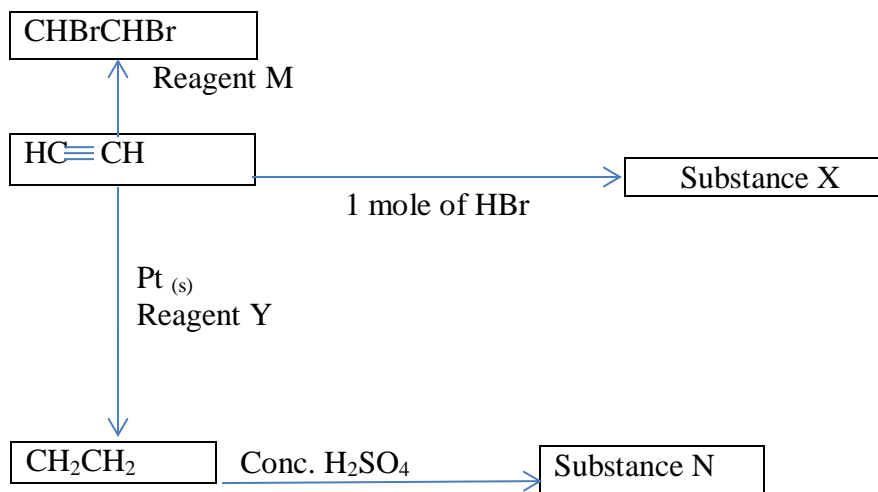
State and explain the effect of

a) Introducing some drops of water to the equilibrium (1mk)

b) Pumping nitrogen gas to the equilibrium mixture (1mk)

c) Lowering the temperature of the reaction (1mk)

12. The scheme below shows some reactions starting with ethyne. Study it and answer the questions that follow.

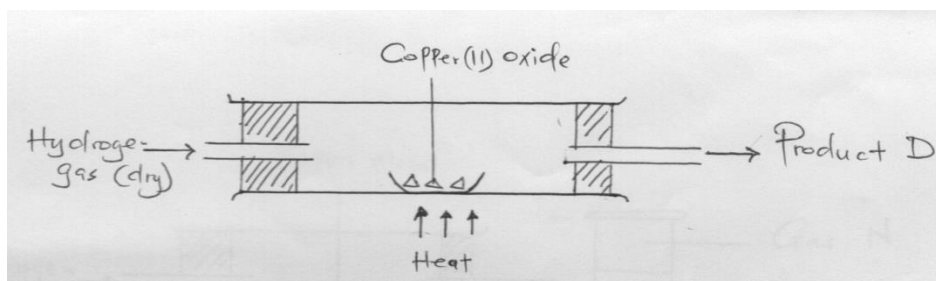


- a) Name substance
- i) X (½mk)
- ii) N (½mk)
- b) Name the reagent M (½mk)
- c) Ethene undergoes polymerization to form a polymer. Write an equation for the reaction and name the product (1½mks)

13. a) State Graham's law of diffusion (1mk)

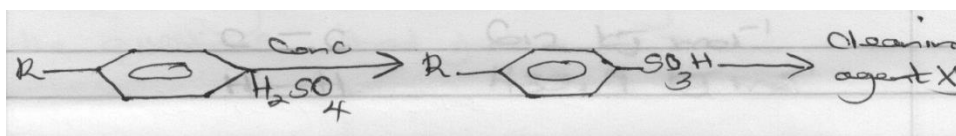
- c) 30cm^3 of hydrogen chloride gas diffuses through a porous in 20 seconds. How long would it take 42cm^3 of sulphur (IV) gas to diffuse through the same pot under the same conditions? (H = 1, Cl = 35.5, S = 32, O = 16) (2mks)

14. In the laboratory experiment, hydrogen gas was passed over heated copper (II) oxide as shown in the diagram below



- a) Write equation for the reaction taking place in the combustion tube (1mk)
- b) Describe a chemical test that can be used to identify the product D (2mks)

15. The scheme below represents the manufacture of a cleaning agent X



- a) Draw the structure of X and state the type of cleaning agent to which X belong (1mk)
- b) State **one** disadvantage of using X as a cleaning agent (1mk)

16. Diamond and graphite are allotrope of carbon.

- a) What are **allotropes**? (1mk)

b) Explain why graphite can be used as a lubricant while diamond cannot? (1mk)

c) Give another element which exhibit allotropy (1mk)

17. Given sodium carbonate solid, lead II nitrate solid and water, Explain how you can obtain a solid sample of lead II carbonate (3mks)

18. Given the following bond energies:

C - C	347kJ/mol
C - H	413kJ/mol
C = C	612 kJ/mol
H - H	435.9kJ/mol

Calculate the enthalpy change of hydrogenation of ethane (3mks)

19. Excess magnesium ribbon sample was heated in equal volumes of:

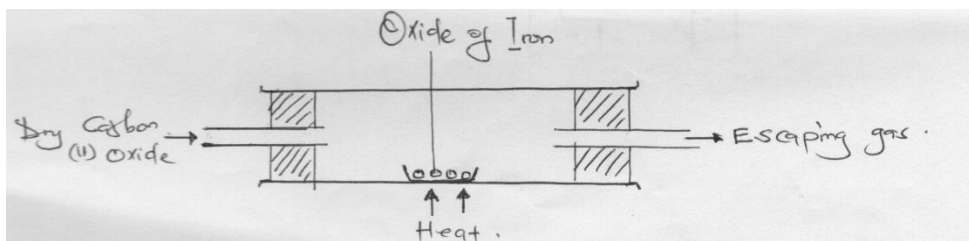
i) Pure oxygen gas

ii) Air

a) Why was the mass of the resulting product in (ii) more than in (i)? (1mk)

b) Write the equations for the reactions in part (ii) (2mks)

20. Excess carbon (II) oxide was passed over heated sample of an oxide of iron as shown in the diagram below. Study it and answer the questions that follow.



Data collected as follows:

Mass of empty crucible	10.98 g
Mass of empty crucible + oxide of iron	13.30 g
Mass of crucible + residue	12.66 g

Determine;

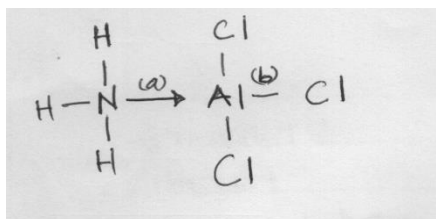
- The mass of the iron (½mk)
- The mass of oxygen (½mk)
- The empirical formula of the oxide of iron (2mks)

21. The table below gives some properties of three elements in groups (VII) of the periodic table. Study it and answer the questions that follow

Element	Atomic No.	Melting point ($^{\circ}\text{C}$)	Boiling point ($^{\circ}\text{C}$)
Chlorine	17	-101	-34.7
Bromine	35	-7	58.8
Iodine	53	114	185

- a) Which element is a gas at room temperature (25°C)? Explain. (1mk)

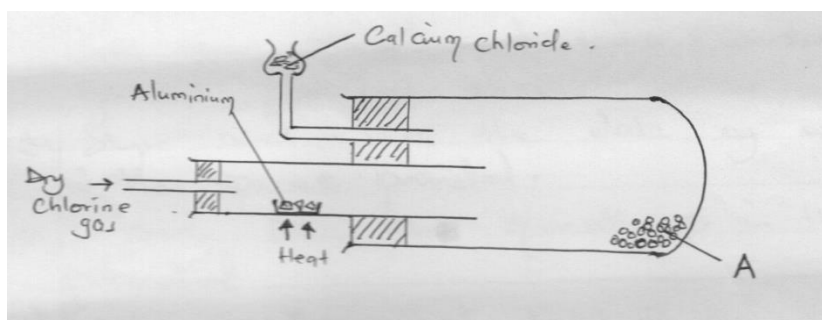
- b) Explain why the boiling point of bromine is higher than that of chlorine (1mk)
- c) Identify the element which has the highest electron affinity. Give a reason (1mk)
22. An element X has relative atomic mass of 88. When a current of 0.5 Amperes was passed through the fused chloride of X for 32 minutes 10 seconds, 0.44 g of X was deposited at the cathode. (IF = 96500C)
- a) Calculate the number of Faradays needed to liberate 1 mole of X (2mks)
- b) Write the formula of the chloride of X (1mk)
23. Aqueous ammonia was added to copper (II) sulphate solution dropwise until in excess.
- a) What observations were made? (1½ mks)
- b) Write down the ionic equations representing the observations mentioned in (a) above. (1½mks)
24. The diagram below shows the bonding between aluminium chloride and ammonia



- i) Name the type of bond labeled
- a) (1mk)
- b) (1mk)

ii) How many electrons are used for bonding in the molecule? (1mk)

25. In an experiment, dry chlorine gas reacted with aluminium as shown in the diagram below.



i) Name substance A (1mk)

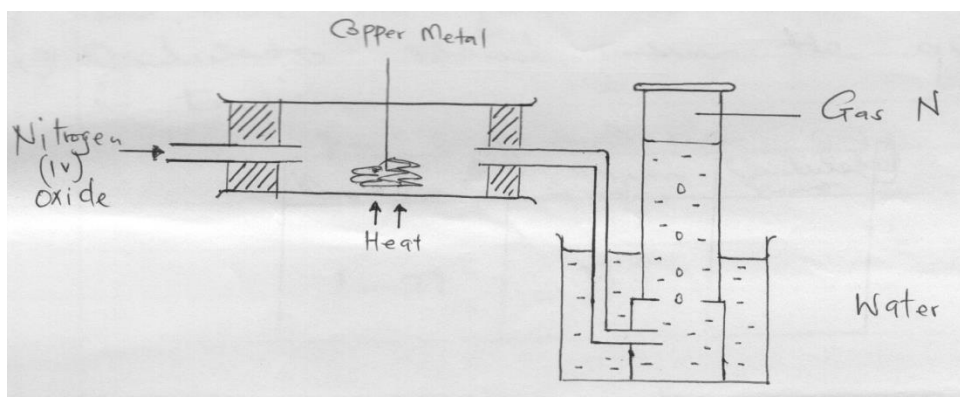
ii) Write an equation for the reaction that took place in the combustion tube (1mk)

iii) State the function of the calcium chloride in the set up above (1mk)

26. a) State the **Gay Lussac's** law (1mk)

c) 10cm^3 of gaseous hydrocarbon C_2H_x required 30cm^3 of oxygen for combustion. If 1 mole of steam and 20cm^3 of carbon (IV) oxide were produced, what is the value of X? (2mks)

27. The set up below is an arrangement showing how metals react with nitrogen (IV) oxide. Study it and answer the questions that follow.



- a) Nitrogen (IV) oxide is passed through the combustion tube before copper is heated.
Give a reason. (1mk)
- b) State the observations that would be made at the end of the experiment in the combustion tube (1mk)
- c) Name gas N (1mk)