Name: _____   **Adm. No**_____**Index No:** _____

School:_____**Candidate's Sign**_____

Date: _____

233/1
CHEMISTRY
Paper 1
THEORY

March /April 2020
Time: 2 Hours

ARISE AND SHINE TRIAL ONE EXAM
MARCH/APRIL - 2020

Instructions to candidates:

a) *Write your name, Admission Number, index number and school in the spaces provided **above***
b) *Sign and write the date of examination in the spaces **above***
c) *Answer **ALL** the questions in the spaces provided below each question.*
d) *Mathematical tables and silent electronic calculators may be used.*
e) *All working **MUST** be clearly shown where necessary*
f) ***This paper consists of 10 printed pages.***

FOR EXAMINER'S USE ONLY

QUESTIONS	MAXIMUM SCORE	CANDIDATE'S SCORE
1 -28	80	
TOTAL SCORE	80	

1. (a). Under what condition does the Bunsen burner produce luminous flame?   (1 mark)
_____

(b). Luminous flame is yellow and sooty. Explain.   (2 marks)
_____

_____

_____

2. (a). Distinguish between isotopes and allotropes   (2 marks)
_____

_____

(b). Name one allotrope of Sulphur that is stable at temperature above $96^{o}C$ (1 mark)

_____

3. Sodium metal burns with a yellow flame in excess oxygen forming yellow solid. The yellow
solid react with water to form gas F.
(a). Name the yellow solid   (1 mark)
_____

_____

(b). Identify gas F   (1 mark)
_____

_____

(c). Write an equation for the reaction of the yellow solid with water.   (1 mark)
_____

_____

4. (a). State Boyle's law.   (1 mark)
_____

_____

(b). Explain why the pressure of a fixed mass of a gas increases with increase in temperature in a
fixed volume container.   (2 marks)
_____

_____

5. The set up in figure 1 can be used to prepare ethyne gas. Use it to answer the questions that
follow.
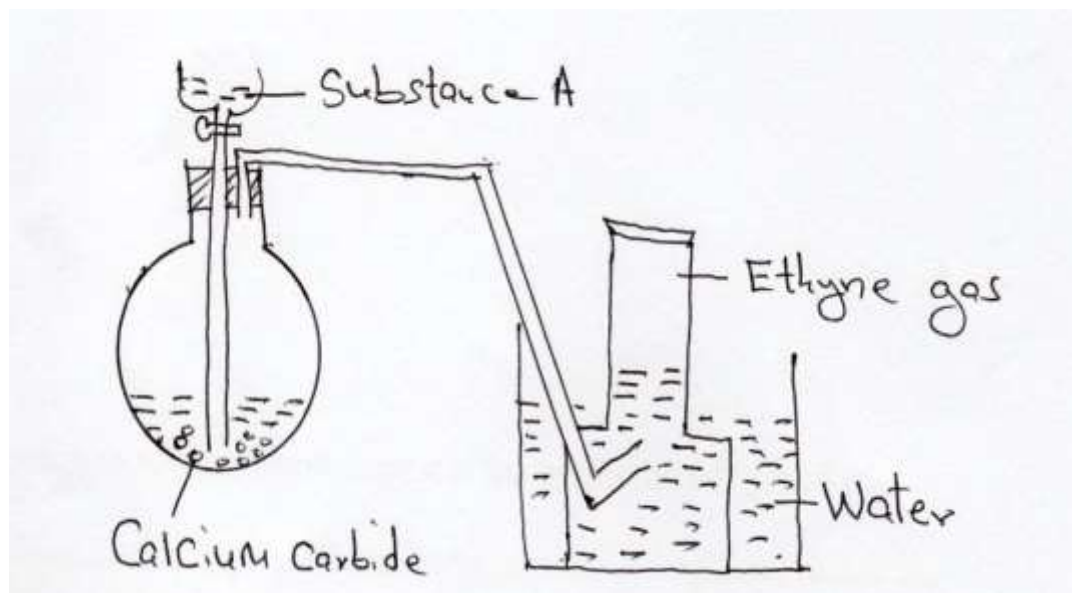
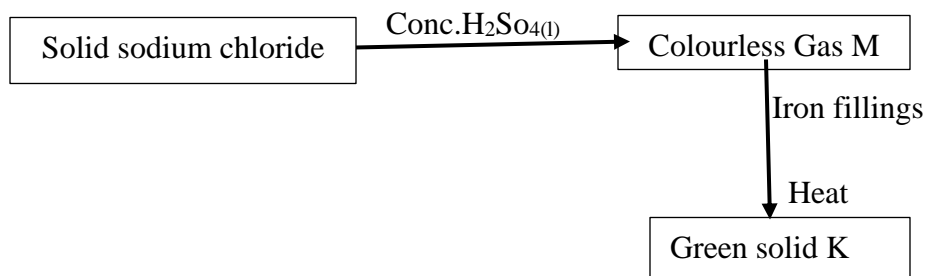[a]. Name substance A   (1 mark)

_____

[b]. Write an equation for the reaction which occurred in the flask   (1 mark)

_____

_____

(c). Draw and name the structure of the compound formed when one mole of ethyne reacts with one mole of chlorine gas.   (1 mark)

6. Starting with zinc carbonate solid describe how zinc hydroxide can be prepared in the laboratory. (3 marks)

_____

_____

_____

_____

_____

7. 24.0cm^3 of 0.18M hydrochloric acid was added to 0.38g of sodium carbonate solid. Calculate the mass of sodium carbonate that did not react. (0=16, Na=23 C=12) (3 marks)

_____

_____

_____

_____

_____

8. The reaction scheme below represent the preparation of gas M.

```
                        Conc.H₂So₄(l)
┌──────────────────────┐  ──────────▶  ┌──────────────────────┐
│ Solid sodium chloride │               │   Colourless Gas M   │
└──────────────────────┘               └──────────────────────┘
                                              │ Iron fillings
                                              │
                                              │ Heat
                                              ▼
                                        ┌──────────────────────┐
                                        │    Green solid K     │
                                        └──────────────────────┘
```

 [a]. Identify gas M and solid K

   Gas M_____ ($^1/_2$ mark)

   Green solid K _____ ($^1/_2$ mark)

[b]. Describe a chemical test for gas M (2 marks)

_____

_____

_____

9. (a). 0.95g of Magnesium Chloride was dissolved in 250cm^3 of water. Calculate the molar concentration of Chloride ions in the solution. (Mg=24 Cl=35.5)   (3 marks)

_____

_____

_____

10. (a). What is an acid-base indictor?   (1 mark)

_____

_____

(b). Describe how the pH of a soil sample can be determined in the laboratory.   (2 marks)

_____

_____

11. In an experiment, Hydrogen sulphide gas was bubbled into a solution of iron (III) chloride. State and explain the observations made.   (3 marks)

_____

_____

_____

_____

_____

_____

_____

12. The diagram below represents part of the periodic table. Use it to answer the questions that follow. The letters are not the actual symbols of the elements.   (2 marks)
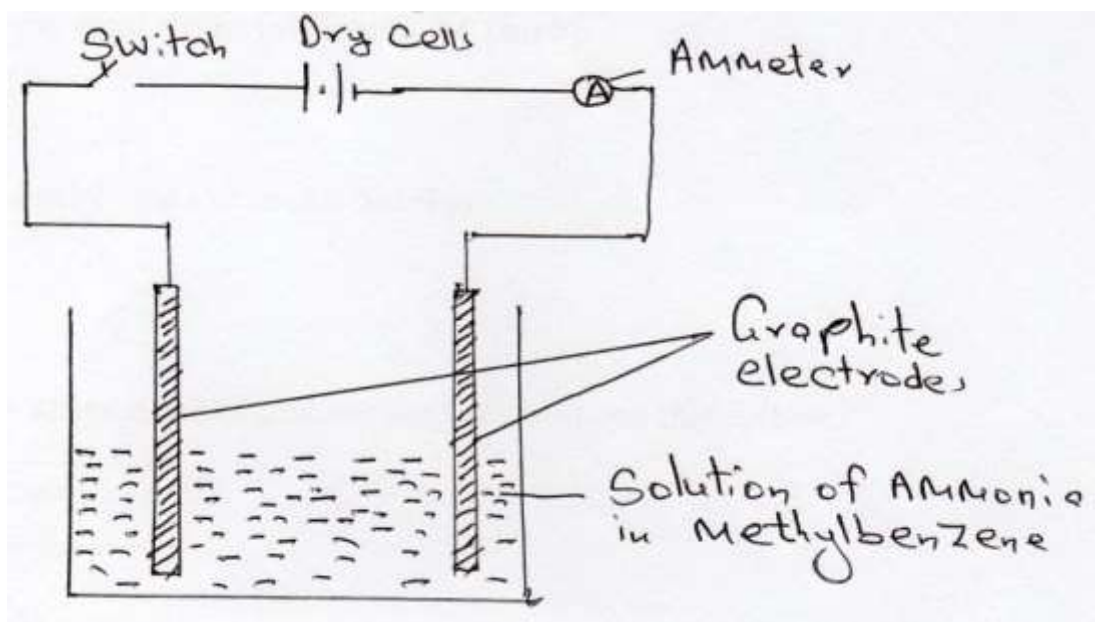
M							
T	V		W			Q	

 (a). Write the Electronic arrangement for the stable ion formed by **M**.   (1 mark)

_____

_____

(b). Write an equation for the reaction between T and **Q**.   (1 mark)

_____

_____

(c). Compare the melting point of element T and V.   (1 mark)

_____

_____

13. Study the set-up below and answer the questions that follow.

State and explain the observation made when the switch is closed.   (2 marks)

14. (a). Define molar heat of combustion.   (1 mark)

_____

_____

(b). X g of element Q was completely burned in air. The heat evolved was used to heat $250cm^3$ of water. The temperature of water rose from 32^oC to 50^oC. Molar heat of combustion of

element Q is -360 kJmol$^-$ .Calculate the value of X. (Density of water is 1gcm^{-3} and specific heat capacity of water is 4.2kJ mol^{-3} R.A.M of Q=24)   (2 marks)
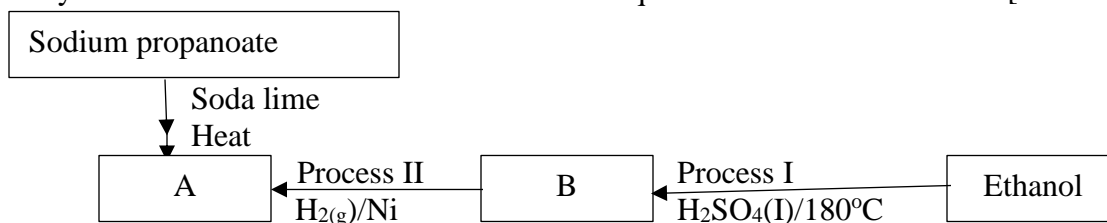
_____

_____

_____

_____

15. A sample of water is suspected to contain chloride ions. Describe an experiment that can be carried out to determine the presence of chloride ions.   (3 marks)

_____

_____

_____

_____

16. In contact process, Sulphur (IV) oxide reacts with oxygen to form Sulphur (VI) oxide in presence of a catalyst.
(a). Name the preferred catalyst for this reaction.   (1 mark)

_____

_____

(b). Give two uses of sulphuric (VI) acid   (2 marks)

_____

_____

_____

17. Study the reaction scheme below and answer the questions that follow.   [1 mark]

| Sodium propanoate |

Soda lime
Heat

| A | ← Process II
$H_{2(g)}$/Ni | B | ← Process I
H_2SO_4(I)/180ºC | Ethanol |

a). Identify substances   (1 mark)

A-

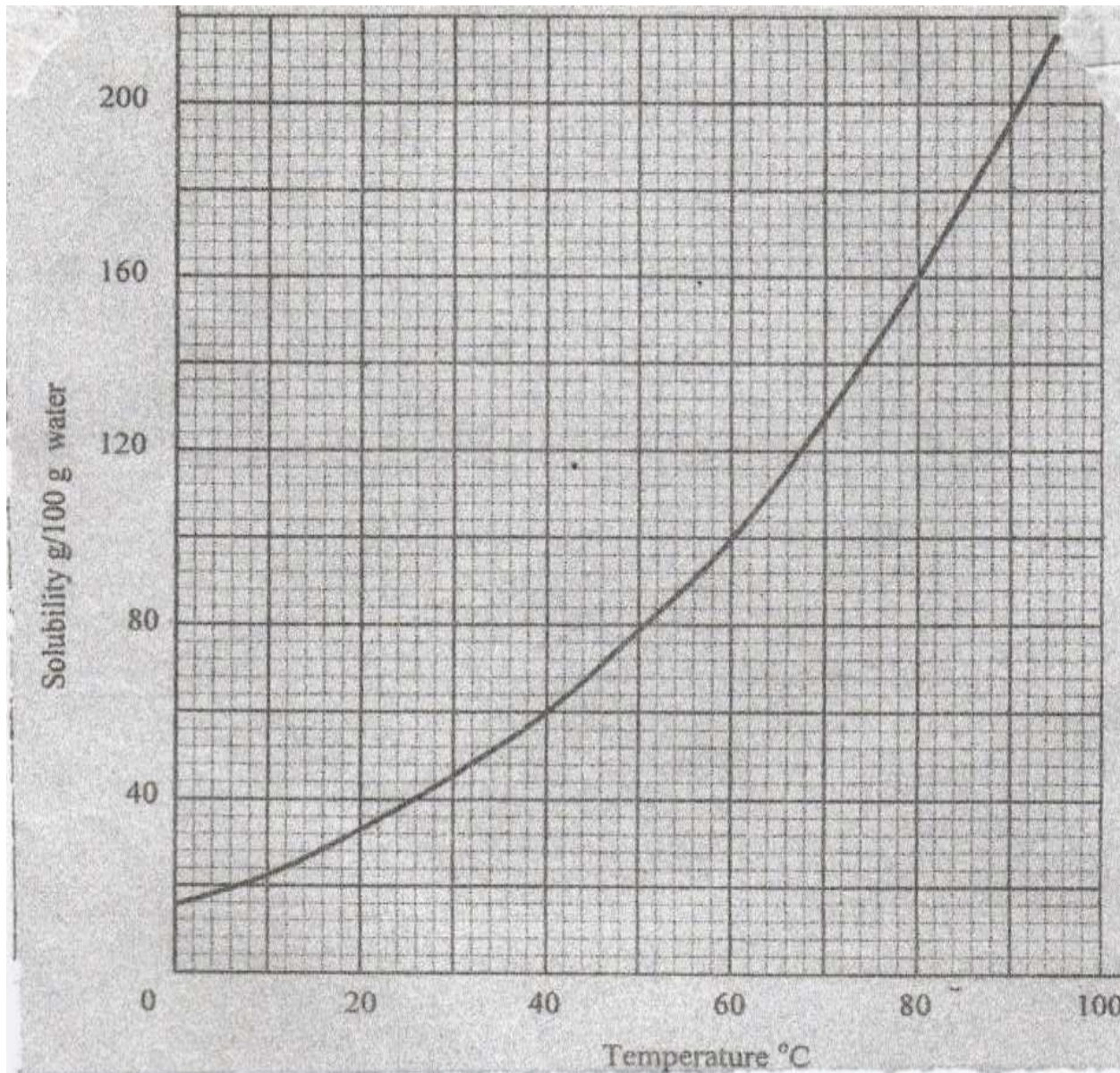B-

[b]. Name process I   (1 mark)

_____

_____

(c). Name the substance produced when Sodium Propanoate react with Soda lime. (1 mark)

_____

_____

18. The solubility curve of potassium nitrate is shown below.

[a]. Determine the solubility of potassium nitrate at 40°C   (1 mark)
_____

_____

[b]. Determine the molar concentration of saturated potassium nitrate at 40°C
(K = 39.0, O =16.0 N=14.0 and   density of water 1g/cm³)   (2 marks)

_____

_____

_____

_____

19. Sample of urine from three participants W, X and P at an international sports meeting were spotted onto a chromatography paper alongside two from illegal drugs, A_1 B_2. A Chromatogram was run using methanol. The figure below shows the chromatogram.
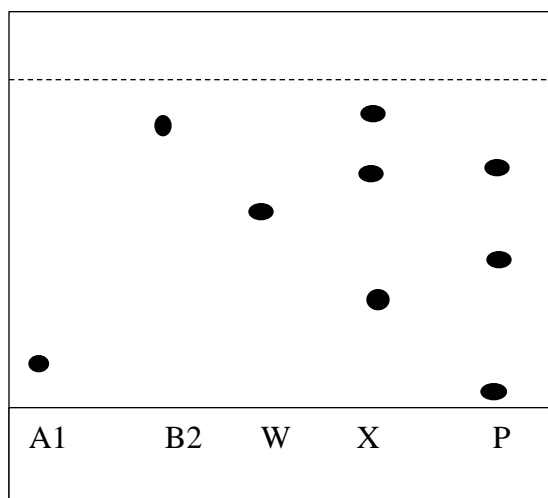
(a). Identify the athlete who had used an illegal drug.   (1 mark)

_____

(b). Which drug is more soluble in methanol. Give a reason.   (2 marks)

_____

_____

20. State and explain the change in mass that occur when the following substances are separately heated in open crucibles.

(a). Magnesium ribbon   (1 mark)

_____

_____

(b). Sodium carbonate   (1 mark)

_____

_____

21. With the help of a well labeled diagram, draw a set-up of an arrangement of assembled apparatus that can be used to prepare dry hydrogen gas, including the appropriate reagents.

                                                                 (3 marks)

22. Dry carbon (II) oxide gas was passed over heated lead (II) oxide.
(a). Write an equation for the reaction. (1 mark)

_____

_____

(b). Give one industrial application of the above reaction. (1 mark)

_____

23. A student burnt magnesium ribbon in a gas jar full of Sulphur (IV) oxide gas
(i). State two observations made in the gas jar. (2 marks)

_____

_____

(ii). Write an equation for the reaction that took place. (1 mark)

_____

_____

24. Air was passed through reagent as shown below.

Air → | Sodium hydroxide solution **A** | → | Hot Copper | → | Excess hot Magnesium **B** | → C
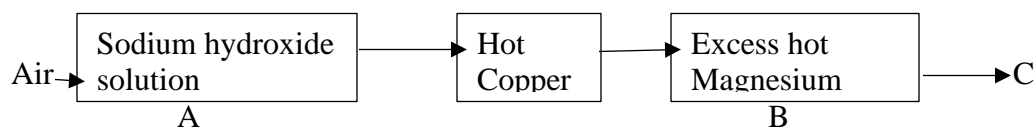
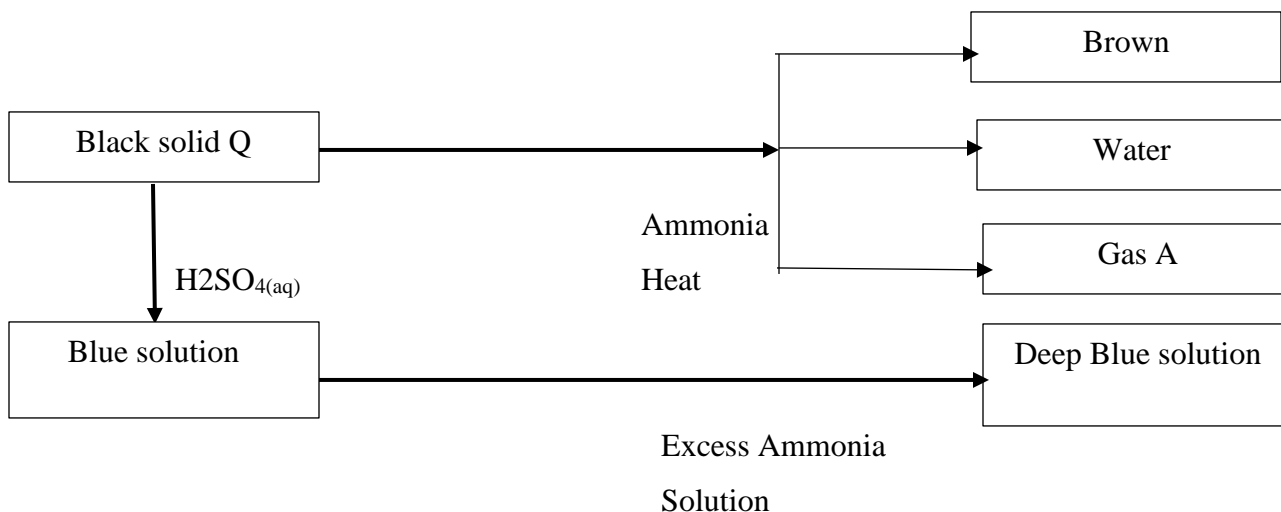(i).State the role of sodium hydroxide solution. (1 mark)

_____

(ii). Name one component in C. Explain. (1 mark)

_____

_____

25. Analysis of a compound showed that it had the following composition. 69.42% Carbon, 4.13% Hydrogen and the rest Oxygen
Determine the empirical formula of the compounds. (3 marks)
(C=12.0, H=1.0 , O=16.0

_____

_____

_____

_____

26. Study the reaction scheme below and answer the questions that follow.   (1 mark)

```
                                              ┌──────────────────────┐
                                              │        Brown         │
                                              └──────────────────────┘
┌──────────────────┐                          ┌──────────────────────┐
│  Black solid Q    │ ───────────────────────▶│        Water         │
└──────────────────┘         Ammonia          └──────────────────────┘
         │                   Heat             ┌──────────────────────┐
         │                                    │       Gas A          │
   $H2SO_{4(aq)}$                             └──────────────────────┘
         ▼
┌──────────────────┐                          ┌──────────────────────┐
│  Blue solution    │ ───────────────────────▶│  Deep Blue solution  │
└──────────────────┘                          └──────────────────────┘
                            Excess Ammonia
                            Solution
```

(a).Identify

i. Black solid Q   (1 mark)

_____

ii. Gas A   (1 mark)

_____

(b). Write an equation for the reaction between ammonia and black solid Q.   (1 mark)

_____

_____

(c). Write the formula of the complex ion in deep blue solution.   (1 mark)

_____

_____

27. Element **S** has an atomic number of 14 and **R** has an atomic number of 17

(a). Write the formula of the ion of element S.   (1 mark)

_____

(b). Using dot (**.**) and cross (x) diagrams show how **S** an **R** combine to form a compound.

(2 marks)

_____

_____

_____

28. Explain why the following substances conduct an electric current.

(a). Aluminium metal   (1mark)

_____

(b). Molten magnesium chloride   (1 mark)

_____