SUNSHINE SECONDARY SCHOOL

233/2
CHEMISTRY PAPER 2
(Theory)
PRE-MOCK 1 - MARCH 2017
TIME: 2 HRS

NAME: ……INDEX:…….

CLASS:…….. DATE:……SIGN:……

INSTRUCTIONS

- ✓ Write your name and index number in the spaces provided.
- ✓ Answer all questions in the spaces provided.
- ✓ Mathematical tables and calculators may be used.
- ✓ All working must be clearly shown.

EXAMINER'S USE

QUESTION	MAX. SCORE	CANDIDATES SCORE
1	14	
2	15	
3	16	
4	11	
5	05	
6	11	
7	08	
Total	80	

1. Study the table below and answer the questions that follow. The letters do not represent the actual symbols of the element.

Formula of ion	**Electronic configuration**
E^{2+}	2
D^{-}	2.8
Cl^{-}	2.8.8
B^{3+}	2.8
A^{2+}	2.8

(a) Select elements found in:

(i) The same group (1mk)

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(ii) Period three (1 mk)

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(iii) What is the family name given to the group number to which element **B** belongs (1mk)

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(b) With reasons compare the atomic radius of elements **B** and **A**. (2 mks)

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(c) State **two** industrial uses of element **B**. (2 mks)

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(d) With reasons, compare the reactivity of **E** and **A**. (2 mks)

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(e) Write the formula of the compound formed when **D** and **A** react. (1mk)

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(b) What type of bond is formed when element E reacts with oxygen. Give a reason or your answer. (2mks)

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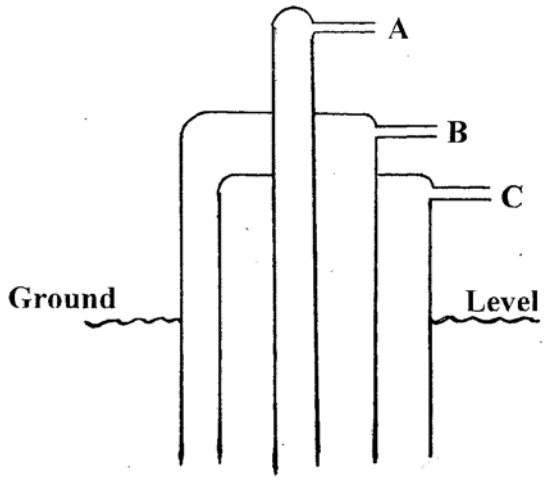
2. (a) The diagram below represents the extraction of sulphur by the frasch process.



(i) Identify and state the use of the substances that pass through tubes A and C (4mks)

A……..

C……..

(ii) Rhombic and monoclinic are Allotropes of sulphur. They are inter convertible as shown below.

$$\text{Rhombic} \underset{}{\overset{96^{o}C}{\rightleftharpoons}} \text{Monoclinic}$$

What does the temperature 96°C represent. (1 mk)

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iii) State the difference in crystalline appearance between rhombic and monoclinic crystals. (l mk)

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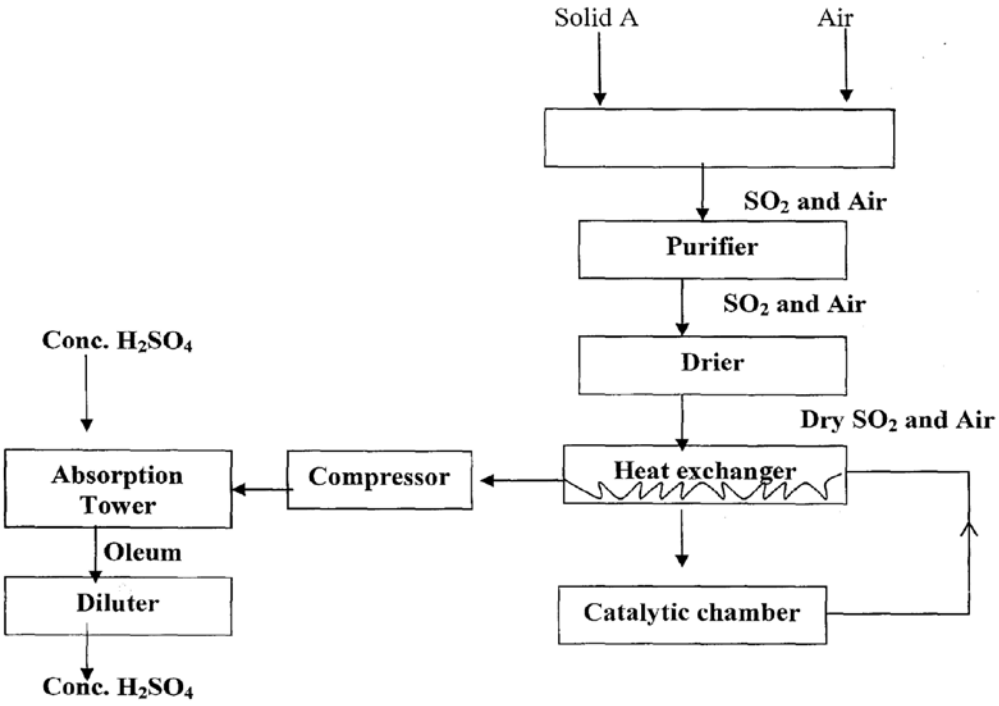
(b) The following scheme represents the steps followed in the contact process, study it and answer the questions which follow.



a) Name **two** possible identities of solid A. (l mk)

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(ii) Name **two** impurities removed by the purifier. (1mk)

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(iii) Why is it necessary to remove impurities? (1mk)

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……

iv) Write the chemical equations for the reactions taking place. (2mks)

a) Catalytic chamber

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b) Absorption tower

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v) Explain why SO_3 is absorbed in concentrated sulphuric (VI) acid instead of water. (1mk)

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3. (a) (i) Apart from ethanol, name two liquid fuels. (1mk)

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(ii) State **two** factors that should be considered when choosing a fuel for cooking. (2mks)

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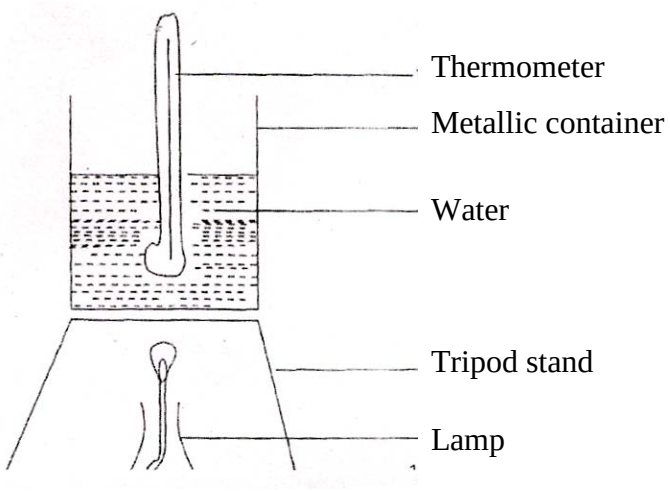

During the experiment, the data given below was recorded.
Volume of water = 500cm^3
Initial temperature of water = 25.0°C
Final temperature of water 46.5°C
Mass of ethanol + lamp before burning 125.5g
Mass of ethanol + lamp after burning = 124.0g

Calculate;

(i) Heat evolved during the experiment (Density of water = lg/cm^3, specific heat capacity of water = 4.2J/g/k. (3mks)

(ii) Molar heat of combustion of ethanol (C 12.0, 0 = 16.0, H = 1.0) (2mks)

(iii) Write the thermochemical equation for the complete combustion of ethanol. (1 mk)

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(iv) The experiment value of molar heat of combustion of ethanol obtained in (b) (ii) above is lower than the theoretical value. Give **two** reasons for this variation. (2mks)

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(v) Why is the water in the container continuously stirred with thermometer? (1mk)

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b) The hydration energy of Al^{3+} and Cl^{-} are -4690 $kJmol^{-1}$ and -364$kJmol^{-1}$ respectively. The heat of solution of aluminium chloride is -332kJ mol^{-1}.

i) Draw an energy cycle diagram to represent the above information. (1mk)

ii) Calculate the lattice energy of aluminum chloride (2mks)

4. a) A current of 0.75 Amperes was passed through a solution of chromium for one hour and four minutes in the process of electroplating an iron spoon. The mass of chromium deposited on the spoon was 0.52g (1F = 96500C, Cr = 52)

i) Calculate the quantity of electricity passed. (1mk)

ii) Deduce the charge of the Chromium ion. (3mks)

iii) How many moles in chromium were deposited? (1 mk)

iv) Draw a well labeled diagram to show how the spoon was electroplated (3mks)

b) Below is a simplified diagram of a Down's cell used for the manufacture of Sodium metal. Study it and answer the questions that follow.

a) Name the substance the anode is made of (1mk)

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b) Explain your answer in (a) above (1mk)

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c) What is the role of the diaphragm in Down's cell (1mk)

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d) In Down's cell for the manufacture of Sodium metal, Calcium chloride salt is added to lower the melting point from 800^0C to 600^0C. Explain why it is necessary to lower the melting point (1mk)

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5. Complete the diagram to show how dry hydrogen chloride gas is collected. (2marks)

(b) Identify liquid **Q** (1mark)

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(c) Write a balanced equation for the reaction that produces hydrogen chloride gas in the above experiment (1mark)

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(d) State the effect of dry hydrogen chloride gas on

(i) Dry blue litmus paper (1mark)

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(ii) Wet blue litmus paper (1mark)

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(e) Calculate the volume of hydrogen chloride gas produced if 120g of sodium chloride was used with excess of liquid Q at S.T.P .(Na= 23,Cl=35.5,H=1.0, S = 3) molar gas volume = 22.4 litres at s.t.p). (3marks)

(f) State and explain the observations made when hydrogen chloride gas is bubbled through silver nitrate solution. (2marks)

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6. Below gives a summary of a small part of organic chemistry. Use it to answer the accompanying questions.

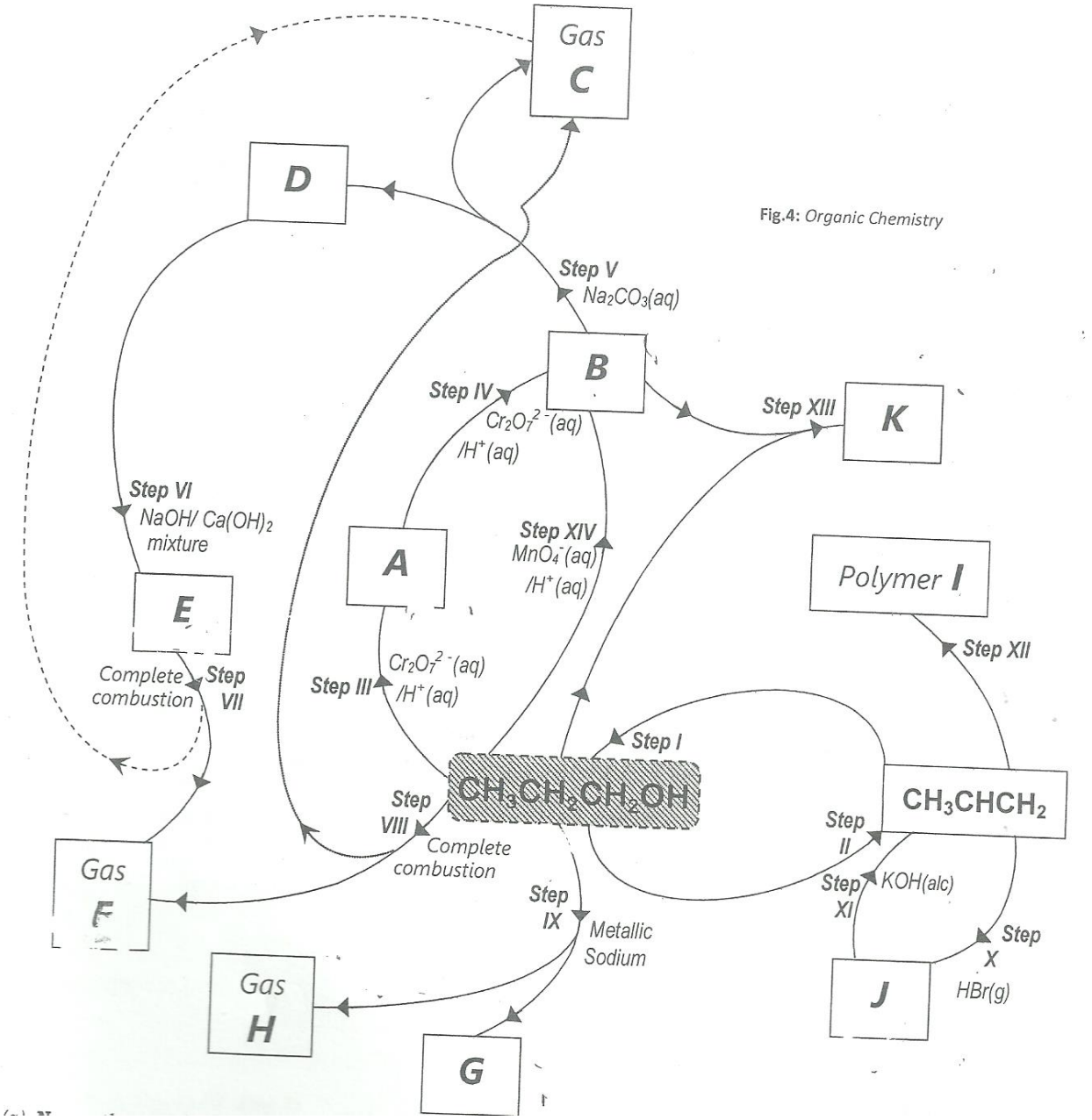

Fig.4: *Organic Chemistry*

a) Name the species labelled:

i) A ----------v) E ----------

ii) B ----------vi) Gas F ----------

iii) Gas C ----------vii) G ----------

iv) D ----------viii) Gas H ----------

b) i) step I: ----------iv) step VI ----------

ii) step II: ---------- v) step X: ----------

iii) step III: ----------vi) step III: ----------

c) Draw the structure and give the name K (2mks)

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d) Name polymer I and draw a part of its structure showing 3 repeating units. (2mks)

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e) Write the equation showing step VI. (1mk)

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f) Explain the observations that would be made during step XIV. (2mks)

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g) Name the possible isomers of J. (2mks)

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h) Attempt an equation for step XI. (1mk)
