KCSE TRIAL 2020

CHEMISTRY PAPER 2

1. (a). Crude oil is a source of many compounds that contain carbon and hydrogen only.

(i). Name the process used to separate the components of crude oil.   (1 mark)

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(ii). On what two physical properties of the above components does the separation depends.
                                                                                (2 marks)

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(b). Under certain conditions, hexane can be converted to two products. The formula of one of the

products is C_3H_8.

i) Write the formula of the other product.   (1mark)

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(ii). Describe a simple chemical test to show the difference between the two products formed in
b(i) above   (2 marks)

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(c). The set up below was used to prepare and collect ethene gas. Study it and answer the questions that follow
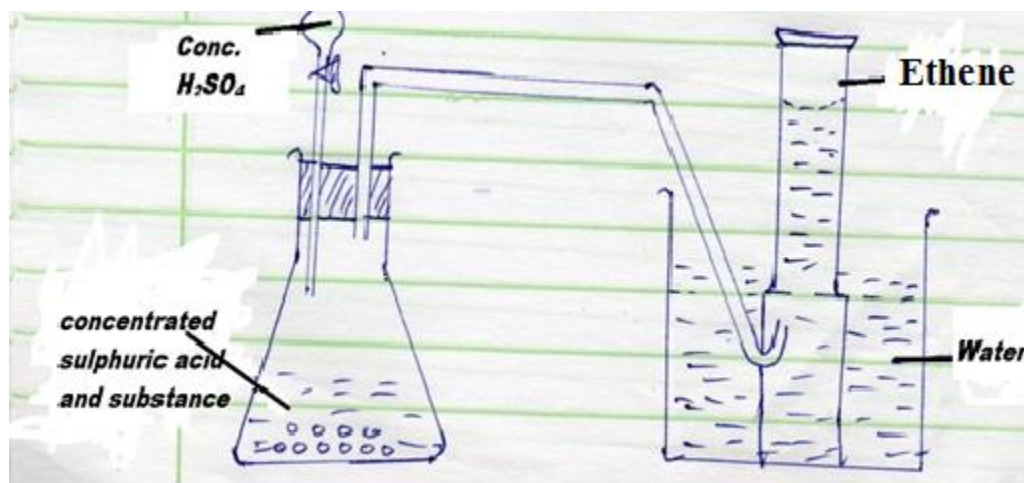
(i).Name the substance T.   (1 mark)

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(ii) Give the property of ethene that allows it to be collected as shown in the set-up above

(1 mark)

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(d). On of the reaction undergone by ethene is addition polymerization. Give the name of the polymer and one disadvantage of the polymer it forms.   (2 marks)

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Name: ………………………………………………………………….…   (1 mark)

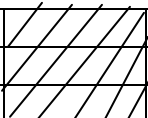Disadvantage of the polymer ……………………………………………………..   (1 mark)

2.(a) Name the method that can be used to obtain pure Iron (III) chloride from a mixture of iron (III) chloride and sodium chloride.   (1 mark)

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(b) A student was provided with a mixture of sunflower flour, common salt and a red dye. The characteristics of the three substances in the mixture are given in the table below.   (1 mark)

Substance	Solubility in water	Solubility in ethanol
Sunflower flour	Insoluble	Insoluble
Common salt	Soluble	Insoluble
Solid red dye	Soluble	soluble

The student was provided with ethanol and any other materials needed. Describe how the student can separate the mixture into its three components.   (3 marks)

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(c) The diagram shows part of the periodic table. The letters do not represent the actual symbols of the elements. Use the diagram to answer the questions that follow.

								Q
R		/////				T		
	Z	/////	N			V	W	
Y		/////					X	

(i)   Explain why the Oxidizing power of W is more than of X.   (2 marks)

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(ii)   How do the melting points of R and T compare. Explain.   (2 marks)

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(iii). Give the formula of the compounds formed between Z ad W   (1mark)

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(iv). Element K is in group (v) and period 2 of the periodic table. Locate the element in the grid above.   (1mark)

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 (v) Using dots (.) and crosses (x), show the bonding between K and hydrogen.   (1 mark)

(vi) Select an element that coulf be used:-

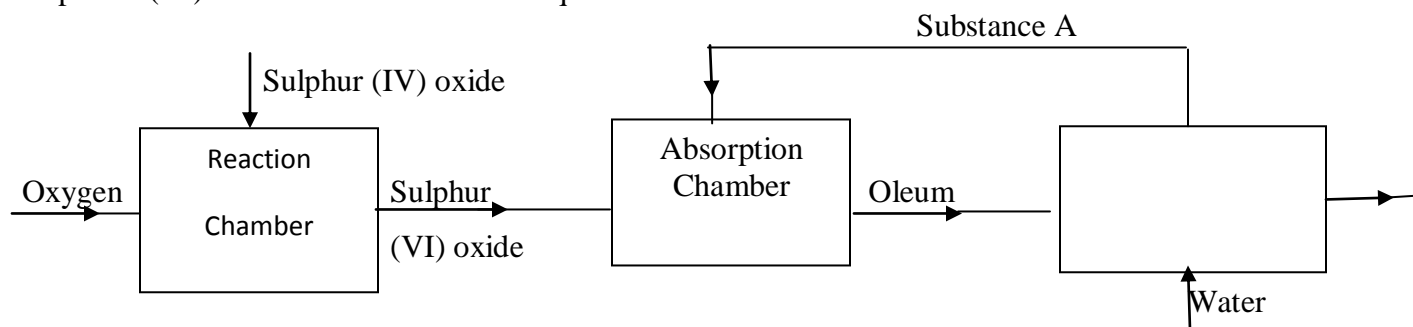   (I) in weather balloons   (1 mark)

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    (II). For making cooking pots.   (1 mark)

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3. The flow chart below shows some of the processes involved in large scale production of sulphuric (VI) acid. Use it to answer the questions that follow.

(a). Describe how oxygen is obtained from air on large scale.   (3 marks)

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(b). (i). Name substance A   (1mark)

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(ii). Write an equation for the process that takes place in the absorption chamber   (1 mark)
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(c). Vanadium (v) oxide is a commonly used catalyst in the contact process.   (1 mark)
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(i). Name another catalysts which can be used for this process.   (1 mark)

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(ii). Give two reasons why vanadium (IV) oxide is the commonly used catalyst   (1 mark)

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(d). State and explain the observation made which concentrated sulphuric (VI) acid is added to crystals of copper (II) sulphate in the beaker.   (2 marks)
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(e) The reactions of concentration sulphuric (VI) acid with sodium chloride produces hydrogen chloride gas. State three property of concentrated sulphuric (VI) acid illustrated in this reaction.
                                                                                      (1mark)
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(f). Name four uses of sulphuric (VI) acid   (2 marks)
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4.(a). What is meant by molar heat of combustion?   (1 mark)
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(b). State the Hess's law   (1 mark)
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(c). Use the standard enthalpies of combustion of graphite, hydrogen and enthalpy of formation of propane to answer the questions that follow.
        ΔH^o_c (Graphite) = - 393kJmol^{-1}
        ΔH^o_c ($CH_{2(g)}$)   = - 286kJmol^{-1}
        ΔH^o_f($C_3H_{8(g)}$)   = -104 kJmol^{-1}

(i). Write the equation for the formation of propane.   (1 mark)
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(ii). Draw an energy cycle diagram that links the heat of formation of propane with its heat of combustion of graphite and hydrogen.   (3 marks)

(iii). Calculate the standard enthalpy of combustion of propane. (2 marks)

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(d). Other than the enthalpy of combustion, state one other factor which should be considered when choosing a fuel. (1 mark)

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(e). The molar enthalpies of neutralization of dilute hydrochloric acid and dilute nitric (V) acid

are -57.2kJmol^{-1} while that of ethanoic acid is -55.2kJ/mol. Explain this observation. (2 marks)

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5.(a). At 25°C, 50g of potassium nitrate were added to 100g of water to make a saturated solution. What is meant by a saturated solution? (1 mark)

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(b). The table below gives the solubilities of potassium nitrate at different temperatures

Temperature (^{o}C)	12	20	28	36	44	52
Solubility g/100g of water	22	31	42	55	70	90

(i). Plot a graph of the solubility of potassium nitrate (vertical axis) against temperature.

(3 marks)

(ii). Using the graph:

I. Determine the solubility of potassium nitrate at 15°C. (1 mark)

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II. Determine the mass of potassium nitrate that remained undissolved given that 80g of potassium nitrate were added to 100cm^3 of water and warmed to 40°C. (2 marks)

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(c). Determine the molar concentration of potassium nitrate at 15^oC

(Assume there is no change in density of water at this temperature. (K=39, N=14, O=16)

(3 marks)

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6.a)(i). Carbon (IV) oxide is present in soft drinks. State two roles of carbon (IV) oxide.

(1 mark)

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(ii). Explain the observation made when a bottle containing a soft drink is opened. (2 marks)

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(iii). Carbon (IV). Oxide dissolves slightly in water to give acidic solution. Give the formula of the acid. (1 mark)

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(b). Zinc oxide can be obtained by heating zinc nitrate. A student heated 5.76g of zinc nitrate.
(i). Write the equation or the reaction that occurred. (1 mark)

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(ii). Calculate the total volume of gases produced (Molar gas volume = $24dm^3$, Zn = 64.5, O =16, N=14.0) (2 marks)

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(c). Excess carbon (II) oxide gas was passed over a heated sample of an oxide of zinc as shown in the diagram below. Use it to answer the questions that follow.
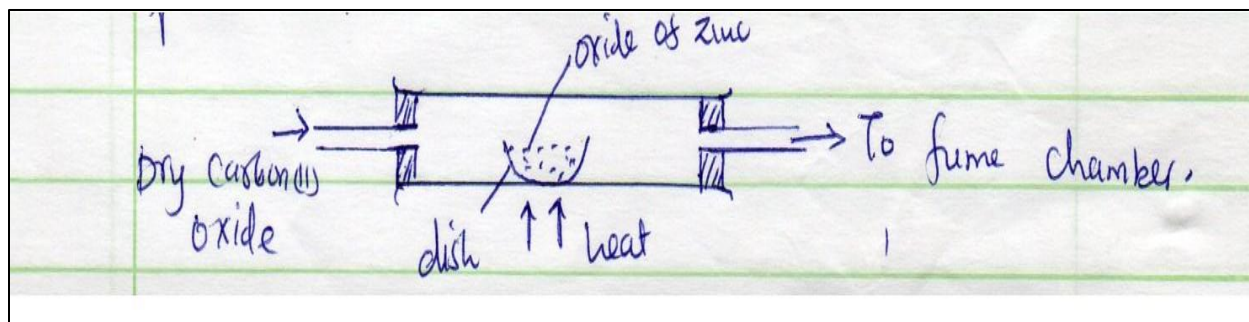
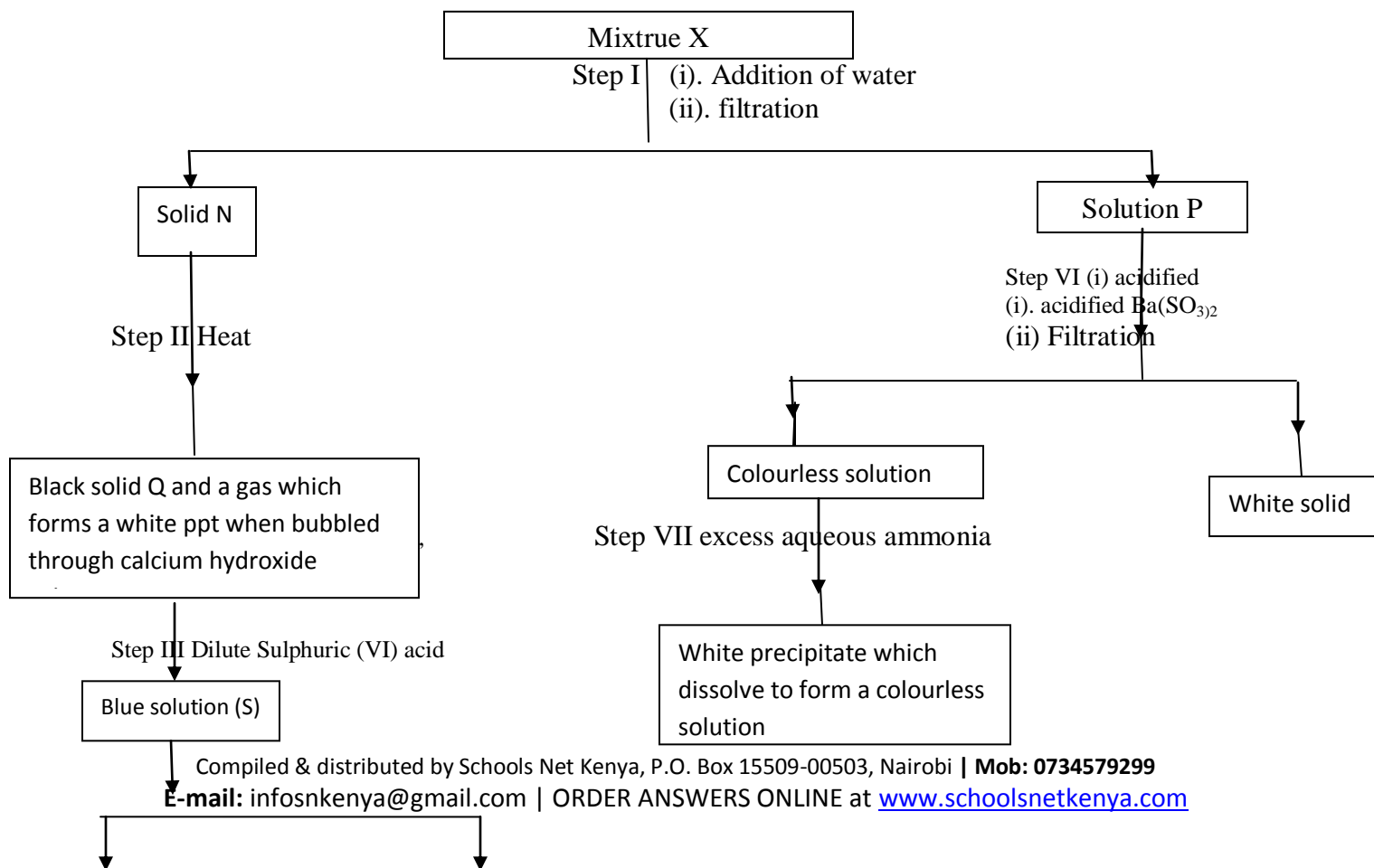(i). State and explain the observations made in the combustion tube. (3 marks)

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(ii). Write an equation or the reaction which took place in the dish. (1 mark)

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7. The flow chart below shows a sequence of reactions involving a mixture of two salts, mixture X. Study it and answer the questions that follow.

Step IV Excess equeous
Ammonia

Step V Magnesium powder

(a). Write the formula of the following
(i). anious in solid Q   (1 mark)
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…………………………………………………………………………………………
(ii). The two salts present in mixruew M.   (2 marks)
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(b). Write an ionic equation for the reaction in step (VI).   (1mark)
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(c).State and explain the observations made in step (V)   (3 marks)

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(d)(i). Starting with lead (II) oxide,describe how a pure solid sample of lead (II) sulphate can be

prepared in the laboratory.   (2 marks)
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(ii). How can one determine whether the lead (II) Sulphate prepared is pure?   (2 marks)

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