Which one of the following substances undergoes a chemical change when heated?

A. Ice
B. Wax
C. Anhydrous aluminum oxide
D. Sulphur

1. In fractional distillation of crude oil (petroleum), the product that is obtained first is the one which has the ,
   A. Highest density
   B. Highest boiling point
   C. Lowest density
   D. Lowest boiling point
2. The separation of substances that make up ink by chromatography depends on the
   A. Solubility of the substance in a solvent
   B. Size of the chromatography paper
   C. Freezing point of the substance
   D. Osmotic pressure of the solution of ink
3. Which one of the following is a basic oxide?
   A. SO_2
   B. ZnO
   C. CaO
   D. P_2O_5
4. Iron rust faster in heavily industrialized areas. This is due to,
   A. Higher temperature
   B. Acid fumes in the air
   C. Soot in the air
   D. Water as a reactant
5. The fountain experiment can be demonstrated with ammonia because ammonia,
   A. Reacts readily with water
   B. Is very soluble in water
   C. Is lighter than air
   D. Is denser than air
6. Sodium nitrate was heated strongly in a test tube. Which of the following statements is correct?
   A. Nitrogen dioxide is formed
   B. Oxygen is given off
   C. Nitrogen dioxide and oxygen are formed
   D. No decomposition occurs
7. Which one of the following gases is obtained by fractional distillation?
   A. Nitrogen
   B. Ammonia
   C. Hydrogen
   D. Sulphur dioxide

8. Calcium chloride when exposed to air changes to from solid to liquid. This is because the salt is
   A. Deliquescent
   B. Hygroscopic
   C. Efflorescent
   D. Hydrated
9. The solubility of salt W is 35g per 100cm^3 of water at 20^oC. the mass of W in 40cm^3 of water at the same temperature is,
   A. 7.0g
   B. 14.0g
   C. 87.5g
   D. 114g
10. During electrolysis of concentrated sodium chloride solution, the carbon anode decreases in size because carbon reacts with ,
   A. Chlorine
   B. Oxygen
   C. Sodium
   D. Sodium hydroxide
11. Which of the following would give off carbon dioxide if strongly heated?
   A. Quick lime
   B. Slaked lime
   C. Marble chip or limestone
   D. Cement
12. The use of iron in the Haber process is
   A. Catalyze the reaction
   B. Speed up the reaction
   C. Inhibit a higher yield of ammonia
   D. To improve the performance of aluminum
13. Select one property that is not characteristic of ammonia,
   A. Its colourless
   B. It turns moist red litmus paper blue
   C. It is a strong oxidizing agent
   D. It does not burn in air but burns in oxygen
14. Which o.ne of the following pairs of compounds is in the same homologous series?
   A. Ethane and ethyne
   B. Ethene and ethyne
   C. Ethyne and methane
   D. Ethane and methane
15. Compounds that have identical molecular formula but different structural formula are called?
   A. Allotropes
   B. Isotopes

C. Isomers
D. Radicals

16. The process from which soap is prepared from fatty acids is referred to as
    A. Polymerization
    B. Saponification
    C. Fermentation
    D. Cracking
17. Which one of the following hydrocarbons contains multiple bonds?
    A. C_2H_6
    B. C_2H_2
    C. C_3H_8
    D. CH_4
18. Which one of the following is not true about element Q with electronic configuration of 2: 8:3?
    A. It conducts heat and electricity
    B. It's a metal
    C. It forms solid chlorides
    D. Its valency is 2
19. The number of neutrons in the atom Y represented by $^{213}_{84}Y$ is
    A. 84
    B. 129
    C. 213
    D. 297

20. a) Define the following terms;-
    i. Standard solution.

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…… (2marks)

    ii. Isomers.

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…… (2marks)

    b). The molarity of a solution X is 0.05Moldm^{-3}. Calculate the number of moles contained in 25cm^3 of X.

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…… (2marks)

c). Represent the covalent bonding in H_2O and NH_3 diagrammatically using dots or crosses to indicate electrons.

i. H_2O.

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…… (2marks)

ii. NH_3.

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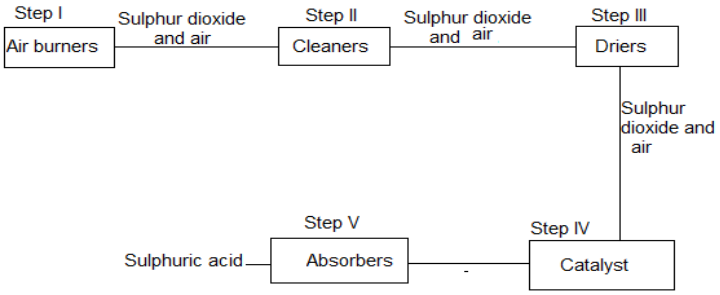
…… (2marks)

SECTION B (70MARKS)

1. The following chart shows the steps in the manufacture of sulphuric acid by contact process.



a) Write the equation for the reaction that takes place in step I.

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…..... (1mark)

b) Why is step II necessary?

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…….. (1mark)

c) Name ;-

i. The drying agent in step III.

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……..……..(½mark)

ii. The catalyst in step IV.

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…….. (1mark)

d) Describe the process that takes place in step V.

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…… (2marks)

e) Sulphur dioxide combines with air to form sulphur trioxide. State two conditions for maximum yield of sulphur trioxide.

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…… (1mark)

f) Give one use of sulphuric acid.

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…….. (1mark)

2. a)(i) State the difference between fats and oil.

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…….. (1mark)

ii). Give one example of each.

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…… (2marks)

b). Briefly describe how soap can be prepared.

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……..….. (2marks)

c). State what would happen (be observed) if soap solution was shaken with a solution containing magnesium hydrogen carbonate.

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…….. (1mark)

d). State one disadvantage of soapless detergent.

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……..... (1mark)

3. When concentrated potassium iodide solution is electrolyzed,

i. What ions are produced?

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……
……..…… (1mark)

ii. Which ion would migrate to the anode?

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…….…… (1mark)

iii. Which ion would migrate to the cathode?

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……..…… (1mark)

iv. Write the half equation in the anode.

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……..… (1mark)

v. Write the half equation in the cathode.

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……..… (1mark)

vi. What is the overall equation in this reaction?

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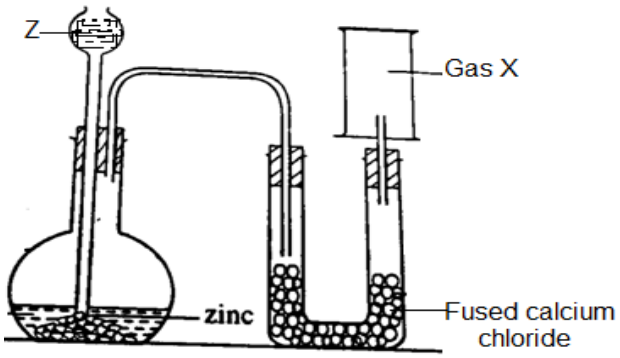
……..…. (2marks)

4. Study the diagram below carefully and answer the questions that follow.



a) Identify the following;-

i. Gas X.

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……(1mark)

ii. Z.

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…….(1mark)

b) Write the equation of reaction taking place in the flask.

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…… (1mark)

c) What is the purpose of the anhydrous calcium chloride?

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…… (1mark)

d) Name another co mpound that could serve the same purpose as anhydrous calcium chloride.

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……
…… (1mark)

e) Give another metal that can be used to instead of Zinc.

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……
…….. (1mark)

f) Name the method used to collect the gas and state the property of the gas that enables it to be collected using this method.

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…… (1mark)

5. The compound with the molecular formula $C_{10}H_{22}$ can undergo the following reaction.

$C_{10}H_{22} \longrightarrow C_8H_{18} + W$

a) Name the process involves in this reaction.

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…….. (1mark)

b) To which hydrocarbon series does W belong?

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…… (1mark)

c) Name the gas W.

……
…… (1mark)

d) Write the equation for complete combustion of gas W.

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…….. (1mark)

e) Gas W was bubbled through bromine. State what was observed.

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…….…….. (1mark)

f) Write the equation of reaction that took place.

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……..…….. (1mark)

g) Name the product formed in this reaction.

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…….……. (1mark)

6. Write an equation for the combustion of methane in;-

i. Excess oxygen.

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……. (1mark)

ii. Limited oxygen.

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……. (1mark)

b). When 11.5g of methane are burnt in excess oxygen, 640KJ of heat are produced. Calculate;-

i. Heat of combustion of methane.

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(2marks)

ii. Volume of methane at room temperature that will burn to produce 1560KJ.

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(2marks)

iii. Heat evolved when 32g of methane is burnt.

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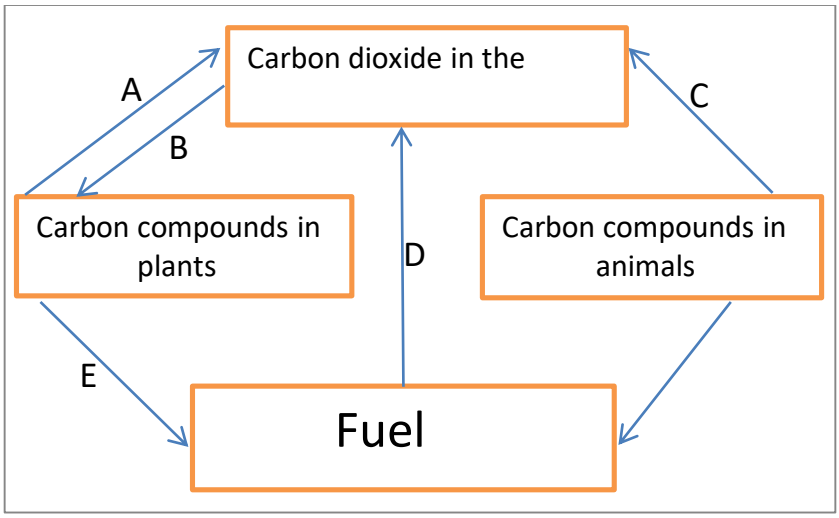
…… (1mark)

7. The figure below shows part of carbon cycle. Study it carefully and answer the questions that follow.



a) Name the processes A to E
(5marks)

A. ……
……

B. ……
……

C. ……
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D. ……
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E. ……
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b) Mention the importance of the following processes;

i. Marked B

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……
……..... (1mark)

ii. Marked E.

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……
…… (1mark)

8. Use the table below to answer the questions that follow. The letters are not the real symbols of the atoms.

Atom	Protons	Neutrons
X	15	16
W	8	8

Z	12	12

a) Write the electronic configuration of;- (1½marks)

i. X.

……..

ii. W.

……

iii. Z.

……

b) Write the valency of;-
(1½marks)

i. X.

……

ii. W.

……

iii. Z.

…….

c) Write the formula of the compound formed between;- (1mark)

i. X and Z.

……

ii. Z and W.

……

d) Write the formula of the;- (2marks)

i. Chloride of Z.

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ii. Oxide of Z.

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iii. Nitrate of Z.

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iv. Oxide of X.

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e) What are cations?

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…… (1mark)

9. When dilute hydrochloric acid was added to iron (ii) sulphide, gas X was evolved.

a) Write an equation for the reaction that took place.

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…… (1mark)

b) i). State how gas X was identified.

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……. (1mark)

ii). Explain why gas X is normally prepared in a fumed cupboard.

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(1mark)

c) a gas jar containing gas X was inverted over a gas jar containing moist sulphur dioxide.

i. State what was observed.

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…… (1mark)

ii. Write the equation for the reaction.

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……
…… (1mark)

d) Sulphur dioxide gas was passed into a beaker containing a red flower and water.

i. State what was observed.

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……. (1mark)

ii. Give reason for your answer.

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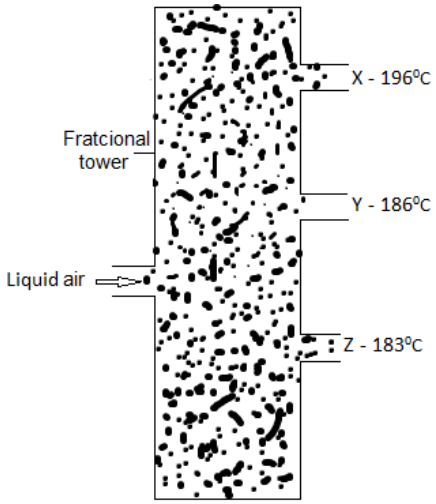
……. (1mark)

10. a). The diagram below shows industrial manufacturing of nitrogen. Study it carefully and answer the questions that follow.



i. What type of process is this?

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…… (½mark)

ii. Name the gases X, Y and Z.

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…….. (1½marks)

iii. Which gas is removed first and why?

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…….. (1mark)

b). Draw the structural formula of the following
(2marks)

i. 1 – Chlorobutane.
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ii. 2 – Chloro but – 1 – ene.
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iii. 1,2 Dichloroethane.
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iv. 1,2 Dichloro pent – 1 – ene.
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c) Name the following compounds;-
(2marks)

i. $CH_3 – CH_2 – CH_2 – CH = CH_2$.
……
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……

ii. $CH_3 - C \equiv C- CH_3$.
……
……

iii. $CH = CH – CH_2$
| |
Cl $CH_3- CH_2$
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……
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iv. CCl_4

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……
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***********THE END**********