HOLIDAY PACKAGE S.2

PILKINGTON COLLEGE MUGULUKA

CHEMISTRY DEPARTMENT 2023

1. Physics deals with the relationship between energy and matter, biology deals with living things. What does chemistry deal with? (01 mark)

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Identify the four areas in chemistry which contribute to the economy of Uganda? (04 marks)

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(a) What is matter? (01 mark)

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(b) Write down three properties of

Solid (2 ½ marks)

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Liquid (2 ½ marks)

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Gas (2 ½ marks)

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c) Why is gas compressible while a liquid is incompressible, yet particles of the two states undergo Brownian motion in a similar pattern?

(1 ½ marks)

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2(a) Define the following changes

Physical changes (temporary changes) (½ mark)

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Chemical changes (permanent changes) (½ mark)

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(b) Write down two differences between physical and chemical changes. (2 marks)

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c) Identify two substances that sublime? (1 mark)

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(b) Using suitable examples explain what the following terms mean;

Kinetic theory of matter? (3 marks)

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(c)Brownian motion? (3 marks)

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(d)Diffusion? (3 marks)

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(e) Why does the purple colour spread when a crystal of potassium manganite (VII) is placed in water? (1 mark)

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f) The particles in liquids and gases showrandommotion.Whatdoesthatmean,and why does it occur? (1 mark)

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(a) List down three examples of materials that are made of;

Wood (1 ½ marks)

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Ceramic (pottery) (1 ½ marks)

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Fibres (1 ½ marks)

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(b) What happens to the following material when heated?

Rubber (½ mark)

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Pieces of wood (½ mark)

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Plastic (½ mark)

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c) List two examples of;

Natural fibres (2 marks)

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Synthetic fibres (2 marks)

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As s.2 student who now understands what Chemistry is and how it is studied, prepare a brief message to deliver to the new students on why:

Laboratory is important in the study of Chemistry.

You should not enter the laboratory and carry your own experiments without instruction from the teacher or laboratory worker.

It is important to consider safety precautions while in the laboratory and to discuss how you can ensure safety in the laboratory.

It is important to understand the essential steps that you would follow to carry out an experiment in a Chemistry laboratory (05 marks)

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Make a list for different pieces of apparatus that can be used to measure volume of a liquid in the laboratory and discuss condition under which each of them would be most appropriate to choose for measurement of volume. (05 marks)

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Question 2

(a) The table below show the component of air and its percentage composition by volume, you are required to fill in the blank spaces. (05 marks)

Component	Percentage composition by volume
Nitrogen	……
Carbon dioxide	……
……	0.03%
……..	0.9%
Water vapour	……..

(b) Identify the component of air which can be detected by (03 marks)

Glowing splint ……

Anhydrous copper (II) sulphate ……

Calcium hydroxide solution ……

Question 3

3. Matter is anything that occupies space and has weight. Matter exists in different ***States*** . A ***state*** of matter is one of the distinct physical forms in which matter exists.

(a) Below are diagrams showing different states of matter. Use them and answer the questions that follow

P **Q** **R**

(i) Name the state of matter, (1.5 marks)

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Complete the table below for the properties of states **P, Q** and **R**

(04 marks)

State of matter	**How particles are arranged**	**Attractive forces of attraction between particles**
P		
Q		Very weak.
R		

State the properties of each state of matter as a result of arrangement of particles and the attractive forces between them.

P (1.5 marks)

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Q (1.5 marks)

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R (1.5 marks)

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In the table below; name the ***process*** for the change of state of matter and in each case; state whether ***heat energy is absorbed*** or ***heat energy is released*** during the change of state

(03 marks)

Change of state	Name for the process	State whether ***heat energy is absorbed*** or ***heat energy released*** during the change of state
R to **P**		
Q to **R**		
P to **Q**		

4. Radical is a group of atoms or an atom which exists in several compounds but cannot exist on this own, therefore they are applied when deriving formulae of compounds due to the fact that they have specified valencies. Use the information below to answer the questions that follow

Radical	Valency
Sulphate	2
Nitrate	1
Peroxide	2
Carbonate	2
Hydroxide	1

Come up with the chemical formula of the following compounds (05 marks)

Compound	Formula
Iron (III) sulphate	
Sodium nitrate	
Potassium peroxide	
Lead (II) Carbonate	
Aluminium hydroxide	

(b) The density of mercury is 13.5g/cm^3. The density of water is 1.0g/cm^3. Using the density values given, determine whether each of the following objects will sink or float in mercury and in water. (Choose either sink or float) (07 marks)

Object	Density	Mercury	Water
Aluminum	2.7 g/cm^3		
Lead	11.3 g/cm^3		
Silver	10.5 g/cm^3		
Steel	7.8 g/cm^3		
Platinum	21.4 g/cm^3		
Pine wood	0.85 g/cm^3		
Water (ice)	0.90 g/cm^3		

5. In chemistry laboratory we often encounter many chemicals such as acids, bases and different salts which are used when during both qualitative analysis and volumetric analysis. Give a brief meaning of the following terms (03 marks)

(a) Acid .....

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(b) Base .....

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(a) Salt .....

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(b) Lynette mixed an acid and a base and formed a new solution (02 marks)

(i) What was the composition of the new solution ……..

(ii) Write a word equation between and acid and base to show the formation of new solution

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Name 3 examples of indicators found in the laboratory (03 mark)

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Namayanja was given two beakers A and B. Beaker A was containing dilute sulphuric acid and beaker B was containing sodium hydroxide solution. Explain how she can identify the beaker containing an acid and a base (02 marks)

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The atomic numbers of elements X and Y are 12 and 6 respectively.

As a student of S.2 who has knowledge about the periodic table, write the electronic configurations of;

Element X (01mrk)

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ii) Element Y. (01mrk)

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b). Which of the above elements is;

i). a metal. (01mrk)

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ii) a non metal. (01mrk)

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c). Write the ionic formula of element Y. (01mrk)

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Neutralization is one of the chemical reactions that are so important in real-life situations.

a). Describe what is meant by the term "neutralization reaction", giving an example. (02mrks)

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b). Suggest three situations in every day life where neutralization reactions are applied to solve problems. (03mrks)

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3 .Salts are substances which are chemically formed when acids react with bases. Using chemical equations, describe how salts are formed from the following neutralization reactions.

a). Zinc metal and dilute Hydrochloric acid. (11/ 2mrks)

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b). Sodium Carbonate and Sulpguric acid. (02mrks)

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c).Copper (II) Oxide and dilute Hydrochloric acid (11/2mrks)

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4 .The Scientists discovered that 99% of substances which naturally occur on earth contain acids and alkalis.

a). Using definitions, differentiatebetween an acid and an alkali. (03mrks)

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b). State two examples in each of the following;

i). Acids. (01mrk)

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ii). Alkalis. (01mrk)

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5 . Having learnt about electronic arrangement and ion formation in atomic structure, use that knowledge to describe how the Aluminium atom forms its ion.(use configurations and structures). (05mrks)

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6 .Air is a very important and abundant mixture of gases on planet earth. Basing on the knowledge of "Air and Environment",

a).state the composition of oxygen in the unpolluted air. (01mrk)

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b). State the natural process through which the above component of air in 6(a) above can be increased in concentration. (01mrk)

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c). Apart from Nitrogen and Oxygen, state the three components of unpolluted air. (03mrks)

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7 .The electronic configurations of various atoms are shown below;

A-2;1 B-2;6 C-2;8;1 D-2;8 E-2;7

i). Which one of these configurations A to E represents a noble gas element? (01mrk)

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ii). Which two of these configurations represent atoms from the same group of the periodic table? (02mrks)

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iii). Which one of these configurations is in period 3 of the periodic table? (01mrk).

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iv). Which one of these configurations becomes stable by gaining only one electron?\

(01mrk)

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8 .Water pollution is one of the overwhelming causes of communicable disease outbreak.

What is meant by the term "**water pollution**"? (02mrks)

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b). You have been invited by your community leaders as an Environmental Engineer to sensitize people about various ways of ensuring that all water sources are unpolluted. Suggest three ways you would tell the community people. (03mrks)

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9. Element X has a mass number 37 and atomic number 17.

Work out the number of; (01mrk @)

i) Protons

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ii). Electrons

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iii) .Neutrons

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b).Write the electronic arrangement of X. (01mrk)

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c).State the period and group to which X belongs. (01mrk)

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10. Write the chemical formula of the following salts , using the knowledge of valencies and the periodic table. (01mrk@)

i) Calcium Hydrogen Carbonate .

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ii). Potassium Nitrate.

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iii). Copper (II) Carbonate

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iv). Sodium Hydrogen Carbonate

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v) Barium Sulphate.

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11. Dilute Sulphuric acid solution can be neutralized using an alkali such as Sodium Hydroxide or adding a solid oxide such as Copper (II) Oxide.

Write a balanced chemical equation for the reaction between;

i). Sodium Hydroxide and Sulphuric acid. (1 1/2mrks)

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ii). Copper (II) Oxide and Sulphuric acid . (1 1/2mrks)

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Describe briefly how Copper (II) Sulphate crystals can be prepared in the laboratory using Copper (II) Oxide. (05mrks)

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Identify any other five soluble salts you know. (05mrks)

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State any two uses of salts in the every day life. (02 mrks)

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12. a). Explain what is meant by the term an **ion**. (02mrks).

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b).Giving two examples in each, describe the following terms;

i).Cations. (02mrks)

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ii).Anions. (02mrks)

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c). With aid of electronic structures, describe how the following atoms form their ions;

i).Flourine. (03mrks)

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ii). Silicon. (03mrks)

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iii). Lithium. (03mrks)

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13. Suggest three locally available materials or substances that are;

Acidic. (1 1/2 mrks)

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Alkaline. (11/2 mrks)

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Distinguish between a **strong acid** and a **weak alkali**, giving one example for each. (03mrks)

Write the well balanced chemical equations for the following word equations; (11/2mrks@)

Magnesium(s) + Nitric acid (aq). ⟶ Magnesium Nitrate (aq) + Hydrogen (g)

Calcium Carbonate(s) + Hydrochloric acid (aq). ⟶ Calcium Chloride (aq) + Carbondioxide (g) + Water (l)

Describe any six uses of acids and bases, state three for each. (06mrks)

14 . In your community or village, you have a challange of unsafe water ; where the water sources like wells; have muddy water , and the bore holes provide salty water. This hardly kills the thirst of community members. However, the local leaders have a resolution of treating this water.

What is meant by the term "**water treatment**"? (02mrks)

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Explain any six scientific procedures that you as a chemistry student can perform for the community to ensure that water is clean and safe for domestic consumption. (12mrks)

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Describe what is meant by the term " **sludge**". (01mrk)

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1. A foreign investor is seeking a suitable place where to set a cement factory but lacks the scientific knowledge about the characteristics of quality cement.

Task: Assuming in your district, you happen to have raw materials suitable for the factory, write a report to the investor that will make him attracted.(20 marks)

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2. The government of Uganda under **NEMA** is against cutting down of trees and clearing swamps yet the biggest percentage depend of them for fuel.

Task: Write a composition about how people can alternatively servive with minimum practice. (20marks)

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Using Kinetic theory of matter, explain the following observations

Popcorn pops when placed in the popcorn machine and heated

(02marks)

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Bicycle tube may expand and burst when pressure inside is too much and it's left under sunshine for sometimes (02marks)

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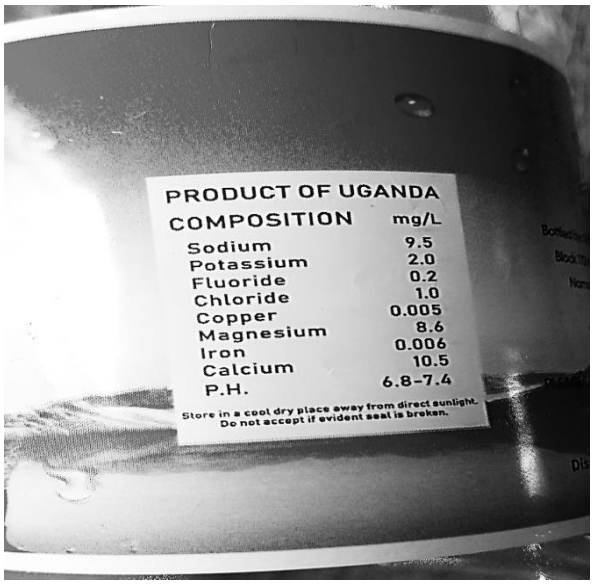
Fig 1 below shows a bottle of Ruwenzori mineral water with the composition of minerals present in the water. Use it to answer the question below it



Write the chemical symbols of the minerals found in the water (04marks)

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A group of senior two students from LAC went for a field study in one of the largest limestone quarries in Tororo, Eastern Uganda. Limestone is used in the production of cement. Cement is one of the component of concrete

Write the chemical formula of the main component of cement limestone used for manufacture of cement (01mark)

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Other than cement, name any other three materials used for making concrete (1 ½ marks)

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Explain why it's advisable to pour cold water on cemented floor for a period of two weeks after screeding the floor (1 ½ marks)

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Drugs are manufactured to a very high degree of purity. To ensure that the highest purity possible is obtained drugs are dissolved in a suitable solvent. (a) What method can you use to test for the purity of the drugs (01marks)

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Explain why you have chosen that method (02marks)

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Apart from the method in (a) what other method can be used (01mark)

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Explain the following observations

Common salts decrease the melting point of ice. (02marks)

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Addition of common salts to water increases the boiling point of water

(02marks)

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The table below shows how certain substances affect the rusting of steel. A tick () indicates that the substance is present. Across () indicates that the substance is absent. Complete the table

	Substances present			
Speed of rusting	Water	Air	Salt	Mud
Nil				
Nil				
Slow				
Fast				
Very fast				

Using the table, answer the following questions

Which two substances are needed for rusting to occur (01mark)

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Which substance together produce very fast rusting? (01mark)

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Mr. Okello, who lived on a farm by the seaside, said there was no point inwasting his car during rainy season because it becomes muddy as soon as it was taken out again. Say whether or not you agree with the statement giving a reason for your answer (02marks)

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Petrol consist of mainly hydrocarbon; it has the chemical formula C8H18. When we ride motorcycles, petrol is broken down through the process of combustion

Name the product produced when petrol is broken down in through the process of combustion in limited supply of air (01mark)

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Explain the impact of the product produced, when a person that got involved in an accident and broke his leg was allowed to sleep in a poorly ventilated room together with the motorcycle (03marks)

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The graph below shows heating of ice until boiling starts

Briefly state what happens in regions (04marks)

AB

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BC

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DE

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Complete the following sentences (04marks)

The most abundant gas in the air is _____

Liquid air is separated into its components by _____

A pollutant in the air which leads to production of acid rain is

_____

Incomplete combustion of disease fuel produces a poisonous gas called

_____

Water is very essential in our daily life. It's used for several purposes which support our life, however there are so many liquid that may look the same as water through the physical properties water may differ. For example, Kerosene and water are both colorless

What do we use to distinguish the two liquids (½ mark)

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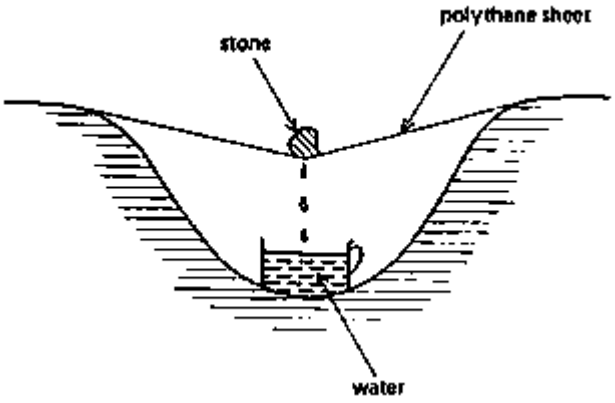
Complete the table below, in relation to question a(i) (3½ marks)

Substance use to distinguish the two liquid	Observation with water	Observation with kerosene

A desert survival kit contains a plastic sheet and a cup. A hole is dug in the ground and the sheet is stretched over the hole whilst a stone in the middle forms the sheet into a cone. In the heat of the sun, moisture from the ground collects on the underside of the sheet, runs down to the point of the cone and drips into the cup



(i) The overall process that takes place is an example of (01mark)

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(ii) Give two applications of the process in (i) above (02marks)

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Explain the following observations

A ball left on a cemented floor would have a reduced pressure over night (03marks)

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A wet cloth hanged during a sunny windy day takes shorter time to dry than the one hanged during a cold day (04marks)

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Why is salt poured in roads during winter? (03marks)

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Over the post years, lead pipes were used to supply water to most cities, factories and homes. Due to corrosion of lead pipes, its use has been banned in most countries across the world.

(i) What two likely health effect would be caused by corrosion of lead pipes

(01mark)

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(ii) What other material is commonly being used to supply water other than lead pipes? (01mark)

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(i) What are the properties of that material being used instead of lead pipe?

(08marks)

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Does the material in b(i) above have some disadvantages? If yes, give five of those disadvantages (05marks)

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(a) (i) Complete the table below

Scenario	**Type of change under gone**
Drying of wet cloth under sunshine	
Burning of petrol in car engine	
Dissolving of sugar crystals in hot water	
Photosynthesis in plants to make their own food	

(ii) Compare the types of changes undergone in the scenario above (06marks)

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(iii) Give at least another example of each type of change apart from those in the table above

(b) (i) A small child has been playing with matches and its clothes have caught fire. Explain how you would put off the flames (02marks)

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(ii) 80cm^3 of gas was collected in a gas syringe. This was passed several times over hot copper powder until no further contraction of volume took place. After cooling to original temperature, the volume was found to be reduced to 63.2cm^3 . calculate the percentage of this gas present in the sample air

(03marks)

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A patient is in a critical condition and needs oxygen, but the hospital lacks oxygen. You studied chemistry, you are provided with all the equipments to obtain oxygen

(a) (i) Where would you obtain oxygen from (01mark)

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(ii) What procedures would you follow to obtain pure oxygen to be given to the patient? (09marks)

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(b) (i) Apart from obtaining oxygen, what other applications does the method have?

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(ii) Give two reasons why common salts are used in the food industry (02marks)

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CHMASTER

SECTION A.

1. Harish group of company is an Indian company located in Uganda and deals with the production of many chemical products within Uganda, from the knowledge of ome of the products existing within our society, identity any four chemical products which are found within our society. (4 marks)

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2. Obang, s. 1 student carried out an experiment in the lab, He got two glass cups and Labeled them A and B. and in cup A, he filed it with hot water and the cup B, he filled it cold water. He then immersed in each cup a tea bug. It took just 30 seconds for the hot water in cap A to change its colour and 60 seconds for water in cup B to change its colour.

i. Identify the property responsible for the colour change in both cups. (1 mark)

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ii. Explain why it took a short time for hot water in cup A to change than the one in Cup B. (3 marks)

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3. Sharifah, a senior two student wants to separate sand and water from their mixtures.

i. Identify the different methods of separation Sharifah will use to separate the mixtures. (1 mark)

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ii. Briefly describe the procedures through which Sharifah shall follow to separate her mixtures. (3 marks)

6. (a) Explain what is meant by the terms

(i) 'Mass number'.

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(ii) 'Atomic number'

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(b) An atom of an element is represented by the symbol 39

19 (i) State the mass number of the atom.

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(ii)What is the atomic number of the atom?

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(iii) How many neutrons are present in the atom?

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7.Carbondioxide gas can be prepared in the laboratory by reacting an acid with a carbonate.(a) Write an ionic equation for the reaction.(b) Draw a labelled diagram of the apparatus that can be used in the laboratory to prepare and collect a sample of carbondioxide.(c) Write equations to show how carbondioxide reacts with each of the following and state what would be observed in each case.

(i) Sodium hydroxide solution.

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(ii) Calcium hydroxide solution.

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(iii) Magnesium metal.

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(d) Name one process in each case by which the concentration of carbondioxide in the atmosphere is

(i) Increased.

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(ii) Decreased.

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8.Explain what is meant by the terms(i) solubility of a salt.(ii) saturated solution.(b) 75 g of a saturated solution contains 30 g of salt.Calculate(i) the solubility of the salt.(ii) the percentage of the salt in the saturated solution.(c) (i) Briefly describe how a dry sample of copper (II) sulphate crystals can be obtained from copper (II) oxide in the laboratory.

(ii) Write an equation for the reaction.

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9. (a) Explain what is meant by the terms

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(i) ‘Miscible liquids’

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(ii) ‘Immiscible liquids’ Give an example in each case.

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(b) Describe how mixtures of

(i) Immiscible liquids

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(ii) Miscible liquids can be separated. In each case draw labeled diagrams to illustrate your answer.

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1. Harish group of company is an Indian company located in Uganda and deals with the production of many chemical products within Uganda, from the knowledge of some of the products existing within our society, identity any four chemical products which are found within our society. (4 marks)

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2. Obang, s. 1 student carried out an experiment in the lab, He got two glass cups and labeled them A and B. and in cup A, he filed it with hot water and the cup B, he filled it cold water. He then immersed in each cup a tea bug. It took just 30 seconds for the hot water in cap A to change its colour and 60 seconds for water in cup B to change its colour.

i. Identify the property responsible for the colour change in both cups. (1 mark)

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ii.Explain why it took a short time for hot water in cup A to change than the one in Cup B. (3marks)

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3. Sharifah, a senior two student wants to separate sand and water from their mixtures.

i.Identify the different methods of separation Sharifah will use to separate the mixtures. (1 mark)

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ii.Briefly describe the procedures through which Sharifah shall follow to separate her mixtures.

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4. Three jars A, B and C are taken, jar A is half-filled with tap water, Jar B is half-filled with water which was boiled for a few minutes, Jar C is half-filled with the same boiled water as in B. in all the three jars, an iron nail is dropped, in jar C, after the addition of the iron nail, some oil is added so that a film covers the surface of water. The jars are kept for and opened after 10 days.Observations: The nail in jar A is completely rusted.

The nail in B is slightly rusted. The nail in C has not rusted at all.

i. Identify the type of change being investigated in the experiment. (1mark)

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ii. Give reason for the observations above? (3marks)

5. (a) Elements are made up of atoms, Atoms consist of subatomic particles.State the three sub atomic particles of an atom. (1. 5 marks)

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(b) The table below shows the atomic numbers of three atoms

Atom

Atomic number mass number

A

B

C

12

12

12

24

25

26

i. Suggest, in terms of the number of subatomic particles, why the atomic numbers of the three atoms are the same . (1.5 marks)

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ii.Explain, in terms of the number of sub atomic particles why the mass

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6. A student wants to separated a mixture of ethanol, olive oil and water. Ethanol has a boiling point of 780C, water has a boiling point of 1000C and olive oil has a boiling point of 3oo0C.

i. Identify the method that can be used for the separation of these mixtures. (1 mark)

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ii. From the three substances, which liquid will be collected first. (1mark)

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Briefly explain why the three liquids shall be collected at different time interval. (2 marks)

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7. Previously in Uganda, petroleum has been discovered in the western region ofUganda. After the extraction of petroleum, how will the discovery of petroleum contribute to the development of Uganda. (4 marks)

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8. The knowledge of chemistry has improved peoples lives through manufacturing of medicines for treatment, detergents for cleaning to mention but a few, However its knowledge has also been misused in different. What are some of the different ways in which the knowledge of chemistry has been misused. (4 marks).

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4 "ALL THAT GLITTERS MAY NOT BE GOLD BUT ATLEAST IT CONTAINS FREE ELECTRONS