S.1 Work book

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BASED ON THE NEW CURRICULUM

With guide notes, practical, application qns, projects,

Group activities and activities of integration

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Chemistry

LUMASA RICHARD

New curriculum work book for s.1

Chemistry

Student's information.

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Chapter 7: Air

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1 CHEMISTRY AND THE SOCIETY

1.1 Nature of chemistry.

In primary, you studied science. But have you ever wondered about how the science you studied applies in everyday life. For example, have you ever wondered how tea leaves change the color of hot water when added or why does sugar make the tea sweet. Have you ever wondered why shiny metals develop a brown coating on them?

As you go on with Chemistry you will understand that chemistry is all around us and it's a branch of the science you studied in primary but which specifically deals with studying matters and changes that occur to substances under different conditions.

Group activity 1. In groups of 3 to 4 students, look at the pictures below of the common things in everyday life. Identify those ones made up of chemicals and those ones which are not.

The meaning of chemistry.

Many changes that take place around us on objects under different conditions show what the study of chemistry is about.

Group activity 3. You are required to look at the following changes and use them to define chemistry. Discuss about each of the picture in groups of 3 to 4 students. Answer the qns then choose one person to present to the rest of the class in presence of a teacher.

a)

i) Which change is taking place?

……

ii) Which conditions are required for the change in the picture to occur?

……

……

iii) Which process is being illustrated in the picture?

……

b)

i) Which change is taking place?

1.3 Importance of chemistry in daily life.

Many of the things which take place in everyday life are caused by chemical reactions and are examples of chemistry. We use very many chemicals, we eat very many chemicals which makes chemistry an essential part in our daily lives.

Examples of chemistry in everyday life and its nature of action.

1. Digestion; this relies on chemical reactions between food and enzymes to breakdown food into small substances which the body can absorb and use.

2. Cooking; this is a chemical change which changes food to make it tasty, kills all microorganisms on food such that the food is useful to our bodies.

3. Using soaps and detergents; soaps and detergents are chemical substances which dissolve and remove dirt from our bodies, clothes and dishes.

4. Working of drugs; drugs are produced using the knowledge of chemistry. Some like pain killers work by blocking pain receptors.

Activity of integration 1.

Read carefully below about how members of Sarah's family started their day.

Sarah woke up one day late than usual. She was hearing her mum's loud voice telling her to make tea. When she moved out of the bed, she met her younger brother who was so dirty after playing in mud earlier morning. She removed his dirty clothes and washed them using detergents. She also bathed her young brother using a bathing soap. As she was moving to the kitchen, her father called her and asked her to clean her shoes. She polished her father's shoes using a new shoe polish they bought from the market. She then went to the kitchen in order to make tea in the kettle. She observed bubbles of boiling water which produced steam in the kettle. She then added tea leaves which changes the entire colour of hot water. She tested the tea but it was so bitter. She then added sugar which made the tea sweet. She poured the tea in the flask and took it in the leaving room where she saw her mother putting fruits and soda in the refrigerator. She started feeling headache. When her mother knew about the headache, she gave her pain killer tablets which made her feel better after a few minutes. She moved out of the house and saw their neighbor painting his old metallic door which had developed a brown coat.

a) Outline activities at Sarah's home showing chemistry. Give all

……

……

……

……

i) Identify the occupation.

……

ii) How is the knowledge of chemistry used in that occupation?

……

……

……

iii) How is the activity above useful to the society

……

……

……

c)

i) Identify the occupation.

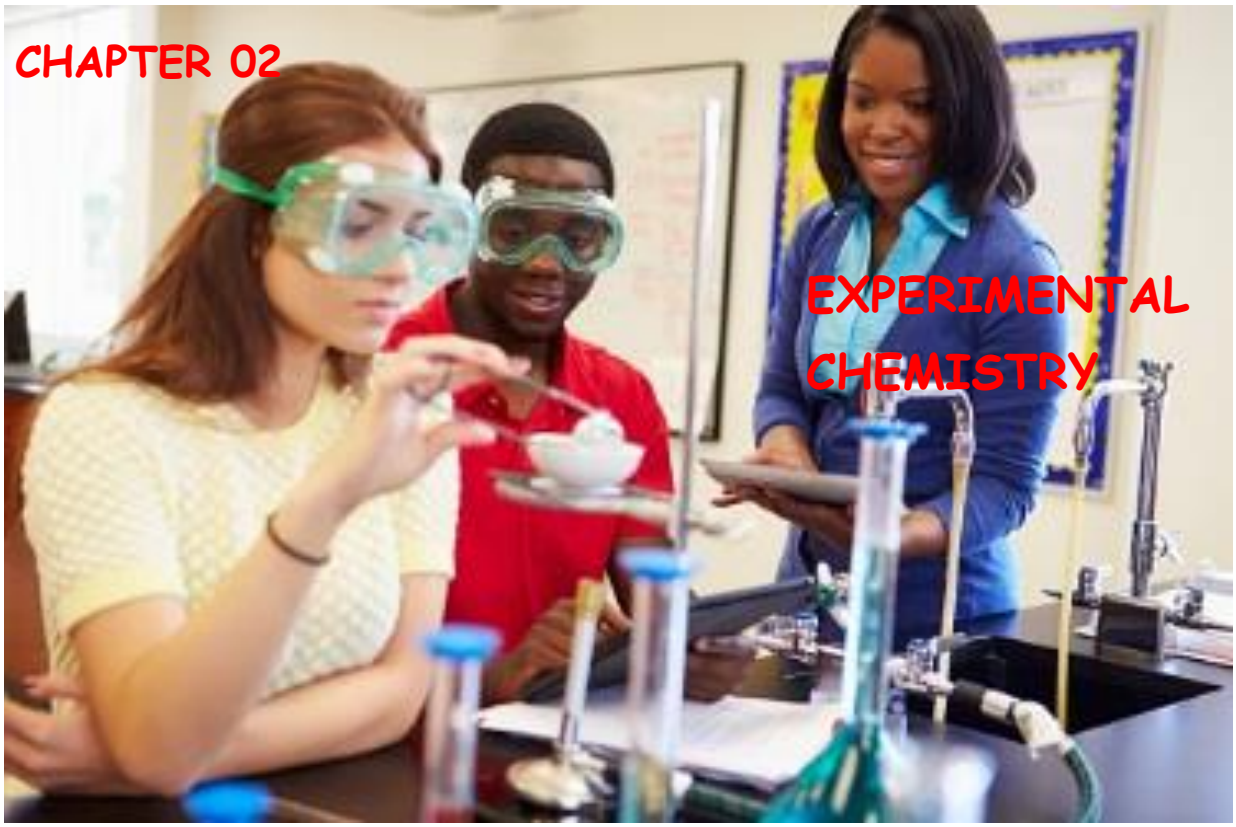
……

ii) How is the knowledge of chemistry used in that occupation?

……

……

……



By the end of the chapter you should;

- Know laboratory apparatuses.
- Know laboratory rules and regulations.
- Identify substances using melting and boiling points

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2.2 Laboratory rules and regulations.

A laboratory is a place where scientific experiments are carried out and where scientific equipments are kept.

Some of the Rules in the laboratory.

- Carry out only experiments suggested by the teacher.
- Do not eat or drink in the laboratory.
- In case of accidents, report to the laboratory technician.
- Always follow instruction given.
- Avoid unnecessary movements in the laboratory.
- Use clean and dry apparatuses when in the laboratory.
- Handle your apparatus with great care.
- Don't taste or smell gases.
- Never use faulty apparatus.

Safety in the laboratory.

Safety measures and precautions need to be taken in the laboratory to prevent accidents.

The most common accidents are in the laboratory include;

i) fire

Group activity. The picture below shows a particular laboratory safety equipment. In groups of 3 to 4 students, study the picture below and use it to answer the questions that follow.

a) (i) Name the equipment

……...

(ii) Sate the use of the equipment.

……

b) Outline the procedure of using that equipment

……..

……..

……..

……..

c) Apart from a laboratory, give three other places where we can find that equipment.

……

……

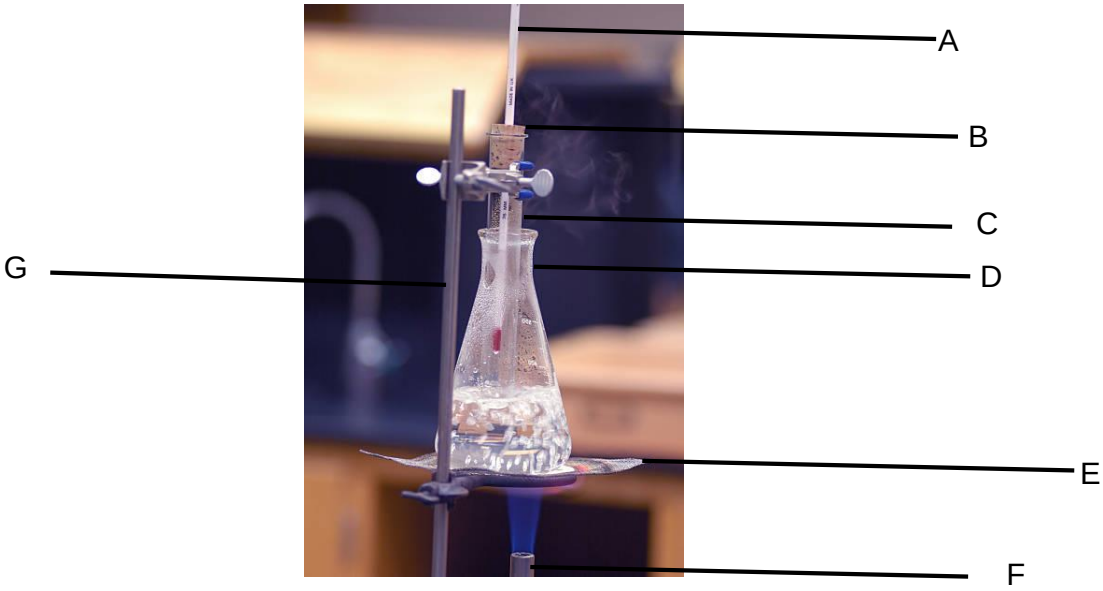
……

Group activity; Safety symbols are found on labels of containers and on bottles containing dangerous chemicals.Identify the symbols below and give their meaning.

A B C D

Chapter 02 application questions.

1. The figure shows a set of apparatus in the laboratory. Use them to answer the questions that follow.



a) Name the apparatuses

A …… B ……

C …… D ……..

E …… F ……..

G ……

b) State the functions of the apparatuses from the experiment in the picture above.

A ……

B ……

C ……

D ……

E ……

F ……

G ……

c) State the type of flame on the apparatus labelled F

……..

ii) Mention any four characteristics of the type of flame you have stated above.

3.1 Defining matter

Matter is anything which has mass and occupies space.

A book is matter, a computer is matter, food is matter, and dirt in the ground is matter. Sometimes matter may be difficult to identify**. For example**, air is matter, but because it is so thin compared to other matter (e.g., a book, a computer, food, and dirt), we sometimes forget that air has mass and takes up space. Things that are not matter include thoughts, ideas, emotions, and hopes.

QN. Identify whether the following is matter or not. Give a reason for your answer.

a) A pancake.

Is it matter ……

Reason ……

b) Love

Is it matter ……

Reason ……

c) the moon

Is it matter ……

Reason ……

d) An idea of a new invention.

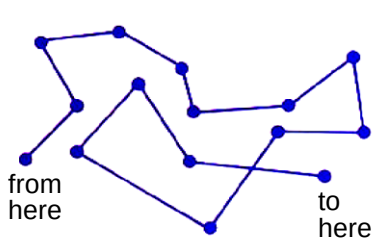
Is it matter ……

Reason ……

Matter is made up of particles.

Rock, air, and water look very different. But they have one big thing in common: they are all made of very tiny pieces, far too small to see. For the moment, we will call these pieces particles. In fact everything around you is made of particles – and so are you!

The particle moves in a random way, changing direction every time it hits another particle. We call this random motion



ii) Explain why the dust stayed in the air for a long period of time?

……..

……

iii) What does your explanation in (ii) show about particles?

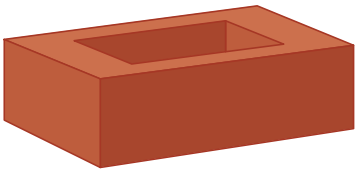
……..

……..

3.3 Investigating properties of solids, liquids and gases.

When investigating properties of solids, liquids and gases, we shall consider the arrangement of particles and the forces between the particles and movement of particles.

Particles in solids.



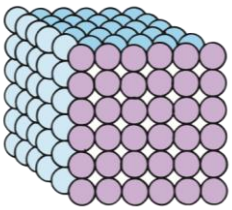
A solid has a fixed shape and a fixed volume.

It does not flow. Think of all the solid things around you: their shapes and volumes do not change.

Arrangement of particles in solids

- Particles in solids are very close to one another and are in a fixed pattern.
- The forces of attraction between the particles are strong.
- The particles can vibrate but cannot move past each other.
- Particles are close together touching each other.

Note. Strong forces hold the particles together so they cannot leave their positions. The only movements they make are tiny vibrations to and fro



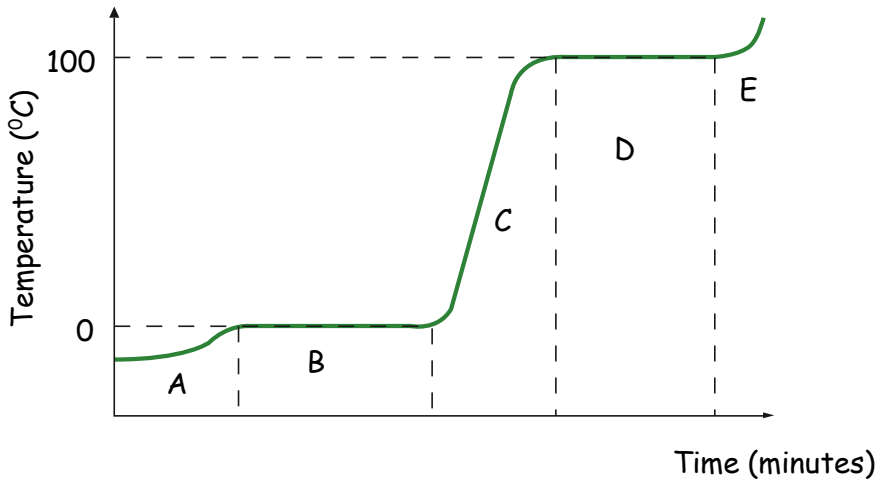
Particles in liquids

A liquid flows easily. It has a fixed volume, but its shape changes. It takes the shape of the container you pour it into

Showing changes of state on a graph

Heating curve

Look at this graph. It shows how the temperature changes as a block of ice is steadily heated. First the ice melts to water. Then the water gets warmer and warmer, and eventually turns to steam:



AT A

- All water is in solid state (ice). Ice warms up as the temperature is increasing.

At B

- Ice starts to melt at 0^0C.
- For ice to melt the particles must obtain sufficient energy to overcome the forces of attraction between the water particles to allow relative movement to take place
- Once melting starts, the temperature stays at 0°C until all the ice has melted

At C

- All water is in liquid state. Water warms up as temperature is increasing.

At D

- Water starts to boil at 100^0C.
- For water to boil, sufficient energy must be provided.
- Once boiling starts, the temperature stays at 100^0C until all the liquid water has boiled.

At E

- All water is in gaseous state. (steam)

The rate of diffusion of gases

Diffusion is the movement of particles from a region of high concentration to a region of low concentration.

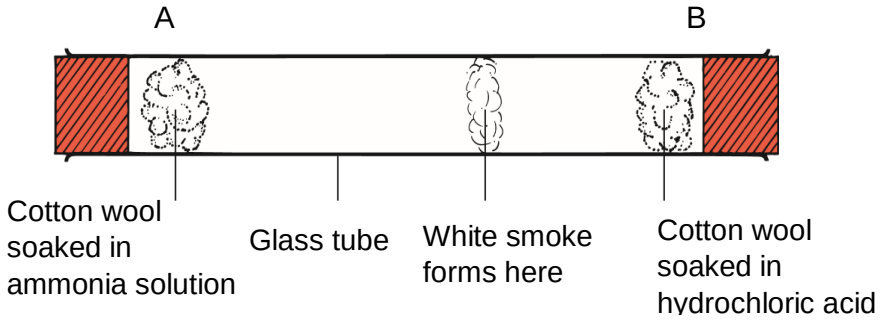
Diffusion of gases depend on two factors;

- **The mass of the particles.**

The smaller the mass of its particles, the faster the gas will diffuse. The mass of a molecule is called its relative molecular mass. So we can also say: The lower its relative molecular mass, the faster a gas will diffuse.

The particles in hydrogen chloride gas are twice as heavy as those in ammonia gas. So ammonia will diffuse faster because it has a lower mass.

Cotton wool soaked in ammonia solution is put into one end of a long tube (at A below). It gives off ammonia gas. At the same time, cotton wool soaked in hydrochloric acid is put into the other end of the tube (at B). It gives off hydrogen chloride gas. The gases diffuse along the tube. White smoke forms where they meet:



The white smoke forms closer to B. So the ammonia particles have travelled faster than the hydrogen chloride particles.

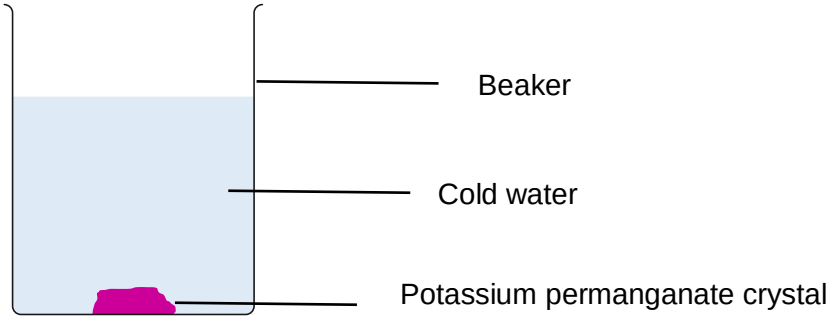
- **The temperature**

When a gas is heated, its particles take in heat energy, and move faster. They collide with more energy, and bounce further away. So the gas diffuses faster. The higher the temperature, the faster a gas will diffuse.

Activity of integration.

Timothy woke up early in the morning on a Saturday and started preparing for school. The weather was windy, her mother had hanged clothes on the wire to dry and she was also preparing tea. On opening the door of his bedroom, timothy smell the tea being cooked from the kitchen. When he reached the living room, he saw that the door of the fidge had been left open. Timothy moved towards the fidge to close it. When he approached it, he saw a block of butter, removed it and placed it in his hand and it was quite hard. After 15 minutes of holding the butter, the butter became soft and started

3. A large crystal of potassium permanganate was placed in the bottom of a beaker of cold water, and left for several hours.



a) Describe what would be seen:

i) after five minutes

……

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……

ii) after several hours

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……

……

b) Explain your answers using the idea of particles.

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c) Name the two processes that took place during the experiment.

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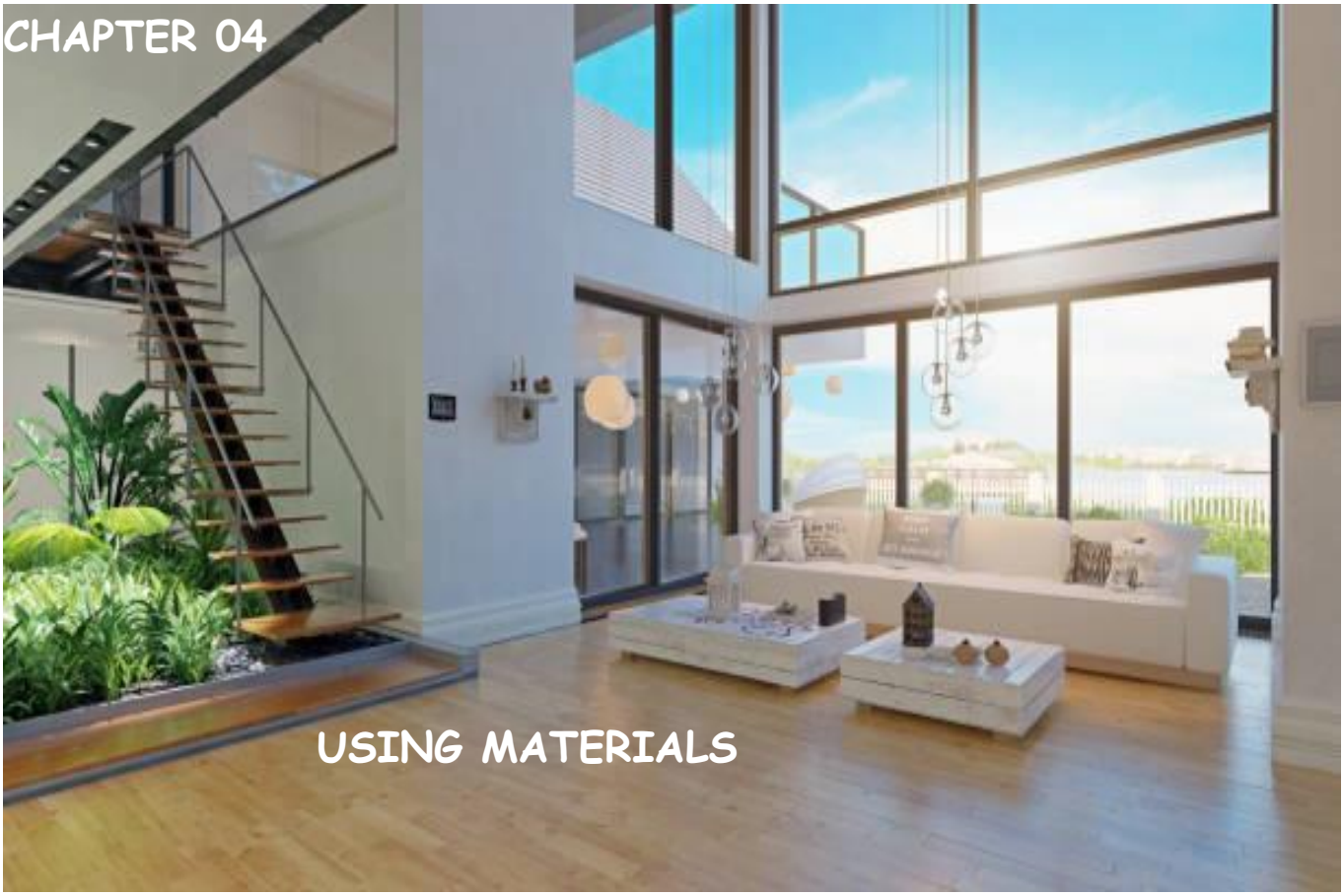
4. Use the idea of particles to explain why:

a) solids have a definite shape

……

……



By the end of the chapter you should;

- Know the materials used in everyday life
- Know how common materials pollute the environment
- Understand properties of different materials
- Understand polymers and their use in daily lives

Group activity. **The pictures below show different materials. Place the name of the material to the group in the table where it belongs.**

b) Group the items given in the table below.

Material	Name of Items from the picture
Metal	
Ceramic (pottery)	
Glass	
Fibres	
Wood	
Plastic	

a) Briefly describe how concrete is made. (Research from internet)

……

……

……

……

……

……

……

……

b) Suggest any three properties of concrete

……

……

……..

c) Outline four uses of concrete

……

……

……

……

SYNTHETIC POLYMERS

Polythene

It's one of the common plastics seen. It is not very strong. It is made from small molecules of a gas called ethene.

Group activity; In groups of 3 to 5 students, carry out research from textbooks and internet about the question below. Brainstorm on it and answer the questions that follow.

The pictures below show polythene pellets and one of the product made from it. Use them to answer the questions that follow.

Polythene for packaging is made and sold as pellets like these. Later they will be heated to soften or melt them, and turned into plastic bottles and bags.

To make a bottle, polythene pellets are melted. A little molten polymer is fed into a mould. A jet of air forces it into the shape of the mould. Then the mould is opened – and out comes a bottle.

a) Outline the properties of polyethene that suits the manufacture of substances from it. Give at least 6.

……..

……..

……..

……..

……..

……..

……..

……..












Nature of material	Name of materials from the picture.
Biodegradable	
Non-biodegradable	

GROUP ACTIVITY. Study the pictures below and use them to answer questions that follow.

C

D

E

F

Identify the building material used in

A …… B ……

C …… D ……

E …… F ……

State the advantage and disadvantage of using each of the material for building

……..

……

By the end of the chapter you should;

- Should be able to, identify all the temporary and permanent changes that takes place in our everyday life.
- Should be able to, recognize reversible and irreversible changes to matter under different conditions.
- Should be able to understand what happens to substances when heated or burnt.

a) Name the change that took place in the picture below.

……

b) Using the picture above, define the change that is being shown in the picture above.

……..

c) With a reason, explain why it is the above mentioned change in (a) above.

……

NOTE;

- From startup activity (1), garden tools rusted forming a new substance. This is termed as a permanent change
- From startup activity (2), ice cubes melted forming water. But the water can be turned back in to ice but no new substance is formed.

PERMANENT CHANGES.

Permanent changes are changes where a new substance is formed and it cannot be reversed.

The formed new substance has a composition different from that of the original substance.

Permanent changes can also be termed as chemical change.

Examples of permanent changes.

1. Cooking food.

Cooking food is a permanent change because it involves the change in the composition of the food. After cooking, the raw ingredients cannot be regained back. So a new substance is formed and it is irreversible.

When water from the sea wets the sand on the beach. The formed wet sand has the same composition to that of dry sand and after sometimes when the water flows back, the wet sand can dry up again when heated by the sun.

5. Fresh water changing into dirty water.

When fresh water is contaminated by chemicals and other substances like rubbish, it becomes dirty water. The formed dirty water can be turned back to fresh water by physical means like decantation. Thus the change is reversible and no new substance is formed.

Activity of integration.

Sharifah is a student in Kyocera secondary school in gulu district. When in the chemistry class, their teacher taught that melting of candle wax when a candle is burning is a physical change. The teacher told them to go and research more from a particular book in the library about chemical and physical changes. On reading the book, she found that a burning candle has both physical and chemical changes. Sharifah wondered which chemical change is in the burning candle since their teacher had only said that a burning candle has only physical change. When she went back home, she saw her uncle splitting firewood into small pieces. At the same time, her mother was using the splitted pieces of wood to cook food.

Burning candle picture from the textbook

Sharifa's mother cooking using splitted fire wood

CHAPTER 06

ELEMENTS, MIXTURES AND COMPOUNDS

By the end of the chapter you should be able to

Understand;

- Most elements, their symbols and their use in everyday life.
- Different mixtures and their ways of separations.
- Why some liquids form layers on mixing.
- Purity and impurity of substances.

 Zinc	• its used in galvanizing other metals • It is used in alloys such as as brass • It is used in metal roofs
 Iron	• Its used to make steel • It is used to make bridges • It is used to make bicycle chains • It is used to make cutting tools • It is used to make forks, spoons, knives.
 Lead	• It is used in car batteries • It is used to store corrosive liquids. • It is used in weights for lifting.

Metals have physical properties such as;

- They are good conductors of heat
- They are good conductors of electricity
- They rust if exposed to moist air
- They can be attracted by a magnet
- They are ductile
- They are tough, hard and don't easily shatter when you harmer them.
- They have high densities
- They are malleable i.e. they can be hammered into different shapes.

Group activities. The pictures below show various ways how metals are used in daily lives. Use them to answer the questions that follow.

a) State the use of hydrogen in the picture above.

……

ii) Carry out research and state the property of hydrogen that suits the use of hydrogen in the picture above.

……

b) State any other two uses of hydrogen gas

……

……

2. The picture below shows the use of a particular non-metal in daily life.

a) State the non-metal used from the picture above.

……

ii) State the use of the non-metal from the picture

……

iii) State the place where that non-metal is being used from the picture

……

b) Which solvent can be used to dissolve one of the two solids?

……..

c) State the solid which will be dissolved by the solvent stated in b.

……..

d) With a reason, state whether the solvent in b will be evaporated over a water bath or not

……

……

……

……

2. By using a magnet

A magnet is suitable for separating mixtures of solids where one can be attracted by a magnet. A magnet is brought close to the mixture and the magnetic material is attracted leaving the one that is not magnetic.

Examples of mixtures separated using a magnet include;

- Iron and Sulphur.

A magnet will attract the iron from the mixture as shown in the picture b5elow.

3. Sublimation method

This method is used to separate two solids of which one of them must sublime when heated. Examples of substances which sublime include; iodine, benzoic acid, ammonium chloride, iron (III) chloride.

Mixtures that are separated by sublimation include'

By the of this chapter, you should be able to;

- *Understand that air is a mixture of different gases that can be separated and used.*
- *Explain how air pollution can affect the atmosphere.*
- *Understand the processes such as burning and rusting/corrosion use oxygen from the air to for oxides.*

a) Why do divers and astronauts carry oxygen when going down the sea and to the moon respectively?

…….. ……..

……..

b) How do they carry oxygen?

…….. ……..

……..

c) How is oxygen useful to them.

…….. ……..

……..

1.

CARBON DIOXIDE

Ordinary air contains 0.03% of carbon dioxide . Air breathed out contains 3% of carbon dioxide. Thus more carbon dioxide is exhaled by animals occurs freely in air.

Group activity, Below are pictures showing ways how carbon dioxide is used. Use them to answer the questions that follow.

a) How is carbon dioxide used in the picture above

……..

b) Which property of carbon dioxide favours its use for the activity in the picture?

……..

Rusting

This car was once new and shiny. But it has been **corroded** – broken down by reaction with something in the atmosphere. In time, it will all be dust.

The corrosion of iron is called **rusting**. The red-brown substance that forms is called **rust**.

Oxygen and water are required for rusting to occur. Iron rusts faster in salty water. (Salt speeds up the oxidation.)

In fact the iron is oxidized, in this reaction:

$4Fe\ (s) + 3O_2\ (g) + 4H_2O\ (l) \longrightarrow 2Fe_2O_3.2H_2O\ (s)$

iron + oxygen + water → hydrated iron(III) oxide (rust)

The chemical formula for rust is hydrate iron(III) oxide.

Group activity; you are required to perform an experiment to investigate the conditions necessary for rusting in your groups.

Materials you need; test tubes, cotton wool, cooking oil, iron nails, anhydrous calcium chloride

Procedure

- Get three test tubes and label them 1, 2 and 3.
- Clean the nails very well and place two nails in each test tube
- In test tube 1, push cotton into it half way of the test tube. Add a small layer of anhydrous calcium chloride on top of the cotton wool and cover it with another cotton wool.
- In test tube 2, cover the nails with boiled water then add cooking oil on the surface of boiled water.
- In test tube 3, add water until all the nails are covered.
- Keep your test tubes and their contents for three days and after observe what happens.

a) Explain the following during the experiment.

i) adding anhydrous calcium chloride in test tube 1.

By the of this chapter, you should be able to;

- Understand the occurrence of water as a natural resource, its physical and chemical properties and importance in everyday life
- Explain how water is recycled by natural processes
- Understand the processes of water and sewage treatment

PROPERTIES OF WATER

Water has its own properties such as any other substance, that is to say; Physical and chemical properties.

Physical properties of water.

Group activity In groups of 4-5 students. Carry out research and list the physical properties of water.

The pictures below show some uses of water in daily life.

a)

How is water used in the picture above?

……

How is that use of water important to our community?

……..

……

……

……

b)

How is that use of water important to our community?

……

……

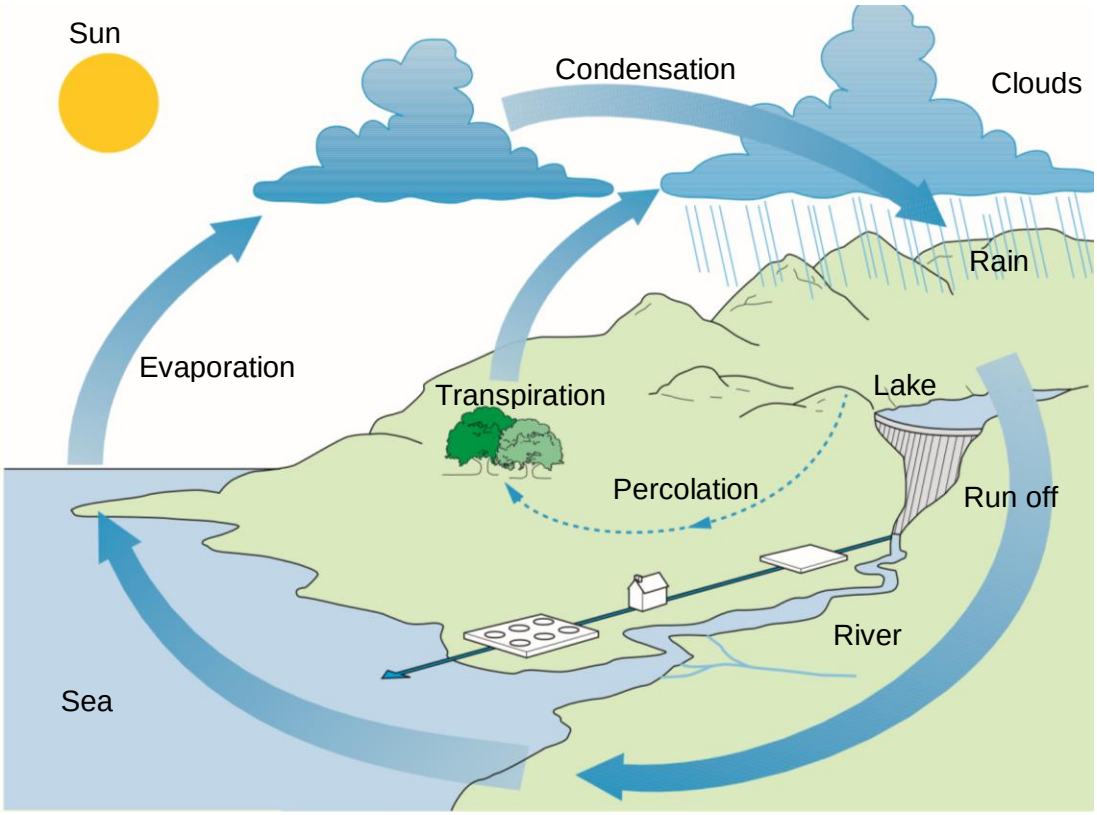
……

……

The water cycle

In spite the fact that a lot of water is used daily domestically industrially and in irrigation the amount of water on earth remains fairly constant.

Diagram showing water cycle



Group activity In groups of 4-5 students, use the diagram above to describe how water is recycled. Answer in the space below.

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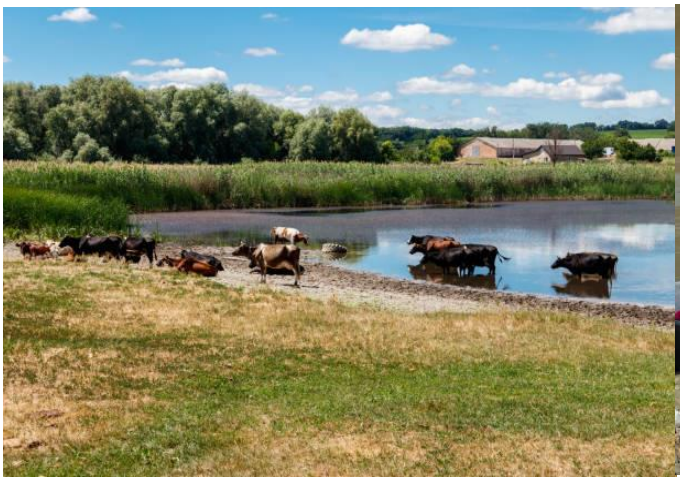
Activity of integration.

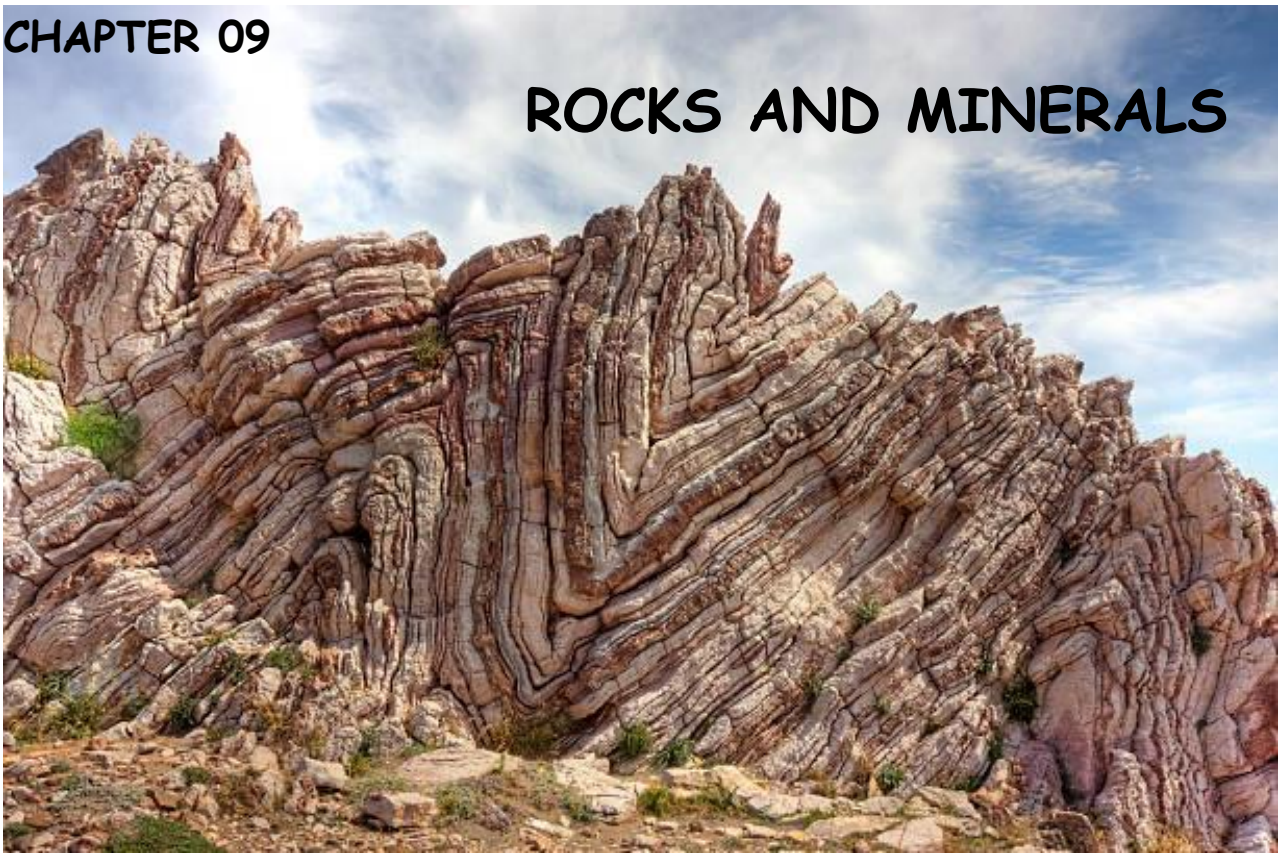
Kawuki lives along the channels of a water body which supplies the entire village of kajabijo with water. He has many cows which drink and move within the water body. He has a big plantation of crops next to the water body on which he uses a massive amount of fertilizes to ensure that he get high yields. He normally cools his machines in water and his wife earns a living by washing clothes daily for people in kajabijo. The wife uses detergents and soap to wash the clothes.



Write a piece of advise to kawuki letting him know about the ways his family and activities pollute the water body, the possible effects the pollution could do to kijabijo and how he can participate in solving the problem of water pollution in the area.

CHAPTER 09

ROCKS AND MINERALS



By the of this chapter, you should be able to;

- Understand how rocks are formed.
- Identify the physical properties of rocks.
- Identify the types of rocks
- Understand the importance of rocks.

Examples of sedimentary rocks

Limestone

sandstone

shale

conglomerate

GROUP ACTIVITY. In groups of 2 to 3 students, carry out research about sedimentary rocks, identify their properties and uses in daily life and list them in the space below.

Physical properties

…….

…….

…….

…….

…….

Uses in daily life.

…….

…….

…….

…….

…….

Igneous rocks

Are rocks formed from cooling and solidification of magma. They are formed when hot molten magma crystallizes and solidifies.

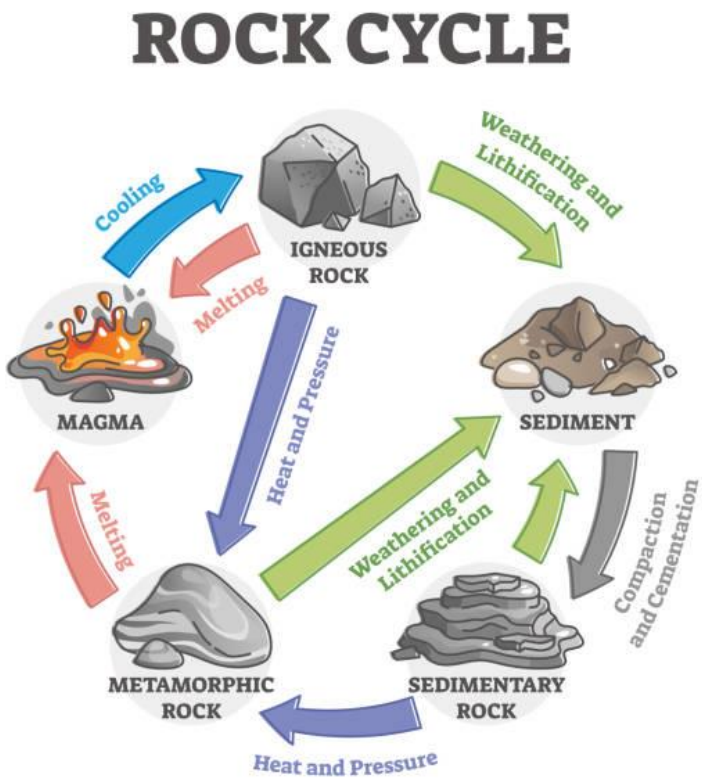
FORMATION OF IGNEOUS ROCKS

Hot magma flows out of a volcanic mountain

When hot molten magma crystallizes and solidifies, if forms an igneous rock.

ROCK CYCLE

The picture below shows the rock cycle. Use it to answer the questions that follow.



In your groups, carry out research about the rock cycle and describe it briefly.

MINERALS

A mineral is a naturally occurring solid with a specific chemical composition and a distinctive internal crystal structure.

Most minerals are chemical compounds composed of two or more chemical elements. However, copper, sulphur, gold, silver, and a few others occur as single “native” elements. Minerals are extracted from rocks by mining.

Common groups of minerals found in rocks.

- Silicates
- Carbonates
- Sulphates
- Halides
- Oxides

1. Silicates minerals

Are an ionic compounds whose anions consist of silicon and oxygen atoms.

Examples of silicate minerals include; quartz, mica, olivine, feldspar.

Quartz

Its one of the most common minerals in Earth’s crust, quartz has two forms: macrocrystalline (with crystals that can be seen by eye) and cryptocrystalline (formed of microscopic crystals).

Macrocrystalline quartz is usually colorless and transparent, as in rock crystal, or white and translucent, as in milky quartz.

Colored varieties include: pink and translucent rose quartz; transparent to translucent lavender or purple amethyst; transparent to translucent black or brown smoky quartz; and transparent to translucent yellow or yellow-brown citrine. All crystalline varieties form hexagonal prisms and pyramids.

Gypsum

QN. Carry out research and state the uses of sulphate minerals.

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4. Halides minerals.

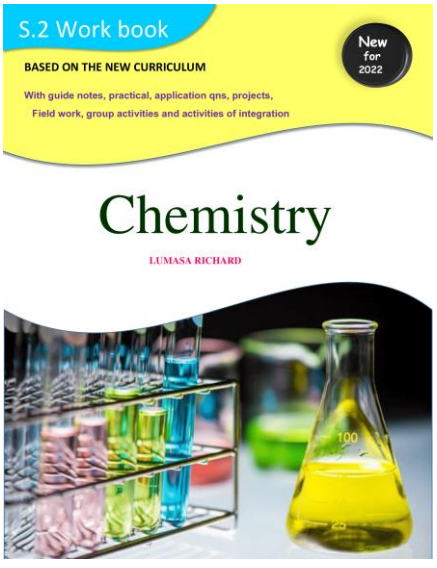
Minerals in this group consist of metals combined with one of the four common halogen elements: fluorine, chlorine, iodine, or bromine. Halides tend to be soft and many crystallize in the cubic system.

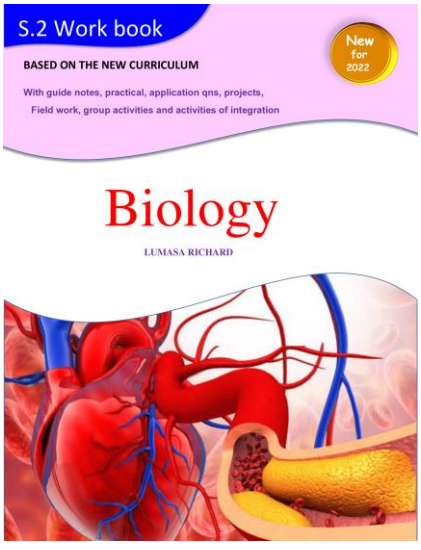
Compositionally and structurally, there are three broad categories of halide mineral: simple halides, halide complexes, and oxyhydroxy-halides.

Simple halides form when a metal combines with a halogen. Halite and fluorite are examples of simple halides.

Halite

Fluorite





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