GRADE 8; INTEGRATED

SCIENCE SIMPLIFIED NOTES

CBC RATIONALIZED WORK

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MWALIMU CONSULTANCY

STRAND 1;MIXTURES, ELEMENTS AND COMPOUNDS.

1.1-Elements & Compounds.

Meaning of Atoms, Elements, molecules and Compounds.

- Matter is anything that occupies space and has mass.
- Matter is composed of pure substances and mixtures.
- The pure substances are can be element and compounds while the mixtures can either be uniform or non-uniform.
- **An element** is a substance that cannot be decomposed into simpler substances by chemical or physical means.
- An element is a pure substance which cannot be made simpler using chemical means.
- Elements are the building blocks of matter. Everything around is made up of an element orelements.
- An element is made of atoms.
- Atoms of the same element are identical.
- **A compound** is pure substance that consists of atoms of two or more elements that are chemically joined together.
- Compounds are formed when atoms of different elements react.
- Compounds can be broken down into elements through chemical reactions.
- **Sodium** and **chlorine** are elements that combine chemically to form **sodium chloride** whichis a compound.

Relating common elements to their symbols.

- Pure substances either elements or compounds has a unique name and symbol.
- A symbol is a sort -hand notation for the chemical name of an element.
- Chemical symbols are used instead of names by scientists because they are much easier, convenient and universally recognized.
- Compounds are represented by a chemical formula.
- A chemical symbol is usually derived from first letter of the English name of the element.
- It is also derived from Latin name of the element.

For example,

- **H** is the chemical symbol of **hydrogen**.
- **O** is the chemical symbol of **Oxygen**.
- **K** is the chemical symbol of **potassium**. For potassium the **K** is derived from Latin word

Kalium.

- Some elements might start with same first letters, such as **Carbon**, **Calcium, Chlorine** and**Copper** have their names starting with letter **C,** therefore letter C cannot be used to represent all of them as chemical symbol.
- The first letter **C** is assigned to represent Carbon, while the rest of the elements are assignedtwo letters from their name as follows.

✓ **Carbon** represented by **C.**
✓ **Calcium** represented by **Ca.**
✓ **Chlorine** represented by **Cl**
✓ **Copper** represented by **Cu** from Latin word ***cuprum***

- The first letter of a symbol is always capitalized, while the second letter is written in small letters.
- The symbols of some elements derived from English names are as follows:

	Name ofelement	Chemical symbol		Name ofelement	Chemical symbol
1	Hydrogen	**H**		Nitrogen	**N**
2	Helium	**He**	8	Oxygen	**O**
3	Lithium	**Li**	9	Fluorine	**F**
4	Beryllium	**Be**	10	Neon	**Ne**
5	Boron	**B**	11	Magnesium	**Mg**
6	Carbon	**C**	12	Aluminium	**Al**

- The symbols of some elements derived from Latin names are as follows:

	Name of element	Latin name.	Chemical symbol		Name of element	Latinname	Chemical symbol
1	Sodium	**Natrium**	**Na**		Silver	**Argentum**	**Ag**
2	Iron	**Ferrum**	**Fe**	8	Tin	**Stannum**	**Sn**
3	Copper	**Cuprum**	**Cu**	9	Zinc	**Zincum**	**Zn**
4	Lead	**Plumbum**	**Pb**				
5	Gold	**Aurum**	**Au**				
6	Mercury	**hydrargyrum**	**Hg**				

- Compounds are combinations of two or more elements.
- A chemical formula is an expression that shows the elements in a compound and the relativeproportions of those elements.
- **Water** is composed of **Hydrogen** and **Oxygen** in the ration 2:1.
- The chemical formula of water is **H_2O.**
- **Sodium chloride** also called common salt is composed of Sodium and Chlorine in the ration1:1. The chemical formula for **Sodium chloride** is **NaCl**.

Application of common elements in our day-to-day life.

Food nutrients are chemical compounds found in foods. These nutrients are used by the body to function properly and maintain health.

- ***Examples of food nutrients include:***
- *Proteins.*
- *Fats.*
- *Carbohydrates.*
- *Vitamins.*
- *Mineral salts.*
- Food nutrients are made up o various elements such as: **carbon, hydrogen, oxygen and nitrogen.**

Various food sources that contain various elements.

Mineral element of compound	Examples of food sources
Carbon	present in all foods
Nitrogen	Meat, chicken, fish, milk and eggs.
Flouride	Fish, potatoes, spinach and black tea.
Calcium	Milk, cheese, green leafy vegetables, soya beans, bread and fish
Copper	Nuts and shellfish.
Iron	Liver, meat, beans, nuts and whole grain.
Magnesium	Spinach, bread, fish, meat and dairy foods.
Phosphorus	Read meat, dairy foods, fish, bread and rice.
Potassium	Banana, vegetables, milk, fish, beef, chicken and bread.
Sodium chloride	Salt is found naturally at low levels in all foods. Some salt is added to processed foods and meat products.

- Plants receive water, mineral and other nutrients from the soil which are carried to the otherparts of the plant
- There are various mineral elements present in the soil that are absorbed by the roots of plants.
- The following are some of the important mineral elements required by plants:

✓ **Phosphorus & magnesium –** they are essential for the growth, development and reproduction of the plant.

✓ **Potassium –** increases the quality of fruits and vegetables.

- Various elements are used in manufacture of different toiletries that we use in day-to-day life.
- Some toiletries, for example toothpaste contains flouride compounds to prevent tooth decaywhile soaps and detergents contain a compound of potassium.

Importance of various elements and compounds.

- **Gold:**

✧ Gold is a precious metal.
✧ It is widely used to make jewellery as it is fairly soft and easy to work with.
✧ It is attractive in appearance and neither rust or discolours.

- **Silver:**

✧ It is a precious metal.
✧ It is used in making jewellery but it tends to discolour.
✧ It is also used in making cutlery, teapots and medals.

- **Iron:**

✧ It is one of the most useful metals.
✧ It is strong, can be sharpened and it is easy to work with.
✧ Many items are made of iron or steel.
✧ Steel is a combination of iron and carbon.
✧ Steel is important in construction.

- **Gold and silver:**

✧ They are precious metals elements that occur naturally and have high market value.
✧ In some cases, Gold and silver can be used as currency.
✧ In other cases, these precious metals have various uses such as in electronics, medical technology and awards therefore gold and silver valuable to many businesses.
✧ Gold is more valuable because it is rare than silver.

Information on Packaging labels.

- Substances purchased contain various elements that are part of ingredients.
- The elements present are usually indicated in the information found on the packaging labels.
- Few examples are given below.

a) **Toothpaste-** contains sodium flouride, zinc sulphate and sodium hydroxide.
b) **Body lotion**– contains sodium hydroxide and other compounds
c) **Liquid handwash**– contains sodium chloride.
d) **Baking powder**–contains sodium hydroxide carbonate.
e) **Curry powder**–contains sodium.
f) **Tomato source**–contains a compound of sodium.
g) **Margarine**-contains a preservative that is a compound of potassium.
h) **Beef cubes**-contains a compound of iron and a compound of sodium.
i) **Bottled water**-contains calcium, sodium, potassium, magnesium and other common elements.

1.2-Physical and Chemical changes.

✧ Matter is anything that occupies space and has mass.
✧ All solids, liquids and gases are made up of matter.
✧ The three states of matter have different physical properties.
✧ These properties depend on intermolecular forces.
✧ Intermolecular forces are forces that hold the particles of matter together.

Properties of different states of matter.

a) Solids, liquids and gases are different in terms of their shapes.

- **Solids.**

Solids have a definite shape which does not change on its own unless use of external forces such as breaking it into smaller pieces.

For example, when a stone is place on a table, or a plate or a tin, it does not change its shape according to the item it is place in or on.

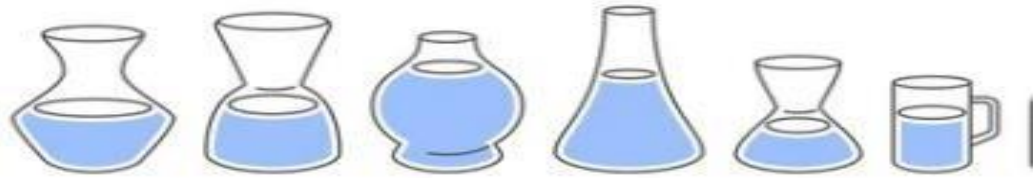
- **Liquids.**

A liquid has no definite shape.

That means a liquid changes its shape to take the shape of the container or vessel in which it is put.

A liquid also changes its shape when spilled on the floor.

For example, when a liquid id poured in two different containers, the liquid will display two different shapes that resemble or are similar to the container they are placed in. this means liquids lack a definite shape



- **Gases.**

Gases-a gas has no definite shape.

A gas changes its shape to look like that of container in which it is held in.

For example, when a balloon is inflated with air, the air inside takes the shape of the balloon.

b.) **Solids, liquids and gases are different in terms of their volumes.**

Solids. When a solid is totally immersed in a liquid, the volume of the displace liquid is equivalent, (equal) to the volume of the solid.

✧ The volume of the stone remains the same when place in two different measuring cylinders. Therefore, solids have a definite shape.

Liquids.

The volume of water poured in a measuring cylinder remains unchanged even when it istransferred from one measuring cylinder to other measuring cylinders of different capacities.

✧ For example, if you pour 30ml of water in a 50mli measuring cylinder, its reading will be 30ml.

✧ If the same water is transferred to a 100ml measuring cylinder, the reading will stillremain 30ml.

✧ Therefore, liquids have a definite shape just like solids.

Gases.

A given mass of a gas can occupy different volumes in different containers. This is an indication that gases, do not have a fixed volume.

c.) **Solids, liquids and gases are different in terms of their Compressibility.**

Compressibility is the ability of a substance to be reduced in volume or size by applying force or pressure on it.

Compressibility can also be defined as how much a given volume of matter decreases when pressed.

 When a bottle id filled with air, it can easily be squeezed compared to one filled up with water.

 If the two are replaced with sand, we cannot squeeze the bottle anymore.

 This experiment proves that gases are highly compressible, liquids have little compressibilitywhile solids are incompressible.

 Gases.

  Occupies entire volume of container.

 Their particles move freely because the intermolecular forces are very weak.

 This makes particles to move far apart from each other and can be brough closer when pressure is applied. This is the reason gases are highly compressible.

 Liquids.

  Their properties lie between those of gases and solids.

 Their intermolecular forces in liquids are weaker than in solids but stronger than in gases.

 The particles in liquids do not move freely as in gases, therefore, it is difficult to compress liquids since the liquid particles can move but keep same volume.

 Solids.

  Particles in solids are very close to each other (closely packed) and the intermolecular forcesbetween the particles are very strong. The strong forces keep the particles in fixed position.

 This is the reason why solids are hard, firm and rigid.

 Therefore, solids are incompressible.

c.) **Solids, liquids and gases are different in terms of their ability to flow.**

Particles in liquids can move from one place to another, therefore, a liquid can flow and change shape. This makes liquids such as water to flow from a tap to fill a jar or a bucket. This is applied when pouring tea in a cup.

✧ Solids have particle that do not move therefore solids cannot flow.

✧ Gases have freely moving particles which can be moved from an area. For example, when you breathe, you force air (gas) into and out of your lungs. This is an indication thatgas flow in and out of the body. This is also applied when cooking gas flows from the gas cylinders to the burners when cooking.

✧ Therefore, liquids and gases can flow while solids cannot flow.

Summary of properties of different states of matter.

State ofmatter	Volume	Density	Shape	Ability toflow	Compressibility
Solid	Has fixed volume.	Generally highe than that of liquidand gas	Has definite shape.	Does notflow.	Incompressible.
Liquid	Has fixed volume.	Generally highe thanthat of ga	Has definite shape.	Flows.	Little compressibility.
Gas	Has no fixed volume	Lower thanboth solids and liquids.	Has no definite shape.	Flows.	Highly compressible.

Pure and Impure substances.

- When two pure substances are mixed together, they form a mixture.
- A mixture is an impure substance. Therefore, a pure substance is any material that is not a mixture at all.
- The melting and boiling points of pure and impure substances can be determined.

Melting point of pure substances (Ice).

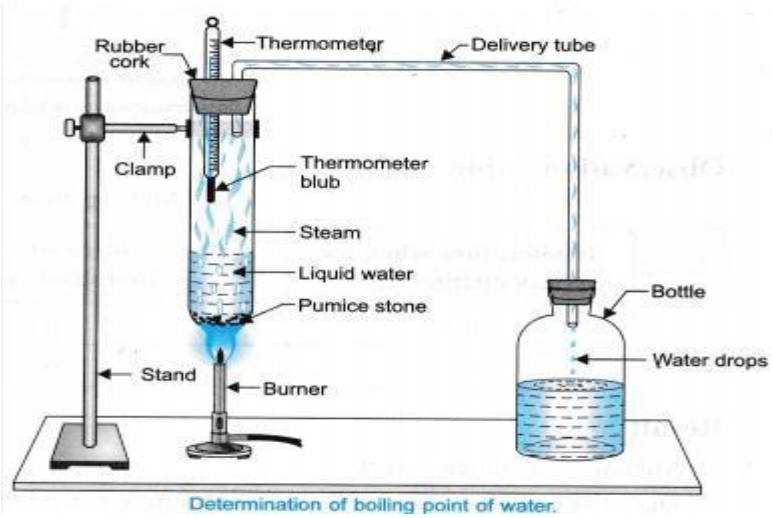
- It is the temperature at which a solid change into liquid state.

- The melting point of ice is the temperature at which ice is converted from its solid state to itsliquid state.
- Heat from a heat source is used to melt the ice.
- The thermometer helps to note the temperature at which the ice melts.
- After the initial and final readings are taken, it will be observed that once the ice attained itsmelting temperature (0^oC), the temperature remains the same until all the ice is converted into liquid state.
- Pure solids have specific melting points. Therefore, it means that ice is a pure substance.

Melting point of Impure substances (Candle wax).

- The melting point of candle wax is the temperature at which the solid materials turns into liquid (by heating it).
- The melting point of candle wax ranges between 46^oC to $68\ ^oC$. Therefore, it means that candle wax is an impure substance.
- Impure substances do not have specific melting points. The presence of impurities affects themelting point of the substances.

Determining Boiling points of Pure and Impure substances.



Determination of boiling point of water.

Requirements for the experiment

1. Boiling tube.
2. Thermometer.
3. Heating apparatus.
4. Distilled water.
5. A spatula.
6. Salt and water.

Procedure for the experiment above.

- Put about $10cm^3$ of distilled water on a boiling tube.
- Close the tube with a stopper that has two holes.
- Pass a thermometer through one hole. Immerse the thermometer bulb into the water.
- Push and 'L' shaped tube through the other hole as shown above.
- Heat the apparatus using a small flame.
- Observe the changes in temperature and record your observations.
- Cool the apparatus and remove the stopper.
- Add a spoonful of salt to some water/ stir to dissolve all the salt to form a salty water solution.
- Repeat the above experiment using a salty water solution in place of pure distilled water.

- Observe changes in temperature, record your observation. What conclusion have you made.
- At what temperature does water (pure water) boil?
- At what temperature does water with dissolved salt (impure water) boil/
- Compare your observations.

Observations and conclusion & Explanation.

➦ When distilled water is heated, the temperature of the water rises to about 100^{o}C.

➦ After this, the temperature remains constant (not changing) for some time. The heat absorbed changes liquid water into water vapour or steam.

➦ Pure water has a definite or specific boiling point.

➦ Salty (impure) water has a range of boiling temperatures above 100^{o}C.

➦ Impurities cause a rise in temperatures of the boiling point of liquids.

➦ The greater the impurities in the given solution, the higher the boiling point. Therefore,we can use the boiling point to determine the purity of a liquid.

Temporary and Permanent Changes in Substances

Temporary Physical changes.

Experiment to demonstrate physical change.

Requirements:

☞A pair of tongs.

☞An iron pin.

☞A source of heat such as burning candle or Bunsen burner and writing materials.

Procedure:

- Hold iron pin using a pair of tongs over a burning flame from either a candle or Bunsen burner for sometime.
- Remove the pin from the flame after noticing any changes you can observe.

Observations, Explanation & conclusion.

✓ Iron pin becomes red-hot when heated.

✓ After sometime the iron pin regains itsoriginal colour on cooling.

✓ This indicates that the iron pin went through a temporary change on heating.

✓ Any change in properties such as shape,size, colour and state of a substance is called a **physical change**.

✓ Physical changes are reversible.

✓ When a change is reversible is said tobe temporary. This is demonstrated when the heated red-hot iron pin regains its original colour after cooling.

Temporary chemical changes

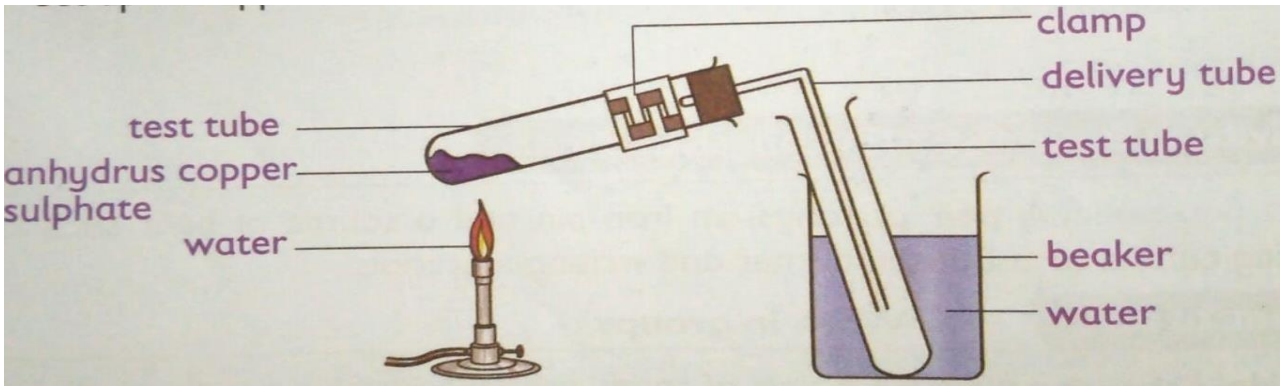
Experiment to demonstrate temporary chemical changes.

Requirements:

- ☞ Safety googles.
- ☞ Two test tubes.
- ☞ Delivery tube (right-angled)
- ☞ Beaker (250ml).
- ☞ Bunsen burner.
- ☞ Clamp.
- ☞ Stand.
- ☞ 5g of hydrated copper (II) sulphate.

Procedure:

- Put 5g of powdered blue hydrated copper (II) sulphate in the test tube.
- Set up the experiment as shown below.



heating blue hydrated copper (II) sulphateObservation, Explanation and Conclusion.

- ✓ When **blue** hydrated copper (II) sulphate is heated in the test tube as show above, it turns colour from **blue** to white. This because it loses water which was making it hydrated.
- ✓ After losing water, it become white anhydrous copper (II) sulphate.
- ✓ When water is added to the white anhydrous copper (II) sulphate, it turns back to its originalblue colour.

- ✓ The chemical change that had occurred is reversed. Some chemical changes are therefore temporary and can be reversed easily. These changes are referred to as **temporary chemicalchanges** or **reversible chemical changes.**

Other examples of temporary chemical changes include the following;

- ☞ On mixing baking soda and vinegar, a chemical reaction produces carbon (IV) oxide gas. This gas causes the mixture to bubble. Once the gas escapes into the air, the reaction stops and the mixture returns to its original state.
- ☞ Freezing, melting and vapourisation of water

Permanent Chemical changes

Experiment to demonstrated permanent chemical change.

Requirements:

- ☞ 5cm magnesium ribbon.
- ☞ A source of heat.
- ☞ Sand paper.
- ☞ A pair of tongs.
- ☞ Writing materials.

Procedure:

- Clean the magnesium ribbon by rubbing it with sand paper. Examine the appearance of the magnesium ribbon.
- Hold the ribbon with a pair of tongs over a burning candle or Bunsen burner for a few minutes.

Caution:

Burning magnesium ribbon produces a very bright flame that can damage your eyes. Avoid looking directly at the flame.

Observation, Explanation & Conclusion.

- ✓ Magnesium ribbon burns with a bright light forming a white ash. If the magnesium ribbon isnot shining it may take long to ignite. Therefore, is advisable to clean the ribbon by rubbing it with sand paper since it is coated with an oxide layer that prevents it from burning.

✓ Burning magnesium ribbon form a substance called magnesium oxide. A change in which one or more substances are formed is known as chemical change.
✓ A chemical change is also known as permanent change. Most chemical changes are irreversible in nature.
✓ Chemical changes are important in life. Example of chemical changes include:
- Digestion of food in the body.
- Ripening of fruits.
- Fermentation of grapes.

Applications of changes of state of matter in day-to-day life.

Change of state of matter has many applications in day-to-day life. Some of these changes are:

Refrigerators.

- Liquids evaporate and absorbs heat in the process. A refrigerator works by using a liquidto remove heat from the food items inside and transfer it to the surrounding. The liquid isfirst heated and then cooled at the back of the fridge where the heat is removed. The process of changing liquid to gas cools the food.

Ice cream vendor.

- Ice cream vendors place ice inside their ice cream carts. The ice absorbs heat from the container surrounds and change to a gas. This leaves the inside of the ice cream cart cold, thus maintaining the ice cream in frozen state.

Melting metals.

- Metals are heated to a molten state making it possible to shape and form them intodesired objects or structures.

Generating electricity.

- Water can be converted to steam, which can in turn be used to drive turbines to generate electricity.

Fog formation.

- Fog forms when water vapour (gaseous state) condenses. During condensation, molecule of water of water vapour combine to make tiny liquid water droplets that are suspended in the air. Fog reduces visibility. Some animals such as insects, depend on fog as a source of water, especially in desert climate.

-Classes of Fire.

- Fires can be classified between four and seven classes.
- The following are six classes of fire mostly widely used and accepted.

Class	Type	Involves
Class A	Ordinary fires	Fires that burn materials such as wood, cloth, paper and plastics.
Class B	Flammable liquids.	Fires that involve liquids such as grease, oils, paraffin, petrol, diesel and alcohol.
Class C	Flammable gases.	Fires that involve gases such as propane, butane and methane.
Class D	Metallic fires.	Fires that are ignited by combustible metals such as potassium, sodium, aluminium and magnesium.
Class E	Electrical fires.	Fores that are caused by electricity or involve electrical equipment and appliances, for example mobile phone andcomputer chargers.
Class F	Cooking fires	These fires are ignited by cooking oil and animal fats.

Fire control measures.

- To prevent the start and spread of fire, one or more components should be removed from thefire triangle.
- A fire triangle in a simple model of understanding the components of fire which are fuel, heat and oxygen.
- Therefore, to control fire one or more components should be removed from the fire triangleas follows:

Removing fuel:

- Use fire-resistant materials where possible.
- This will help to prevent the fire from starting and spreading.

Removing heat:

- Water is mostly used to remove the heat from fire.
- A water fire extinguisher would be the safest way of doing this.
- However, these extinguishers cannot be used on all types of fire.\

Removing oxygen:

- It is important to remove oxygen gas from fore triangle to prevent spread of a fire.
- This can be achieved by using either a carbon (IV) oxide or a form fire extinguisher.

Fire extinguisher come in different types depending on the kind of environment you are in. Some places such as school, work or home, one or more types of fire extinguishers may be required.

The following are different types of fire extinguishers and the classes of fire they put.

Form fire extinguisher  Used in classes A and B. Dangerous for Class F.	***Water fire extinguisher***  Used in class A. Dangerous for classes E and F	***Carbon (IV) oxide fire extinguisher.***  Used for classes B and E. Dangerous for classes A and C
Powder fire extinguisher  Used for classes A, B, Cand E. Dangerous for class F.	Wet chemical fire extinguisher  Use for Class F.	
	Dangerous for class B, C, D and E.	

Other items that can be used to control fire.

In addition to the fire extinguishers, the following items can also be used to control fire.

- Sand-it absorbs heat and cuts off the supply of oxygen. Sand can be used to put out class **A**,**D** and **F** fires.
- Fire blanket-it is useful in putting out class F fires and wrapping around a person whose clothing is on fire.

Rights to safety and access to information.

✧ At school, home and workplace you are supposed to be safe. These paces should take the following precautions for our safety:

✓ Avoid build up of rubbish that can fuel fire.

✓ Put measures in place to detect fires and warn people quickly in case fires start. This can bedone successfully by installing smoke detectors and fire alarms or bells.

✓ Have correct fire fighting equipment to put out a fire quickly.

✓ Keep fire exits and escape routes clearly marked and unobstructed at all times.
✓ Give proper training on emergency procedures to follow, including fire drills.

Access to information on flammable substances is important for the following reasons.

✓ It makes us aware of all hazards (fire and explosion) of the materials we are handling.
✓ Helps us to know which of the materials or products we are working with are flammable.
✓ Helps us to remove sources of ignition (sparks, smoking, flames or hot surfaces) when working with flammable and combustible products.
✓ Helps to use approved equipment, including labelled safety containers, for flammable liquids.
✓ Helps to know the proper personal protective equipment to use when handling hazardous liquids.
✓ Helps us to know how to handle emergencies (fires, spills, personal injury) involving the hazardous materials we work with.

Fire safety posters we should be aware in the environment we are in.

 In case of fire out break this is thepoint to assemble.	 Show the route to use and exit the affected area in case of fire.	 Used to alert the users of the premises to exit the area due to fireoutbreak

indicates the position of a fire extinguisher in the building or location. 	 where one can make an emergency call in case of fire outbreak.	indicates location of a fire hose in the building or in the area. Fire hose is a high-pressure pipe used to carry water or retardant 

Strand 2; LIVING THINGS & THEIR ENVIRONMENT.

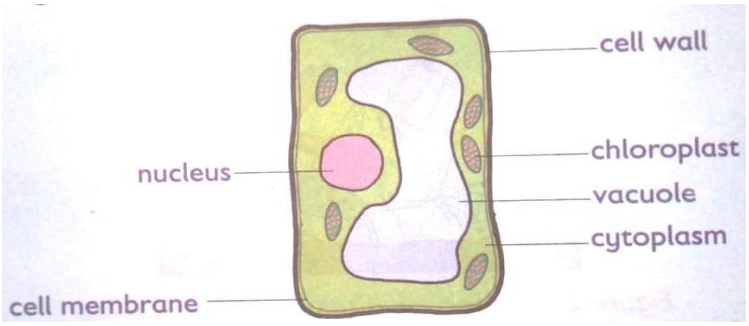
2.1 The Cell.

- Cells make up the structure of living organisms and carry out various biological processes.
- Organisms such as amoeba are composed of a single cell hence are said to be unicellular.
- Organisms such as plants and animals are composed of many cells hence are said to be multicellular.
- Therefore, ***a cell is defined as the basic unit of structure and functions in organisms.***
- To observe the cell, a powerful magnifying instrument called **a microscope** is used.
- A microscope enlarges the image of objects when observed and improves the resolution of the image.

Plant and animal cell structures as seen under a light microscope.

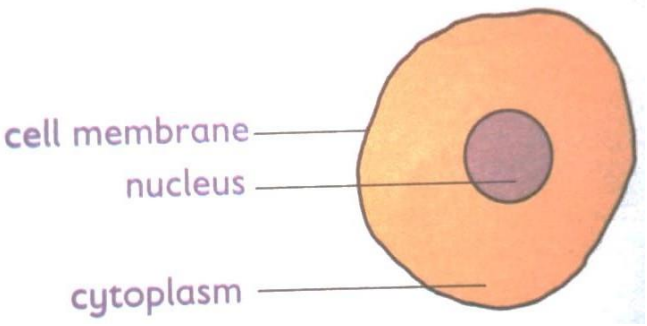
- The following diagram shows the components of a plant cell as seen under a light microscope.

Components of a plantcell.



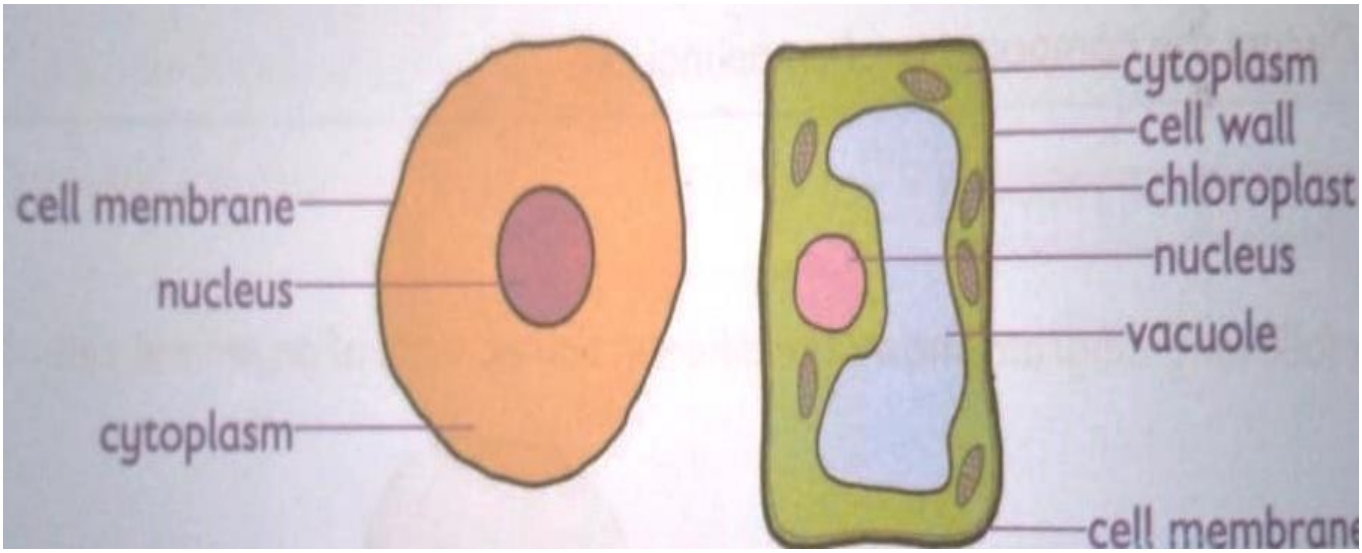
- The following diagram shows different components of the animal cell as seen under a light microscope.

Components of an animal cell.



Comparing plant and animal cells.

- Plant and animal cells have slight differences in their internal structures while sone featuresare common in both.
- The figures below show the components of both plant and animal cells as seen under a lightmicroscope.



Plant cells	Animal cells.
They are large in size.	They are small compared to plant cells.
It has a cell wall.	It does not have a cell wall.
Some plant cells have chloroplast that givethe plant its green colour.	It lacks chloroplast.
Plant cells have a permanent vacuole that occupies a large part of the cell.	Animal cells usually do not have vacuoles, however, small temporary vacuoles mayoccur

Similarities between a plant cell and an animal cell.

They both have the cell membrane.Both have nucleus within them

Part/structure	Function	Found in
Vacuole	It is the space that has a watery fluid (cell sap) that contains dissolved water, mineral salts and waste products.	Both plant andanima cells.

Cell membrane	Cell membrane is a thin layer around the cell that holds the cell together. It acts like a fence and controls what goes in andout of the cell. Therefore, the cell can take in substances it needs and get rid of waste products.	Both plant andanima cells.
Cytoplasm.	It is a jelly-like liquid that fills inside the cell. The cytoplasm is where chemical reactions of thecell take place. It also contains small structures called organelles which have special functions	Both plant andanima cells.
Nucleus	The nucleus carries genetic information and controls what happens or all the activities of thecell	Both plant andanima cells.
Cell wall	It is a thick, tough layer made from cellulose found on the outside of the cell. It covers the cell membrane in plants cells. Cell wall helps the cell to keep its shape. It protects the cell form mechanical damages.	Plant cells.
Chloroplast	It is an organelle in the cytoplasm of plant cells. Chloroplast contain green pigment called **chlorophyll.** Chlorophyll absorbs light that is used by plants to make their own food through **photosynthesis.**	Plant cells.

Functions of the cell structures found in plants and animals' cells.

Magnification of Cells.

- Magnification of a specimen is the measure of how much bigger a specimen is when it is viewed through a hand lens or microscope compared to its original size.
- Magnification is usually expressed using "**X**" before the digits, for example, **X2, X10** and **X20.** The X stands for 'times.'
- It is a measure of how much bigger an object appears when viewed through a hand lens or microscope, for example X2 means the object has been magnified or enlarged two times or the image is twice bigger than the actual object.
- For alight microscope, the final magnified image of an object as seen by the observer is the product of the magnifying power of the lenses that are used. These lenses include eyepiece

lens and the **objective lens.**

- The magnifying power of each of these lenses is marked on the sides of the objective and eye piece lens holder.

In a light microscope, the revolving nosepiece holds three different objective lenses, each with a specific magnifying power of **X4**, **X10** and **X40.** The eyepiece lens further magnifiesthe image formed by the objective lens.

Calculating the Total magnification.

- Finding total magnification of an image you are viewing in alight macroscope is done by:
- Take the power od the objective lens you are using e.g., X4, or X10 or X40 and multiply it by the power of the eyepiece lens, which is usually X10.

Total magnification =magnification of eyepiece lens x magnification of objective len.

Example.

Fill the table below with the correct magnification.

Objective lensmagnification.	Eyepiece lensmagnification	Total magnification.
X4	10	X40
X10	10	
	X10	

2.2 Movement of Material in and Out of the Cell.

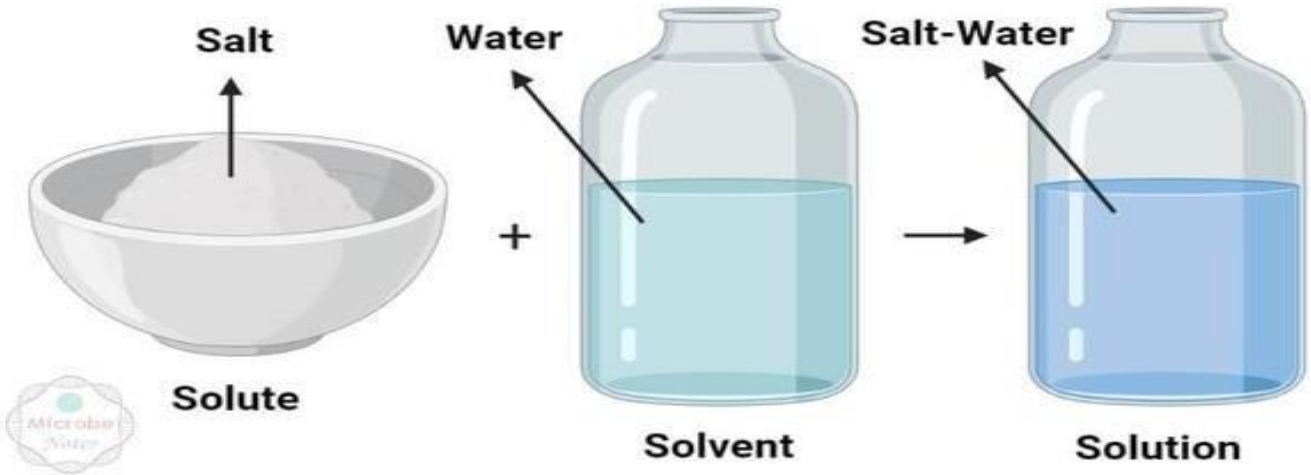
Diffusion and Osmosis.Meaning of Terms.

a.) Solutes and solvent.

When a solid is dissolved in a liquid, we get a solution formed.The solid that dissolves in this solution is called the **solute.**

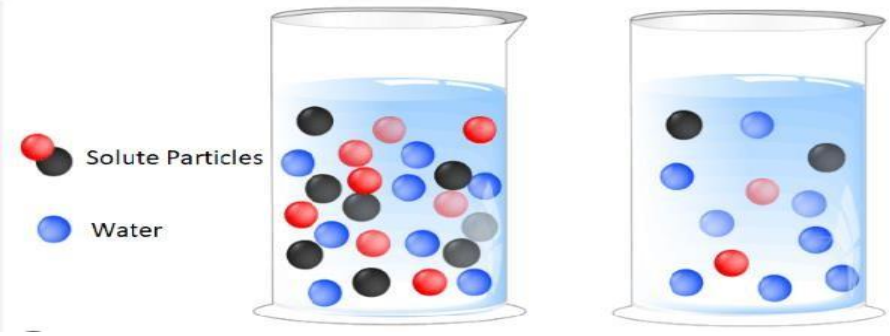
The liquid that dissolves the solid is known as the **solvent.For example,**

Sugar and salt are examples of substances (solutes) that are soluble in water (solvent)



b.) Concentration.

- When there are more solute molecules compared to solvent molecules, a solution is said to be concentrated.
- When there are more solvent molecules compared to solute molecules, then the solution is said to be **dilute**.



DIFFUSION.

An experiment to demonstrate diffusion in liquids.

Requirements:

- A beaker.
- Water.
- Dye or ink.
- A dropper.
- writing materials.

Procedure:

- pour some water in a beaker.
- Put a drop of the dye or ink in the water.
- What observations do you make after a few minutes?

Observation, explanation and conclusion.

- After a few minutes, the ink or dye spread throughout the water in the beaker.
- The ink pr dye spread from the region where it was highly concentrated to region in water where it was in low concentration.

Diffusion is ***defined as the movement of molecules from a region of high concentration to aregion of low concentration.***

Experiment demonstrating diffusion in gases.

Requirements:

☞A bottle of perfume of scented flowers.

Procedure:

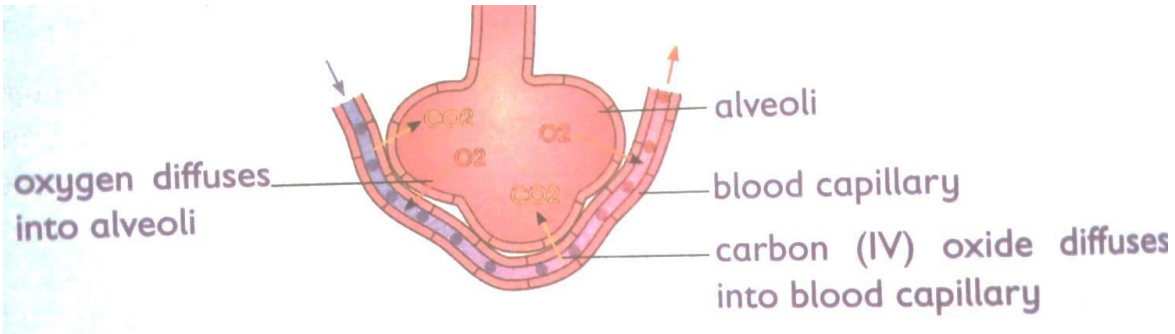
- Place the scented flower in a corner of the classroom.
- Remove the stopper of the perfume, hold it a few centimetres away from your friend's nose.

Observation, explanation and conclusion.

- After a few seconds, you and your classmates will be able to smell the scent of the flower orperfume. This is due to diffusion. The scent of the flower and perfume molecules diffuse theair to their nose.
- Molecules in the scent of flower or perfume moved from the region of high concentration and spread evenly towards the region of low concentration.
- Diffusion in gases also makes it possible for us to smell things, for example, flower, food being cooked and also foul smells.

Roles of diffusion in Living things.

- Plants absorb minerals salts from soil through diffusion.
- Nutrients such as glucose and amino acids move from the small intestines into bloodstreamof animals by diffusion.
- Cells and unicellular organisms such as amoeba get rid of waste substance through diffusion.
- Gaseous exchange is the process through which gases are transferred across cell membraneto either enter or leave the blood. This process is done by diffusion in human beings in the **alveoli** in lungs. Oxygen gas moves from alveoli where is it is highly concentrated to the blood capillaries where it is lowly concentrated.
- On the other hand, carbon (IV) oxide moves from the capillaries where it is highly concentrated into the alveoli where it is lowly concentrated to be exhaled out.



Factors that affect the rate of diffusion.

- **Concentration gradient**-molecules move from region of high concentration to that of low concentration. The greater the difference in concentration between high and low regions, thefaster the rate of diffusion.
- **Temperature**-high temperature increases energy and therefore faster movement of molecules. This increases the rate of diffusion.
- **Mass of particles**- heavy particles move slowly hence slower rate of diffusion. Light particles on the other hand move fast hence faster rate of diffusion.
- **Diffusion distance**- rate of diffusion depends on distance that particles have to travel in order to be evenly distributed within available space.
- **Medium of diffusion**- particles diffuse faster through gases than liquids.
- **Surface area to volume ration**- diffusion occurs faster in smaller organisms as compared tolarger organisms. This is because small organisms have a large surface area to volume ratio.

OSMOSIS.

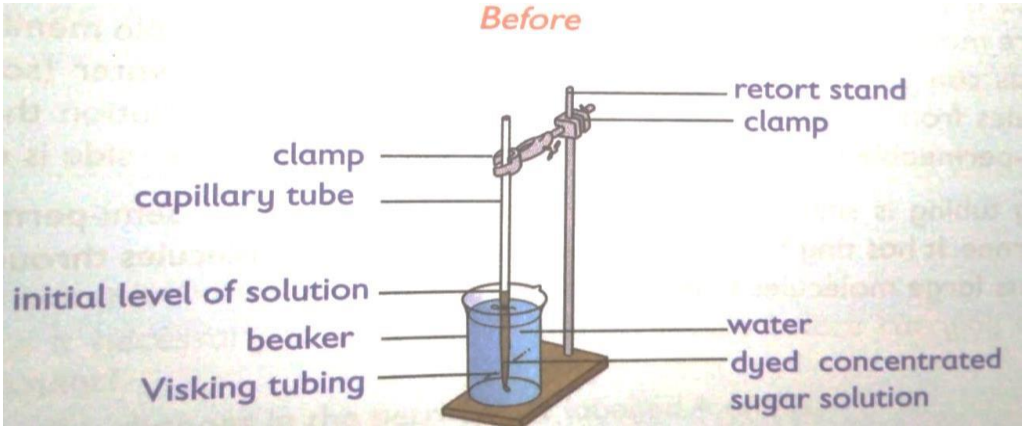
Experiment to demonstrate osmosis process.

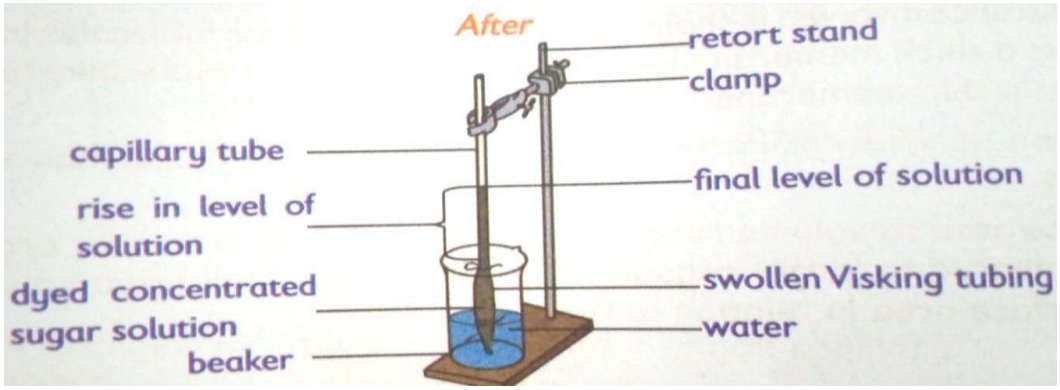
Requirements:

- Capillary tube.
- A thread.
- A clamp.
- Distilled water.
- Visking tubing.
- Dyed concentrated sugar solution.
- A measuring cylinder.
- Writing material

Procedures:

- Moisten a piece of visking tube and rubber between your fingers to open it.
- Tie one end of the visking tubing tightly with a thread.
- Put the dye concentrated sugar solution in the Visking tubing using a measuring cylinder.
- Insert one end of capillary tube to the open end of the visking tubing and tie that end.
- Slowly lower it into a beaker containing distilled water and hold the capillary tube with a clamp.
- Mark the level of dyed concentrated sugar solution in the capillary tube at the beginning of the experiment.
- Leave the experiment for about 20 minutes. Observe and record your results





Questions to answer.

What happens to the level of the dye concentrated sugar solution in the capillary tube after 20 minutes?

POLITE NOTE!

Take note that this is a Sample of the Well Organized Detailed Simplified Notes.

Call/Text/WhatsApp 0746 222 000 / 0742 999 000 for the Complete Notes.

FOR MORE EDUCATIONAL RESOURCES,

CONTACT MR ISABOKE

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