JSS1 First Term Chemistry Note

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JC best Schools International

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JSS1 FIRST TERM SCHEME OF WORK

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2	**INTRODUCTION TO CHEMISTRY**	-Adverse effects -Career prospects tied to chemistry
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7	**ELEMENTS, COMPOUNDS AND MIXTURES**	-Definition of elements -First twenty (20) elements and their symbols -Periodic table of the first twenty (20) elements
8	**ELEMENTS, COMPOUNDS AND MIXTURES**	-Definition of compounds -Examples and its component elements
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WEEK 1 AND 2: INTRODUCTION TO CHEMISTRY

Definition

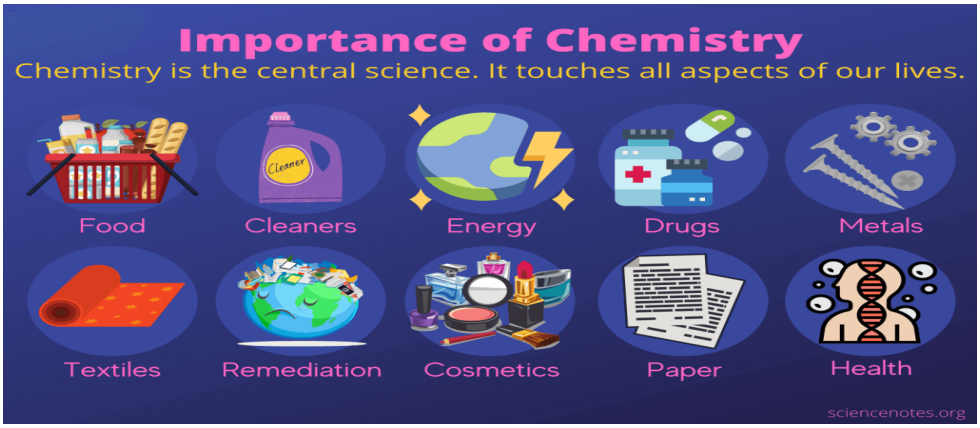
Chemistry can be defined as a branch of science that deals with the study of matter; properties, composition, uses and changes it undergoes.

Branches of Chemistry

The study of modern chemistry has many branches, but it can generally be broken down into five main disciplines, or areas of study:

1. physical chemistry
2. organic chemistry
3. inorganic chemistry
4. analytical chemistry
5. biochemistry

Uses of Chemistry



The basic needs of chemistry include but not limited to the following:

1. food
2. clothing
3. military
4. space science
5. housing
6. medicine
7. transportation

Assignment 1

Briefly explain five (5) main branches of chemistry

Adverse effects of chemistry

Chemical processes and products have also affected our life adversely in the following ways:

1. corrosion
2. pollution
3. drug abuse
4. poisoning
5. death

Careers in chemistry

1. Analytical Chemist
2. Chemical Engineer.
3. Chemistry Teacher.
4. Forensic Scientist.
5. Geochemist.
6. Hazardous Waste Chemist.
7. Materials Scientist.
8. Pharmacologist.
9. Astronaut
10. Medical doctor

Assignment 2

Briefly explain the adverse effects of chemistry

WEEK 3: MATTER

Definition

Matter is anything that has mass (weight) and occupies space.

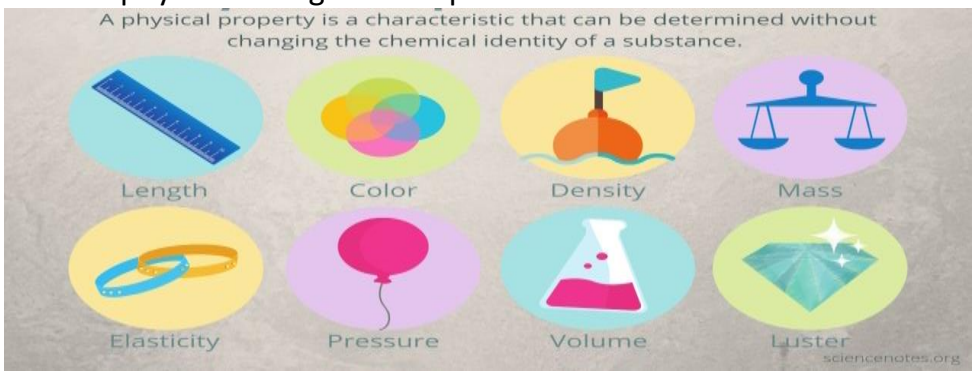
States of matter

Matter exists in three physical states which are:

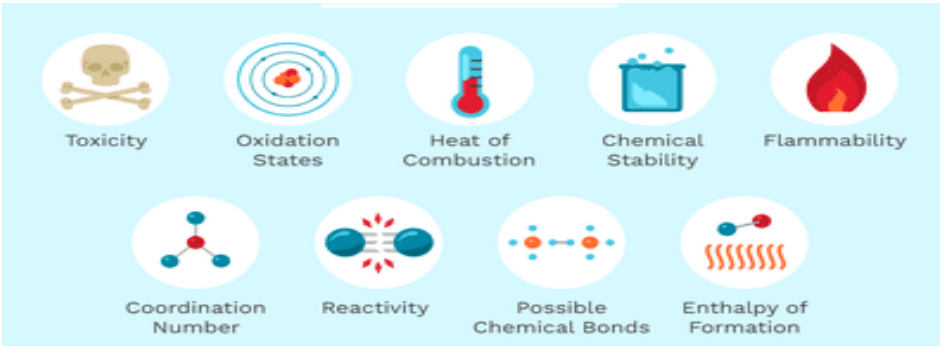
1. Gas; examples are hydrogen, oxygen, nitrogen, carbon dioxide, carbon monoxide, water vapour, helium, neon, argon, ozone, e.t.c.
2. Liquid; examples are water, blood, honey, wine, mercury, oil, acetone, alcohol, coffee, e.t.c
3. Solids; examples are brick, coin, iron bar, rock, banana, sand, glass, aluminium foil, ice, wood, e.t.c.

Properties of matter

1. **Physical properties**: these are observable and/or measurable properties of matter and are associated with physical changes. Examples include



2. **Chemical properties**: these are properties associated with chemical changes and are only evident during or after a chemical reaction. examples



Assignment 3

Mention at least five (5) examples each of physical and chemical properties of matter apart from the ones mentioned above.

WEEK 4: CHANGES MATTER UNDERGO

Matter undergoes changes. These changes may be temporary and easily reversible or they may be permanent and very difficult to reverse. The former is known as a physical change and the latter as a chemical change.

Physical changes

A physical change is a change which is easily reversed and produced no new substances. Examples include

1. Dissolution of salt in water
2. Dissolution of sugar in water
3. Crushing a can
4. Melting an ice cube
5. Boiling water
6. Mixing sand and water
7. Breaking a glass
8. Shredding paper
9. Chopping wood
10. Mixing water and oil
11. Sublimation of dry ice

Chemical changes

A chemical change is a change which is not easily reversed and in which new substances are formed. Examples include

1. Burning of substances like wood
2. Addition of water to calcium oxide (quicklime)
3. Burning of magnesium ribbon in Bunsen flame
4. The rusting of iron in moist air

5. Reaction of some metals with water to produce the corresponding alkalis and hydrogen gas
6. Reactions of metals and calcium trioxocarbonate (VI) with dilute acids
7. Iron in a solution of copper (II) tetraoxosulphate (VI)

Differences between physical and chemical changes

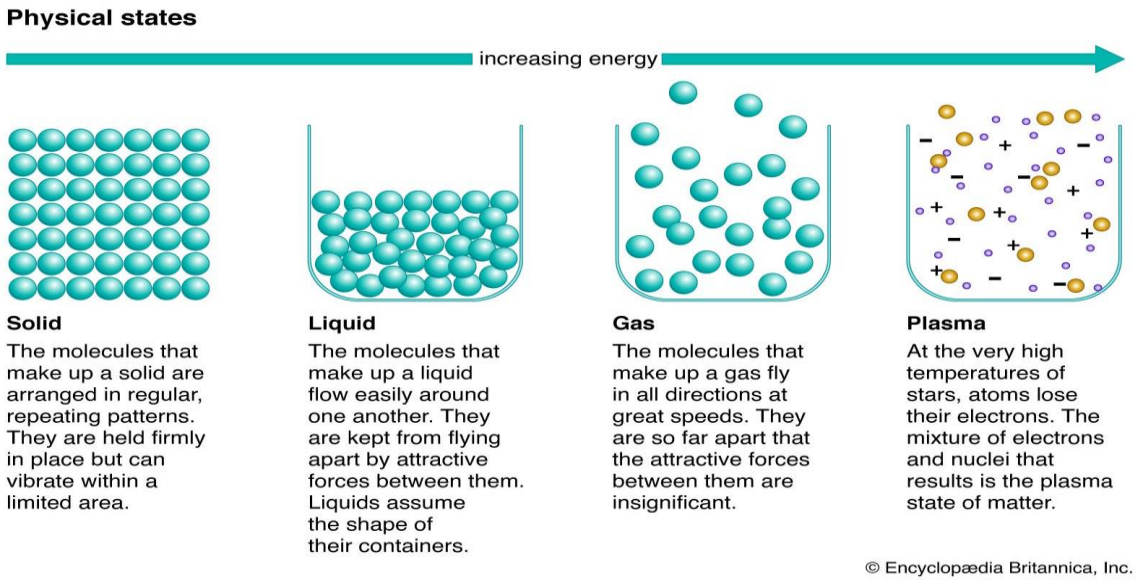
Physical change	Chemical change
1. It is easily reversible	It is not easily reversible
2. It produces no new substances	New substances are produced
3. There is no change in the mass of substances involved	There is change in the mass of substance involved
4. It does not involve any great heat changes except latent heat changes which occur during change of state	A considerable amount of heat change is involved

Assignment 4

Classify each of the following changes as either a physical or a chemical change

1. The melting of candle wax
2. The dissolution of common salt in water
3. The addition of water to quicklime
4. The hardening of cement by the adsorption of carbon (IV) oxide

WEEK 5: STATES OF MATTER



Solid state

Substances in the solid state are made up of particles which are very closely parked and are held firmly together by forces of cohesion. The cohesive forces may be electrovalent, covalent, metallic or the very weak Vander Waals forces.

Liquid state

The particles in a liquid are slightly further apart than those in a solid. It can move about because they have more kinetic energy than solid and are not held in fixed positions. Although the particles can slide about randomly, they are still under the influence of the cohesive forces and their movements are restricted.

Gaseous state

The particles in a gas are relatively far apart and have more kinetic energy than those in a liquid. The cohesive forces in a gas are negligible and the particles are free to move about in all directions at great speed.

Assignment 5

Compare the properties of the three states of matter

WEEK 6: CHANGES OF STATE

Change of state is brought about by a change in temperature (i.e. heating or cooling). When a substance is heated, its constituent particles acquire kinetic energy, when cooled, they become less energetic.

1. **Melting**
   Melting is the process by which a substance changes from the solid phase to the liquid phase when heat is applied. Hence, the temperature at which solid-liquid equilibrium is attained under air at one atmospheric pressure is called the melting point.

2. **Sublimation**
   Sublimation is a chemical process where a solid turns into a gas without going through a liquid stage. Examples of substances that sublime are
   i. Iodine
   ii. Camphor
   iii. Ammonium chloride
   iv. Benzoic acid
   v. Sulphur
   vi. Naphthalene
   vii. Dry ice

3. **Evaporation**
   Evaporation is the process of vapourization of liquids at all temperatures. That is, transition of an element or compound from its liquid state to its gaseous state below the temperature at which it boils.

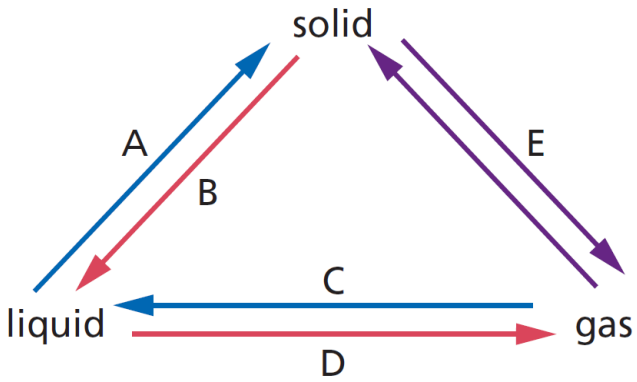
4. **Boiling**
   Boiling is the rapid vapourization of a liquid which occurs when a liquid is heated to its boiling point. Boiling point is the temperature at which the vapour pressure of the liquid is equal to the pressure exerted on the liquid by the surrounding atmosphere.

5. **Freezing**
   Freezing is a process through which a substance changes from a liquid to a solid.

6. **Condensation**
   Condensation is the process where a liquid vapour becomes liquid at a loss of some of its kinetic energy to a colder body.

Assignment 6

The following diagram shows the three states of matter and how they can be interchanged

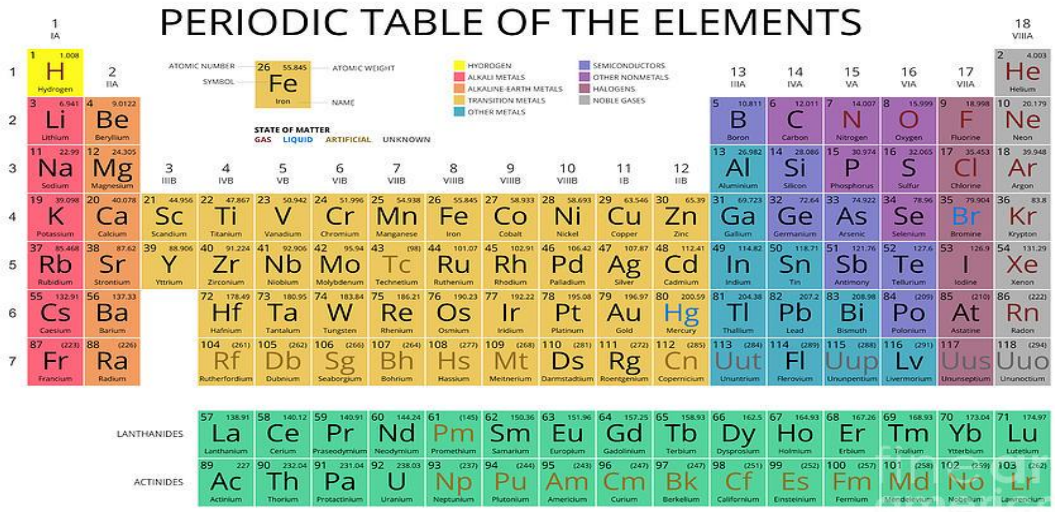


a. Name the changes **A** to **E**.
b. Name a substance which will undergo change **E**.
c. Name a substance which will undergo changes from solid to liquid to gas between 0 °C and 100 °C.
d. Describe what happens to the particles of the solid during change **E**.
e. Which of the changes **A** to **E** will involve:
   (i) An input of heat energy?
   (ii) An output of heat energy?

WEEK 7-9: ELEMENTS, COMPOUNDS AND MIXTURES

ELEMENTS

An element is a substance which cannot be split into simpler units by an ordinary chemical process. E.g. sodium, calcium, bromine, iodine etc



Elements are arranged according to their atomic number and are grouped into metals, metalloids and non-metals. The first twenty (20) elements are

Atomic number	Elements	Symbols
1	Hydrogen	H
2	Helium	He
3	Lithium	Li
4	Beryllium	Be
5	Boron	B
6	Carbon	C
7	Nitrogen	N

8	Oxygen	O
9	Fluorine	F
10	Neon	Ne
11	Sodium	Na
12	Magnesium	Mg
13	Aluminium	Al
14	Silicon	Si
15	Phosphorus	P
16	Sulphur	S
17	Chlorine	Cl
18	Argon	Ar
19	Potassium	K
20	Calcium	Ca

The symbols of elements are derived from the first letter of the element. Where the first alphabet has been adopted, a symbol consisting of the first letter printed in capital together with one other small letter from its name is used.

In some other cases, especially the metals, the Latin names of the elements are used as the source of the symbols in similar way.

Elements that derive symbols from their Latin names

Atomic number	Elements	Latin name	Symbol
11	Sodium	Natrium	Na
19	Potassium	Kalium	K
26	Iron	Ferrum	Fe
29	Copper	Cuprum	Cu
47	Silver	Argentum	Ag
50	Tin	Stannum	Sn
51	Antimony	Stibium	Sb
79	Gold	Aurum	Au
80	Mercury	Hydragyrum	Hg
82	Lead	Plumbum	Pb

Assignment 7

Draw the complete periodic table

Compounds

A compound is a substance that is made up of two or more elements chemically combined together

Some Common Compounds and Their Formulas

Compound	Formula	Elements
ammonia	NH_3	nitrogen, hydrogen
rust	Fe_2O_3	iron, oxygen
sucrose	$C_{12}H_{22}O_{11}$	carbon, hydrogen, oxygen
table salt	NaCl	sodium, chlorine
water	H_2O	hydrogen, oxygen

Assignment 8

Give five (5) examples of compounds and state its component elements.

Mixtures

A mixture is a substance made up of two or more constituents which can be separated by physical means. A mixture maybe heterogeneous or homogeneous

Examples of some mixtures and their constituents

Mixture	Constituents
Air	Oxygen, carbon (IV) oxide, nitrogen, rare gases, dust, moisture
Crude oil	Petrol, heavy oil, gas oil, kerosene, naptha, bitumen, etc
Urine	Urea, water, mineral salts
Palm wine	Water, sugar, alkanols, mineral salts, vitamins, yeast, proteins, fats
Sea water	Water, mineral salts, bacterial etc
Milk	Water, sugar, fat, proteins, mineral salts, vitamins
Brass	Copper and zinc

Differences between compounds and mixtures

Compound	Mixture
1. The composition of elements present in a compound is fixed.	The composition of elements present in a mixture is not fixed.
2 The properties of a compound are different from those of its elements.	It shows the properties of all its constituent elements.
3. Its constituents can be separated by chemical methods only.	Its constituents can be separated by physical methods.
4. A compound is always homogeneous in nature.	The mixtures can be homogeneous or heterogeneous.

Assignment 9

List five (5) examples of mixtures and its constituents apart from those mentioned in the note