

JSS1 First Term Chemistry Note



Compiled by Augustine AIKOYE

JC best Schools International

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JSS1 FIRST TERM SCHEME OF WORK

WEEK	TOPIC	CONTENTS
1	INTRODUCTION TO CHEMISTRY	-Definition -Branches -Uses
2	INTRODUCTION TO CHEMISTRY	-Adverse effects -Career prospects tied to chemistry
3	MATTER	-Definition -States -Properties
4	CHANGES MATTER UNDERGO	-Physical changes -Chemical changes -Differences between physical and chemical changes
5	STATES OF MATTER	-Characteristics of solid, liquid and gas
6	CHANGES OF STATE	-The processes involved in change of state of matter and its relation to kinetic energy
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
9	ELEMENTS, COMPOUNDS AND MIXTURES	-Definition of mixtures -Examples of mixtures and its constituents -Comparison with compounds
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WEEK 1 AND 2: INTRODUCTION TO CHEMISTRY

Definition

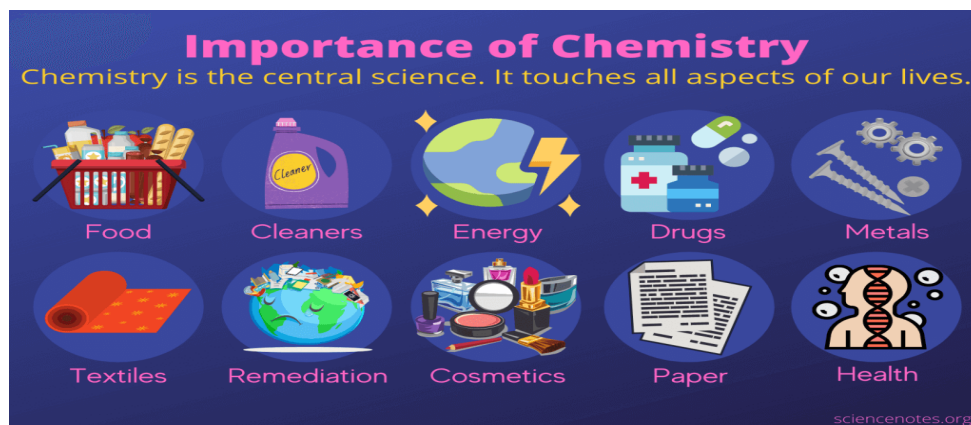
Chemistry can be defined as a branch of science that deals with the study of matter; properties, composition, uses and changes it undergoes.

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:

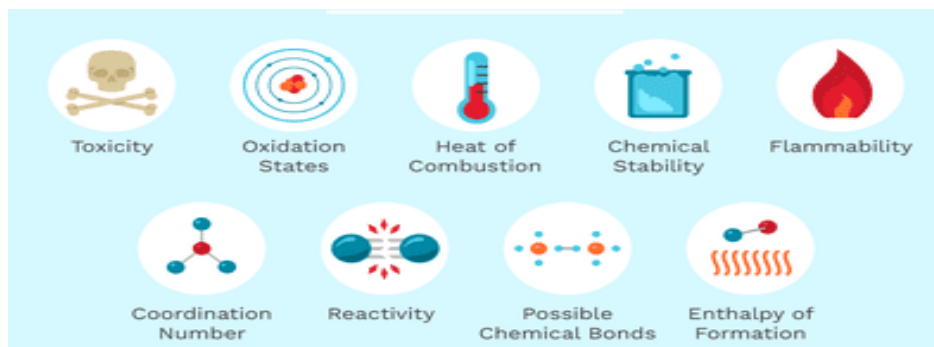
1. Gas; examples are hydrogen, oxygen, nitrogen, carbon dioxide, carbon monoxide, water vapour, helium, neon, argon, ozone, e.t.c.
2. Liquid; examples are water, blood, honey, wine, mercury, oil, acetone, alcohol, coffee, e.t.c
3. Solids; examples are brick, coin, iron bar, rock, banana, sand, glass,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

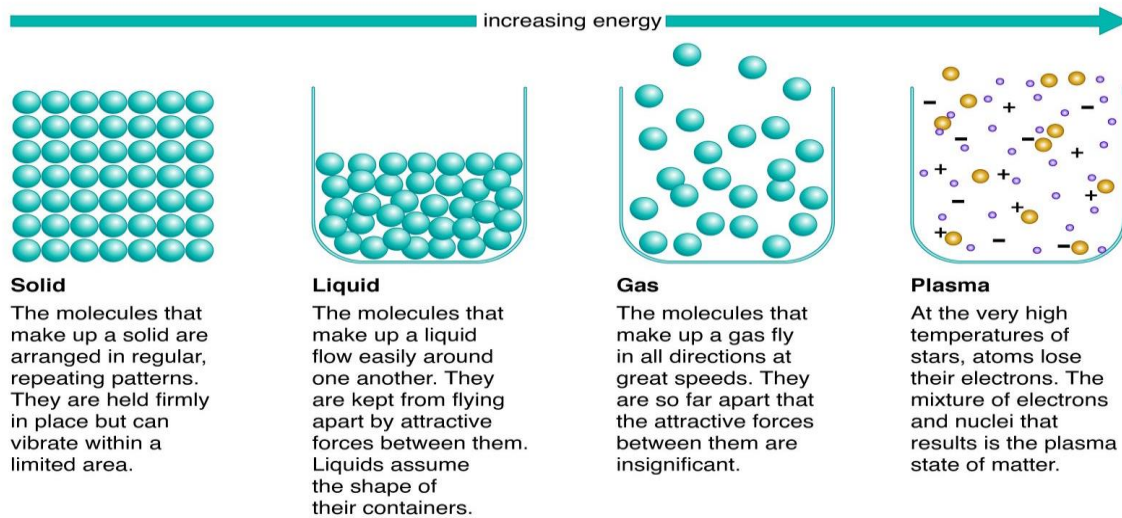
Assignment 4

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

Physical states



Solid state

Substances in the solid state are made up of particles which are very closely packed 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.

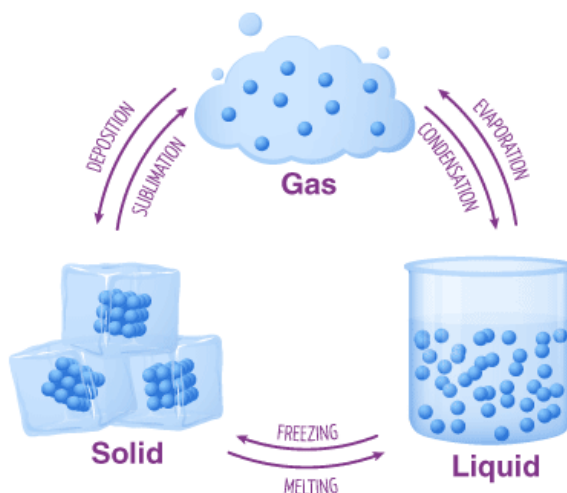
Gaseous state

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

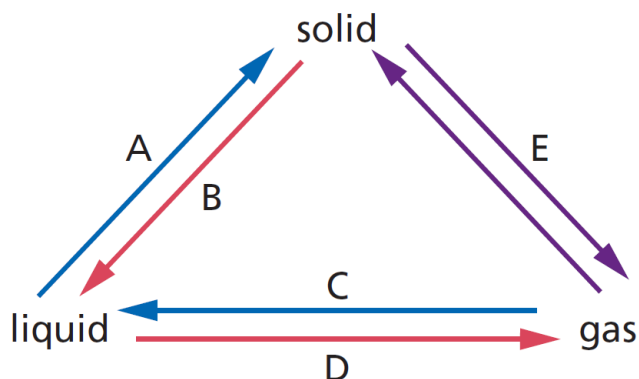
Freezing is a process through which a substance changes from a liquid to a solid.

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



- Name the changes **A** to **E**.
- Name a substance which will undergo change **E**.
- Name a substance which will undergo changes from solid to liquid to gas between 0 °C and 100 °C.
- Describe what happens to the particles of the solid during change **E**.
- Which of the changes **A** to **E** will involve:
 - An input of heat energy?
 - 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

PERIODIC TABLE OF THE ELEMENTS

1

IA

2

IIA

13

IIIA

14

IVA

15

VA

16

VIA

17

VIIA

18

VIIIA

1

H

1.008

Hydrogen

2

He

4.003

Helium

3

Li

6.941

Lithium

4

Be

9.0122

Beryllium

5

B

10.811

Boron

6

C

12.011

Carbon

7

N

14.007

Nitrogen

8

O

15.999

Oxygen

9

F

18.998

Fluorine

10

Ne

20.179

Neon

11

Na

22.99

Sodium

12

Mg

24.305

Magnesium

13

Al

26.982

Aluminum

14

Si

28.086

Silicon

15

P

30.974

Phosphorus

16

S

32.065

Sulfur

17

Cl

35.453

Chlorine

18

Ar

39.948

Argon

19

K

39.098

Potassium

20

Ca

40.078

Calcium

21

Sc

44.956

Scandium

22

Ti

47.867

Titanium

23

V

50.942

Vanadium

24

Cr

51.996

Chromium

25

Mn

54.938

Manganese

26

Fe

55.845

Iron

27

Co

58.933

Cobalt

28

Ni

58.693

Nickel

29

Cu

63.546

Copper

30

Zn

65.39

Zinc

31

Ga

69.723

Gallium

32

Ge

72.64

Germanium

33

As

74.922

Arsenic

34

Se

78.96

Selenium

35

Br

79.904

Bromine

36

Kr

83.8

Krypton

37

Rb

85.468

Rubidium

38

Sr

87.62

Strontium

39

Y

88.906

Yttrium

40

Zr

91.224

Zirconium

41

Nb

92.906

Niobium

42

Mo

95.94

Molybdenum

43

Tc

(98)

Technetium

44

Ru

101.07

Ruthenium

45

Rh

102.91

Rhodium

46

Pd

106.42

Palladium

47

Ag

107.87

Silver

48

Cd

112.41

Cadmium

49

In

114.82

Indium

50

Sn

118.71

Tin

51

Sb

121.76

Antimony

52

Te

127.6

Tellurium

53

I

126.9

Iodine

54

Xe

131.29

Xenon

55

Cs

132.91

Cesium

56

Ba

137.33

Barium

57

La

138.91

Lanthanum

58

Ce

140.12

Cerium

59

Pr

140.91

Praseodymium

60

Nd

144.24

Neodymium

61

Pm

(145)

Promethium

62

Sm

150.36

Samarium

63

Eu

151.96

Europium

64

Gd

157.25

Gadolinium

65

Tb

158.93

Terbium

66

Dy

162.5

Dysprosium

67

Ho

164.93

Holmium

68

Er

167.26

Erbium

69

Tm

168.93

Thulium

70

Yb

173.04

Ytterbium

71

Lu

174.97

Lutetium

72

Hf

178.49

Hafnium

73

Ta

180.95

Tantalum

74

W

183.84

Tungsten

75

Re

186.21

Rhenium

76

Os

190.23

Osmium

77

Ir

192.22

Iridium

78

Pt

195.08

Platinum

79

Au

196.97

Gold

80

Hg

200.59

Mercury

81

Tl

204.38

Thallium

82

Pb

207.2

Lead

83

Bi

208.98

Bismuth

84

Po

(209)

Polonium

85

At

(210)

Astatine

86

Rn

(222)

Radon

87

Fr

(223)

Francium

88

Ra

(226)

Radium

89

Ac

(227)

Actinium

90

Th

(232)

Thorium

91

Pa

(231)

Protactinium

92

U

(238)

Uranium

93

Np

(237)

Neptunium

94

Pu

(244)

Plutonium

95

Am

(243)

Americium

96

Cm

(247)

Curium

97

Bk

(247)

Berkelium

98

Cf

(251)

Californium

99

Es

(252)

Einsteinium

100

Fm

(257)

Fermium

101

Md

(258)

Mendelevium

102

No

(259)

Nobelium

103

Lr

(262)

Lawrencium

104

Rf

(261)

Rutherfordium

105

Db

(262)

Dubnium

106

Sg

(266)

Seaborgium

107

Bh

(264)

Bohrium

108

Hs

(277)

Hassium

109

Mt

(268)

Mitnerium

110

Ds

(271)

Darmstadtium

111

Rg

(272)

Roentgenium

112

Cn

(285)

Copernicium

113

Nh

(284)

Nihonium

114

Fl

(289)

Flerovium

115

Uup

(288)

Ununpentium

116

Lv

(293)

Livermorium

117

Uus

(294)

Ununseptium

118

Uuo

(294)

Ununoctium

LANTHANIDES

57

La

58

Ce

59

Pr

60

Nd

61

Pm

62

Sm

63

Eu

64

Gd

65

Tb

66

Dy

67

Ho

68

Er

69

Tm

70

Yb

71

Lu

ACTINIDES

89

Ac

90

Th

91

Pa

92

U

93

Np

94

Pu

95

Am

96

Cm

97

Bk

98

Cf

99

Es

100

Fm

101

Md

102

No

103

Lr

ATOMIC NUMBER

26

55.845

ATOMIC WEIGHT

Fe

Iron

NAME

HYDROGEN

ALKALI METALS

ALKALINE EARTH METALS

TRANSITION METALS

OTHER METALS

SEMICONDUCTORS

OTHER NONMETALS

HALOGENS

NOBLE GASES

STATE OF MATTER

GAS

LIQUID

ARTIFICIAL

UNKNOWN

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	$\text{C}_{12}\text{H}_{22}\text{O}_{11}$	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 may be heterogeneous or homogeneous

Homogeneous Mixture: It is the mixture, in which the components are uniformly distributed throughout its volume and cannot be seen separately.



Tea Fruit Juice Medicine Honey Milk Blood

Heterogeneous Mixture: It is the mixture, in which the components are not uniformly distributed throughout its volume and can be easily seen separately.



Ice in Water Soupy Noodles Assorted Candies Assorted Dry Fruits Soil Oil in Water

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, naphtha, 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