

NAME OF TEACHER: MRS. FEMI-ADESORO

CLASS: SS ONE

THIRD TERM E-LEARNING NOTES

SUBJECT : CHEMISTRY

SCHEME OF WORK

TOPIC WEEK

1. Revision of last term's work
2. Acids, Bases and Salts: Definition and Characteristics of Acids, Preparation of Acids, Reactions of Acids, Uses of Acids
3. **Acids, Bases and Salts:** Definition, Characteristics and Preparation of bases Reactions and Uses of bases, Relative acidity and alkalinity (the pH scale)
4. **Acids Bases and Salts:** definition and characteristics of salts, preparation of salts and, types of salts, uses and hydrolysis of salt in water
5. **Water:** source of water, types of water (soft and hard), water pollutants, uses of water and laboratory preparation of water
6. **Carbon and Its Compounds:** Carbon, allotropes and their structures, properties, difference between diamond and graphite, chemical properties of carbon, coal and types of coal
7. **Mid –Term Break and Holiday Assignment**
8. **Carbon and its Compounds:** carbon(IV) oxide, CO_2 , preparations, properties and uses, carbon(II) oxide, CO, preparations, properties and uses. Synthetic gases, metallic trioxocarbonates; occurrences, preparation and uses, test for carbon ion

9. Carbon and its Compounds: hydrocarbon and its main classes, crude oil and natural gas-fractional distillation of crude oil and

uses of petroleum fractions, cracking of petroleum fractions, reforming, octane number and knocking, importance of crude oil

and petrochemicals

10. Revision

11. Examination.

REFERENCE TEXTS:

1 .Comprehensive Certificate Chemistry for Senior Secondary Schools by G N C Ohia et al

2. New School Chemistry for Senior Secondary Schools by Osei Yaw Ababio

3. Chemistry for Senior Secondary Schools 1 by Magbagbeola O, et al; Melrose Books and Publishers

4. Revised edition understanding chemistry for schools and colleges by Godwin O. Ojokuku.

WEEK 1

1. Revision of last term's work

WEEK 2

TOPIC: ACIDS, BASES AND SALTS

CONTENTS:

ACIDS

1. DEFINITION AND CHARACTERISTICS OF ACIDS
2. PREPARATION OF ACIDS
3. REACTIONS OF ACIDS
4. USES OF ACIDS

PERIOD 1: DEFINITION AND CHARACTERISTICS OF ACID

Acids are associated with the sour taste we feel when we take fruits such as lemon, lime and oranges especially when they are not ripe. Palm wine left open in the air becomes sour because of the formation of an acid.

- (i) **Definition of acid:** An acid is a substance which produces hydrogen ions (or protons) as the only positive ion when dissolved in water. For example, hydrochloric acid (HCl) dissolves in water to form hydrogen ion (H^+) and hydroxyl ion (OH^-). This process is known as ionization. There are two main classes of acids: ***Organic acids and mineral or inorganic acids***. The former occur as natural products in plants or animal materials while the later can be prepared from mineral elements or inorganic matter. Acids can also be grouped into ***Strong acids (ionizes completely) and Weak acids (ionizes partially)***.

Some organic and Inorganic acids

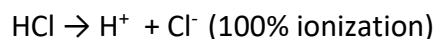
Organic acids	Source	Inorganic acids	Constituents
Ethanoic acids	Vinegar	Hydrochloric acid	Hydrogen, Chlorine
Citric acids	Lime, Lemon	Tetraoxosulphate (vi) acid	Hydrogen ,Chlorine, Sulphur, Oxygen
Fatty acids	Fats and Oil	Trioxonitrate (v) acid	Hydrogen, Nitrogen, Oxygen

STRENGTH OF AN ACID

Strength of an acid is defined as the degree or the extent to which an acid ionizes in water.

Based on this fact, acids can be weak or strong.

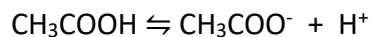
Strong acids are those that ionize completely in water. Examples of strong acids are H_2SO_4 , HCl , HNO_3 , HBr , HI etc. For example HCl ionizes completely according to the equation below:



Strong acids are also strong electrolytes i.e. they have high electrical conductivity.

Weak acids are those that ionize partially in water. Examples are organic acids, such as (Ethanoic acids, Citric acids, amino acids) and some inorganic acids such as

HNO_2 , H_2CO_3 , H_3PO_4 , HF etc. For example ethanoic acid, CH_3COOH , ionizes partially in water according to the equation below:



Weak acids are also weak electrolyte because they are poor conductor of electricity.

BASICITY OF AN ACID

All acids in an aqueous solution yield hydrogen ions which can be replaced by metallic ion.

The **basicity** of an acid is the number of replaceable hydrogen ions, H^+ , in one molecule of the acid.

ACIDS	BASICITY
HCl	1
H ₂ SO ₄	2
H ₃ PO ₄	3
H ₂ CO ₃	2
CH ₃ COOH	1

Characteristics of acids (Physical Properties)

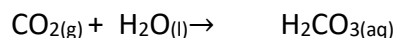
1. Acids turn blue litmus paper red.
2. They have sour taste; e.g. sour taste of unripe fruits.
3. Strong acids are corrosive in concentrated form; e.g. HCl, H₂SO₄

EVALUATION

1. Define an acid and give two examples each of organic acid and inorganic acid
2. Differentiate between a strong acid and a weak acid. Give two examples of each.
3. (a) What is basicity of an acid? (b). Mention four physical properties of an acid.
4. Compare and contrast the electrical conductivity of HCl and CH₃COOH

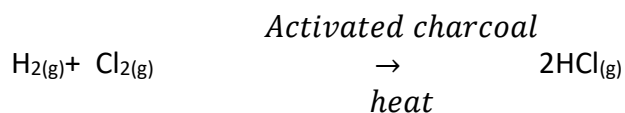
PERIOD 2: PREPARATION OF ACIDS

1. Dissolving non-metallic oxide (acid anhydride) in water.
 - Carbon (iv) oxide dissolves in water to form weak acid, trioxocarbonate (iv) acid.

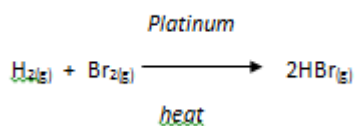


2. Direct combination of constituent elements.

- Hydrogen reacts directly with Halogens in the presence of catalyst to form halogen acids gas which dissolves readily in water to form acid.



3. Heating Hydrogen gas and bromine vapour, in the presence of platinum as the catalyst, produces hydrogen bromide gas, which dissolves readily in water to form hydrobromic acid.



4. Displacement of weak or volatile acid from its salt by a strong acid.

- Concentrated H_2SO_4 is stronger but less volatile than HCl and, H_2SO_4 can therefore be used to displace the weaker HCl acid from its salt (NaCl).



The hydrogen chloride gas formed dissolved in water readily to produce hydrogen chloride acid.

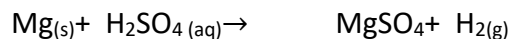
EVALUATION

Mention the methods of preparing acids

PERIOD 3: REACTION OF ACIDS (CHEMICAL PROPERTIES)

1. Reaction of acid with metals

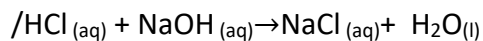
Acid react with some metals to liberate hydrogen gas.



NOTE: Dilute HNO_3 does not react with metals to produce hydrogen gas.

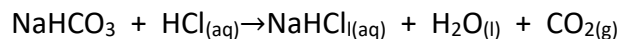
2. Reaction of acids with Base and Alkalis

Dilute acids react with bases and alkalis to form salts and water (known as **neutralization reaction**)



3. Reaction of acids with Trioxocarbonate (iv) and hydrogen trioxocarbonate (iv).

- Acid reacts with CO_3^{2-} or HCO_3^- to liberate carbon (iv) oxide (CO_2).



EVALUATION

- What is neutralization?
- State three chemical properties of acids

PERIOD 4: USES OF ACIDS

<i>Name</i>	<i>Uses</i>
Hydrochloric acid	<ul style="list-style-type: none">• in industries to make chemicals• to remove rust
Tetraoxosulphate (vi) acid	<ul style="list-style-type: none">• to make chemicals• as drying and dehydrating agent• as electrolyte in lead-acid accumulators
trrionitrate (v) acid	<ul style="list-style-type: none">• for making fertilizers, explosives, etc.
Acetic acid (ethanoic)	<ul style="list-style-type: none">• In preserving food• In dyeing silk and other textiles.
Tartaric	<ul style="list-style-type: none">• In making baking soda, soft drinks and health salt
Citric acid	<ul style="list-style-type: none">• In making fruit juice
Fatty acids (e.g. palmitic and stearic acids)	<ul style="list-style-type: none">• In manufacturing soap. (A process known as <i>Saponification</i>)