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SECOND TERM E-LEARNING NOTE

SUBJECT: CHEMISTRY **CLASS: SS2**

SCHEME OF WORK

WEEK	**TOPIC**
1.	Rates of Chemical Reaction • Meaning of Rate of Chemical Reaction. • Rate Curve. • The Collision Theory. • Factors Affecting Rate of Chemical Reactions.
2.	Exothermic and Endothermic Reactions • Heat Content (Enthalpy) of a Substance. • Thermodynamics: First and Second Laws. • Entropy and Free Energy.
3.	Chemical Equilibrium • Reversible Reactions • Le Chatelier's Principle. • Factors Affecting Chemical Equilibrium. • Equilibrium Constant.
4.	Oxygen and its Compounds • General Properties of Oxygen Family. • Electronic Structure and Bonding in Oxygen. • Preparation, Properties and Uses of Oxygen. • Oxides: Classification.
5.	Chlorine and other Halogens • Electronic Configuration of Halogens • Physical and Chemical Properties of Halogens. • Laboratory and Industrial Preparation of Chlorine. • Compound of Chlorine: Hydrogen Chloride. • Test for Chlorides.
6.	Nitrogen • General Properties of Nitrogen Family. • Laboratory Preparation and Industrial Preparation of Nitrogen. • Properties and Uses of Nitrogen. • Nitrogen Cycle.
7.	Compounds of Nitrogen • Oxides of Nitrogen • Ammonia: Preparation, Properties and Uses. • Trioxonitrate (V) acid: Preparation, Properties and Uses.
8.	Sulphur • General Properties of Sulphur Group. • Electronic Structure of Members of Sulphur Group. • Allotropes of Sulphur. • Uses of Sulphur.
9.	Compounds of Sulphur

- H_2S, SO_2 and SO_3: Preparation, Properties and Uses
- Tetraoxosulphate (VI) acid: Industrial Preparation (Contact Process).

10. Revision

REFERENCES

- New School Chemistry for Senior Secondary School by O.Y.Ababio (6^{th} edition)
- Calculations on Chemistry by E.U. Akusoba and G.O. Ewelukwa
- WASSCE past Questions and Answers on Chemistry
- UTME past Questions and Answers on Chemistry

WEEK ONE **DATE: _____**

TOPIC: **RATE OF REACTION**

CONTENT

- Meaning of Rate of Chemical Reaction.
- Rate Curve.
- The Collision Theory.
- Factors Affecting Rate of Chemical Reactions

MEANING OF RATE OF REACTION

The rate of a chemical reaction is the number of moles of reactants converted or products formed per unit time.

Usually, rate of reaction is determined experimentally by measuring change in concentration of one of the components in the reaction with time.

Thus,

$$\text{Rate of reaction} = \frac{\text{change in concentration of reactant or product (mol/dm}^3\text{)}}{\text{Time taken for the change (seconds)}}$$

The unit of the rate of reaction is $mol/dm^{-3}s^{-1}$ or $g\ dm^{-3}s^{-1}$.

Rate of reaction can also be expressed as:

$$\text{Rate of reaction} = \frac{\text{change in number of mole or mass of reactant or product}}{\text{Time taken for the change}}$$

Then the unit of rate is $mols^{-1}$ or gs^{-1}

EXAMPLE: When 0.5g of calcium trioxocarbonate (IV) was added to excess dilute hydrochloric acid, carbon (IV) oxide was evolved. The complete reaction took 5 minutes. What was the rate of reaction?

SOLUTION:

$$\text{Rate of reaction} = \frac{\text{change in mass of reactant}}{\text{Time taken for the change}}$$

$$= \frac{(0.5 - 0)g}{5x60} = \frac{0.5}{300}$$

$$= 1.67 \times 10^{-3}\ gs^{-1}$$

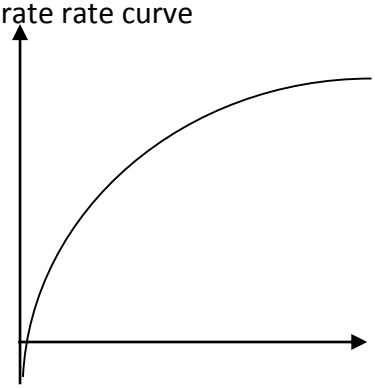
WAYS OF MEASURING REACTION RATE

Concentration is one of the properties of a reaction that can change with time.
The following properties can also change with time and can thus be used to measure rate of reaction.

1. Decrease in mass of reaction system
2. Volume of gaseous product
3. Amount of precipitate formed
4. Change in colour intensity
5. Change in pH
6. Change in total gas pressure

RATE CURVE

The rate curve is a graphical illustration of the rate of a reaction.
The following graph illustrate rate curve



FEATURES OF RATE CURVE

1. It passes through the origin. This is because there is no change in concentration or mass at the start of reaction.
2. It steeps at first, this because the rate is fast at the beginning.
3. It becomes less steep later. This is because the rate slows down.
4. It finally becomes horizontally. This is because the reaction has reached the end points.

The following can be determined from the rate curve

1. Average rate of reaction

$$\text{Average rate} = \frac{\text{total number of mole / mass involved}}{\text{Time taken}}$$

2. Rate at a particular instant during the reaction

Rate at instant = Gradient at a point on the curve

When the rate of reaction has direct variation with concentration, then

$$\text{Rate of reaction} \ \alpha [\text{Concentration of A}]$$

$$R \ \alpha \ [A]$$

$$R = k[A]$$

Where k is called Rate constant

EVALUATION

1. What is rate of reaction?
2. State two ways of measuring reaction rate

COLLISION THEORY

The collision theory states that for a chemical reaction to…