**EMERALD ROYAL INTERNATIONAL SCHOOL, MPAPE ABUJA**

**LESSON PLAN AND NOTE FOR WEEK 1 ENDING 15TH SEPTEMBER, 2023**

**TERM: FIRST**

**WEEK : 1**

**DATE: 11TH - 15TH SEPTEMBER, 2023**

**SUBJECT : CHEMISTRY**

**TOPIC : ALKANOL**

**SUB- TOPIC : 1. industrial production of alkanol by fermentation.**

1. **Estherification.**
2. **Uses of alkanol**

**PERIOD: 1ST**

**TIME : 8: 10 - 8 :50**

**DURATION: 40 minutes**

**CLASS: SS2**

**NUMBER IN CLASS:**  3

**AVERAGE AGE: 15 years**

**SEX: mixed**

**LEARNING OBJECTIVES: By the end of the lesson, the students should be able to;**

1. Explain the industrial preparation of alkanol.
2. Explain estherification.
3. State the uses of alkanol.

**RATIONALE:** The students should understand the industrial preparation of alkanol.

**PREVIOUS KNOWLEGDE:** The student can state the members of the alkanol series.

**INSTRUCTIONAL MATERIALS:** A chart showing the industrial preparation of alkanol and its uses.

**REFERENCE MATERIALS:** New school Chemistry for Senior Secondary Schools by Osei Yaw Ababio .

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| **STAGES/STEPS** | **TEACHER’S ACTIVITIES** | **STUDENTS’ ACTIVITIES** | **LEARNING POINTS** |
| **INTRODUCTION** | The teacher introduces the lesson by reviewing the previous lesson. | The students were active. | To arouse the students interest. |
| **PRESENTATION**  **STEP 1** | The teacher explains the industrial preparation of ethanol. | The students pay attention. | To keep them focus for better understanding. |
| **STEP 2** | The teacher asks the students to define estherification. | The students defines estherification. | To encourage critical thinking. |
| **STEP 3** | The teacher explains the uses of ethanol. | The students pay attention. | To keep them focus for better understanding. |
| **BOARD SUMMARY** | **INDUSTRIAL PREPARATION OF ETHANOL**   1. **Industrial production of alkanol by Fermentation** is the slow decomposition of large organic   molecules such as starch by microorganism into smaller  molecules such as carbon iv oxide and ethanol.  The raw materials for preparing ethanol are starch  from cereal grains (rice, maize, guinea corn, millet, and barley),  potatoes or cassava.  i. The starch (raw material) is extracted from starchy foodstuff  such as cassava by crushing and pressure cooking.  ii.The starch extract is treated with malt at 50-600C for an  hour. The diastase present in malt converts the starch into  maltose.  2(C6H10O5)n + H2O maltase→ nC12H22O11  Starch Maltose  iii. Yeast is then added. Yeast contains two enzymes maltase  and zymase. The maltase converts the  C12H22 O11 + H2 O → 2C6H12O6  iv. The zymase converts the glucose to ethanol and carbon iv  oxide C6H12O6 zymase→  2C2H5OH + 2CO2 Glucose Ethanol  v. The ethanol obtained is only about 18% concentrated; it is  further purification and concentration by fractional distillation  to obtain 95% ethanol.  **Physical properties of Alkanol**  1. It is a colourless, volatile liquid with a characteristic taste  and smell  2. It is readily soluble in water  3. It has a boiling point of 780C  4. It has no action on litmus paper  **NOTE**  Due to the presence of hydrogen bond in the alkanol, they show  higher boiling points than it would have been if there were no  hydrogen bonds. For example, n-pentane, C5H12 (MM = 72g;  B.pt= 360C ) and butan-1-ol, C4H9OH (MM = 74g ; B.pt=  1180C). Although the molar masses of n- pentane and that of  butan-1-ol are very close yet their boiling point are far apart,  why? This is due to the hydrogen bond in butan-1-ol which is not  represent in n-pentane. Hydrogen bond requires extra energy to  break; hence the higher boiling point in butan  -1-ol.  **chemical properties of Alkanol**  i. Ethanol burns in oxygen, giving carbon iv oxide and  water  C2 H5OH + 3O2 → 2CO2 + 3H2O.  ii. Ethanol reacts with sodium, liberating hydrogen, and  sodium ethoxide formed alongside.  2C2 H5 OH + Na →2C2 H5ONa + H2.  (ii) Ethanol reacts with alkanol acids in the presence of  mineral acids to form alkanoate also called esters (sweet  smelling organic compounds). This reaction is called  esterification. **Esterification** is a process whereby alkanol  reacts reversibly with alkanoic acid to form an alkanoate  (ester) and water.  CH3COOH + C2H5OH H+ ↔ CH3COOC2H5 + H2O  (iii) Oxidation of alkanols with acidified MnO4 or K2Cr2O7.  Primary alkanols are oxidized to alkanals; further oxidation  of alkanals yields alkanoic acid) and secondary alkanols are  oxidized to alkanones while tertiary alkanols cannot be  oxidized because all the hydrogens attached to the carbon  carrying the functional group have been completely  substituted.  (a) CH3 CH2 OH from KMnO4[O]→ CH3CHO + H2O  (b) CH3 CHO from KMnO4[O]→ CH3COOH  Secondary alkanols are oxidized to alkanones56  (iv) With prosperous (v) chloride, HCI is given off:  ROH + PCI5 → RCI + POCI3 + HCI  **Uses of Ethanol**   1. Ethanol is a useful solvent for the production of perfume, vanishes, soaps, paints, dyes, drugs and flavouring extracts. 2. It is a starting material used in the manufacture of many important compounds example ethanal, ethanoic acid, ethyl ester and ethoxyethane. 3. It is used as antiseptic in; 4. Surgical spirit for hardening skin and in the treatment of pimples. 5. Sterilization such as cleaning skin before injection. 6. Preservation of biological specimen and food. 7. It is used as an anti freeze in auto mobile radiators because it has low freezing point of -117 degree. 8. It is used in ship compasses, spirit levels and in thermometers designed to measure low temperature. 9. It is used as a fuel either by itself or mixed with petrol in making cars and rockets. | The students ask question for clarification. | To create room for slow learners. |
| **EVALUATION** | The teacher evaluates the students with the following questions;   1. List the 2 ways of preparing alkanol industrially and explain any one. 2. List at least 4 chemical properties of ethanol and explain any 2. 3. List at least 5 uses of ethanol. | The students attempt the questions. | To ascertain their level of understanding. |
| **CONCLUSION** | The teacher concludes by copying note on the board. | The students copy the note into their note books. | For future use. |
| **HOME WORK** | 1. Explain the preparation of ethanol from ethene.   2. Explain 4 materials used in ethanol production. | The students did their assignment and submit for marking and correction. | To encourage the students to study at home. |

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**15th September, 2023**

**DEPUTY HEAD INSTRUCTOR ADMIN**

**NB: Approved!**