



O Grace

Department of Chemistry
OBAFEMI AWOLowo UNIVERSITY, ILE-IFE
Part III B.Sc. Chemistry Degree Examination
RAIN SEMESTER EXAMINATION, 2022/2023 SESSION

CHM 312 – Experimental Organic Chemistry

TIME ALLOWED: 1 Hr 15 mins

INSTRUCTION: Answer all questions

1 (a.) Cyclohexanone reacts with 2,4-dinitrophenylhydrazine under moderate acidic condition to give a precipitate.

- (i) Write the structure of the solid product
- (ii) Why is moderate acidic condition necessary for the reaction?
- (iii) *Mention a simple laboratory procedure that can be used to purify the product*

(b.) (i) What is Jone's reagent?

- (ii) If 0.05 mole of cyclohexanol is completely oxidised by 17 mL of Jone's reagent, what volume of the reagent would be required for complete oxidation of 15 cm³ the alcohol? (Molar mass and specific gravity of cyclohexanone are 100 and 0.947 respectively)

2. The reaction between 2-hydroxybenzoic acid and ethanoic anhydride gives predominantly 2-acetylbenzoic acid in the presence of concentrated sulphuric acid

- (i) Write the structures of all the possible acetylated products
- (ii) Which of the products mentioned in (i) above is most likely to be formed and why?
- (iii) Mention a simple laboratory test for the presence of the following functional groups (a) phenolic (b) carboxylic
- (iv) Mention two properties to consider in choosing a solvent for recrystallization of the product

3. In Claisen-Schmidt condensation reaction, benzaldehyde reacts with its half molar equivalent of acetone in the presence of a base.

- (i) Write the structure of the product
- (ii) Deduce the structure of product, if any, when acetone is replaced in the reaction above with the following compounds
(a) cyclobutene (b) cyclobutanone and (c) cyclobutanol
- (iii) Write the structure of the product formed if equal moles of benzaldehyde and acetone were used in the reaction

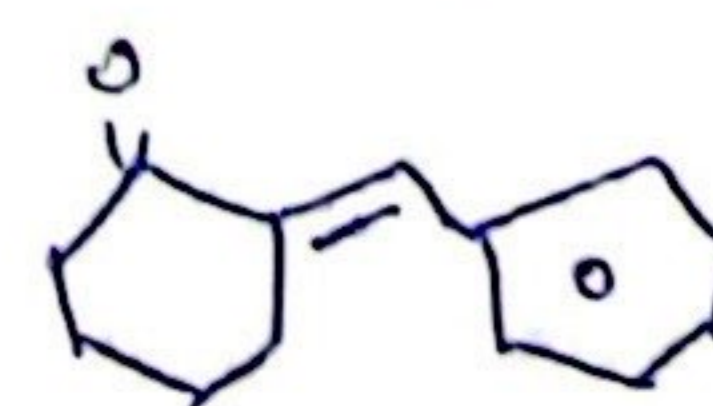
$$\begin{aligned} 17 \text{ mL} &= 17 \times 10^{-3} \text{ L} \\ 1 \text{ dm}^3 &= 1 \text{ L} \\ \frac{1 \text{ dm}^3}{1 \text{ L}} &\times \frac{(10^{-2})^3 \text{ cm}^3}{1 \text{ dm}^3} + \frac{10^{-3} \text{ dm}^3}{1 \text{ m}^3} \\ &= \frac{10^{-6} \text{ cm}^3}{1 \text{ L}} + \frac{10^{-3} \text{ dm}^3}{1 \text{ m}^3} \\ 5.28 \text{ cm}^3 &= 17 \text{ mL} \\ &\times = 19 \text{ cm}^3 \end{aligned}$$

$$d = \frac{m}{\text{vol}}$$

$$\begin{aligned} 1 \text{ L} &= 1 \text{ mL} \\ \frac{1 \text{ dm}^3}{10^{-3}} &= \frac{\text{cm}^3}{10^{-6}} \end{aligned}$$

$$\begin{aligned} 1 \text{ m}^3 &= (10^2)^3 \\ &= 10^6 \text{ cm}^3 \\ \text{mL} \rightarrow \text{L} &= 10^{-3} \end{aligned}$$

$$n = \frac{M}{m}$$



2-benzylidene-cyclohexanone