

B. SC. CHEMISTRY EXAMINATION, 2023

(4th Semester)

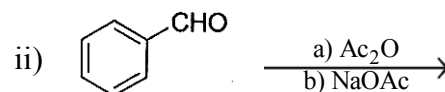
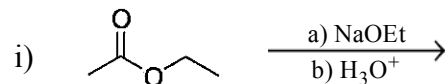
CHEMISTRY (GE)**PAPER: GE/CHEM/TH/04**

Time : Two Hours

Full Marks : 40

Use a separate answer script for each unit.**UNIT : 404G1-P**

- c) Which one between acetic acid and 2-fluoroacetic acid should be more acidic? Explain in brief. 1
- d) Write the structure of the product(s) formed in the following reactions. (*any one*). 1



5. a) Compare between thermal and photochemical reactions. 2
- b) Find out the value of quantum yield in case of the decomposition of hydrogen iodide. 2
6. a) State Einstein's law of photochemical equivalence. 1
- b) How does the intensity of fluorescence vary with temperature? 2
- c) Distinguish between fluorescence and phosphorescence. 2
7. Define: chemiluminescence. 1

1. a) The rate of homogeneous gaseous reaction $2\text{NO}(\text{g}) + \text{Cl}_2(\text{g}) \rightarrow 2\text{NOCl}(\text{g})$, is doubled when the chlorine concentration is doubled but increases by factor of eight when the concentrations of both reactants are doubled. Determine the overall reaction order and order with respect to NO and Cl_2 . Finally, express rate of the reaction and give the unit of rate constant. 3+1
- b) How can you determine order of a reaction using its half life periods ($t_{1/2}$) with different initial concentrations of the reactant? Half life period ($t_{1/2}$) of a reaction is doubled when the initial concentration of the reactant is doubled. Calculate the order of the reaction. 2+2
- c) i) What do you mean by molecularity of a reaction? Give an example of a bimolecular reaction.

[Turn over

[2]

- ii) Plot logarithm of concentration of reactant vs. time for a first order reaction at constant temperature. 2+2

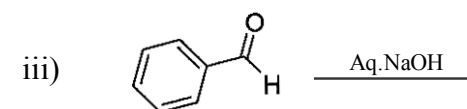
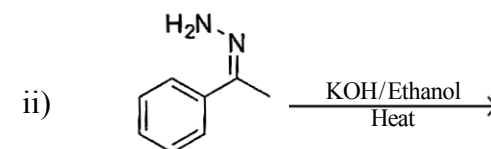
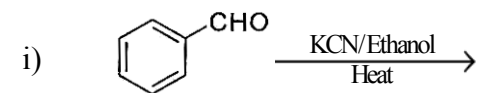
2. Answer **any two** :

- a) Define conductivity (κ) and molar conductivity (Λ_m) of ZnSO_4 (aq) solution. What are the SI units of them? Discuss the effect of dilution on the values of them. 4
- b) Calculate the conductivity (κ) and molar conductivity (Λ_m) (in SI units) of the 0.1 mol dm^{-3} KCl (aq.) solution at 298 K. The conductance of this solution using a conductivity cell having ' l ' = 1 cm and ' a ' = 2 cm is 24 mS at 298 K. Does its value depend on temperature? 4
- c) State and explain Kohlrausch law of independent migration of ions. How will you use it to determine the molar conductivity of acetic acid solution at infinite dilution (Λ_m°)? 4

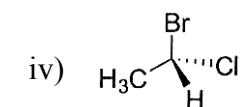
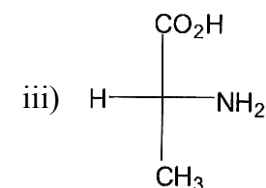
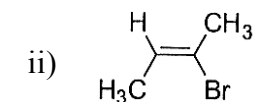
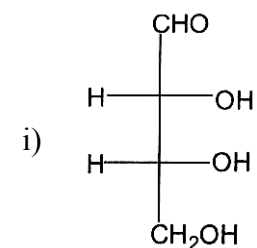
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3. a) What is the iodoform test? Write expected products with a mechanism when acetone is treated with excess iodine in aqueous NaOH. 2
- b) Write the structure of the product formed in the following reactions : 3

[3]



4. a) Designate the following configurations by *R*, *S* or *E*, *Z* (whichever is applicable) (**any two**) 2



- b) A sample of the chiral molecule of limonene is 87% enantiopure. Calculate the percentage of each enantiomer present in the sample. 1