



বিদ্যাসাগর বিশ্ববিদ্যালয়

VIDYASAGAR UNIVERSITY

Question Paper

B.Sc. General Examination 2023

(Under CBCS Pattern)

Semester — II

Subject : CHEMISTRY

Paper : DSC-1BT/2BT/3BT

**(Chemical Energetics, Equilibria and
Functional Organic Chemistry)**

Full Marks : 40

Time : 2 hours

*Candidates are required to give their answers
in their own words as far as practicable.*

The figures in the margin indicate full marks.

*Answer from **all** the Groups as directed.*

GROUP—A

1. Answer *any* **five** questions from the following :

2×5=10

(a) State Le Chatelier's principle.

(2)

- (b) Calculate the pH of 10^{-8} (M) NaOH solution.
- (c) What is common ion effect?
- (d) State the third law of thermodynamics.
- (e) $\text{CH}_3\text{CHO} \xrightarrow[\text{NaOH}]{\text{dilute}} \text{A} \xrightarrow{\text{Heat}} \text{B}$
- (f) $\text{RCOOH} \xrightarrow{\text{AgOH}} \text{C} \xrightarrow[\text{CCl}_4]{\text{Br}_2} \text{D}$
- (g) Distinguish between $\text{CH}_2 = \text{CH} - \text{Cl}$ and $\text{CH}_2 = \text{CH} - \text{CH}_2\text{Cl}$.
- (h) Write a short note on 'Lucas Test'.

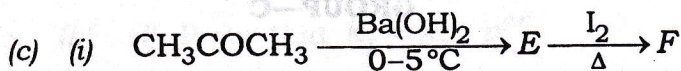
GROUP—B

2. Answer *any four* questions from the following :

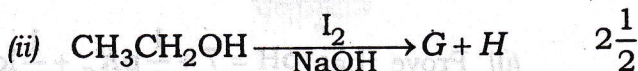
5×4=20

- (a) (i) Discuss the physical significance of entropy. 3
- (ii) What do you mean by the ionic product of H_2O ? 2
- (b) (i) Discuss Friedel-Crafts alkylation and acylation reaction. 3
- (ii) What do you mean by hydrolysis constant of salt? 2

(3)



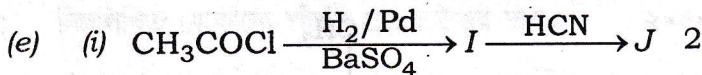
$2\frac{1}{2}$



$2\frac{1}{2}$

(d) (i) Derive Kirchhoff's equation. 3

(ii) Write a note on Buffer solution. 2



2

(ii) Write an example of benzoin condensation. 1

(iii) Write a short note on Wittig reaction. 2

(f) (i) What happens when bromobenzene is treated with sodamide in liquid NH_3 ? Give mechanism. 3

(ii) Give an example of $\text{S}_{\text{N}}\text{i}$ reaction. 2

(4)
GROUP—C

Answer any **one** question from the following :

10×1=10

3. (a) (i) What is the degree of ionization? 2

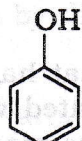
(ii) Prove that $\text{pH} = 7 + \frac{1}{2}\text{pK}_a + \frac{1}{2}\log C$ 3

(b) (i) $\text{C}_6\text{H}_6 \xrightarrow[\text{AlCl}_3]{\text{CH}_3\text{COCl, Anhydrous}} \text{A} \xrightarrow[\text{Con. HCl}]{\text{Zn-Hg}} \text{B}$ 3

(ii) Convert : Cumene \rightarrow Phenol 2

4. (a) (i) $\text{CH}_3 - \underset{\text{CH}_3}{\overset{\text{CH}_3}{\text{C}}} - \text{ONa} + \text{CH}_3\text{Br} \xrightarrow{\Delta} \text{C}$ 1

(ii) Write a short note on pinacol-pinacolone rearrangement. 2

(iii) $\text{E} \xleftarrow[\text{NaOH}]{\text{C}_6\text{H}_5\text{COCl}}$  $\xrightarrow[\text{KOH}]{\text{CHCl}_3}$ D 2

(5)

(b) (i) Prove that $k_p = k_x \cdot p^{\Delta n}$ 3

(ii) Explain all adiabatic processes are isoentropic processes. 2

বঙ্গানুবাদ

পরীক্ষার্থীদের যথাসম্ভব নিজের ভাষায় উত্তর দেওয়া প্রয়োজন।

দক্ষিণ প্রান্তস্থ সংখ্যাগুলি প্রশ্নমান নির্দেশক।

নির্দেশানুসারে সকল বিভাগ থেকে উত্তর দাও।

বিভাগ—ক

১. নিম্নলিখিত যেকোনো পাঁচটি প্রশ্নের উত্তর দাও: $2 \times 5 = 10$

(ক) লা শাতেলিয়ারের নীতিটি লেখ।

(খ) 10^{-8} (M) NaOH দ্রবণের pH গণনা কর।

(গ) সমআয়ন প্রভাব কী?

(ঘ) তাপগতিবিদ্যার তৃতীয় সূত্রটি লেখ।

(ঙ) $\text{CH}_3\text{CHO} \xrightarrow[\text{NaOH}]{\text{লঘু}} \text{A} \xrightarrow{\text{তাপ}} \text{B}$

(চ) $\text{RCOOH} \xrightarrow{\text{AgOH}} \text{C} \xrightarrow[\text{CCl}_4]{\text{Br}_2} \text{D}$