

FEDERAL PUBLIC SERVICE COMMISSION



COMPETITIVE EXAMINATION FOR RECRUITMENT TO POSTS IN BS-17 UNDER THE FEDERAL GOVERNMENT, 2012

Roll Number

CHEMISTRY, PAPER-II

TIME ALLOWED: THREE HOURS	(PART-I MCQs)	30 MINUTES	MAXIMUM MARKS: 20
	(PART-II)	2 HOURS & 30 MINUTES	MAXIMUM MARKS: 80

- NOTE:**
- Candidate must write **Q.No.** in the **Answer Book** in accordance with **Q.No.** in the **Q.Paper**.
 - Attempt **ONLY FOUR** questions from **PART-II**. All questions carry **EQUAL** marks.
 - Use of simple calculator is allowed.
 - Periodic Table is on page-2.
 - Extra attempt of any question or any part of the attempted question will not be considered.

PART-II

- Q.2.** (a) What is the difference between Valence Bond Theory and Molecular Orbital Theory? (08)
- (b) Draw the molecular orbital diagram of CO molecule showing sigma π bonding, nonbonding and anti bonding molecular orbitals. (08)
- (c) Discuss the difference between the hybridization of SO_2 and SO_3 (04)
- Q.3.** (a) Discuss the rate law of SN_1 mechanism. (06)
- (b) What is the importance of half life in the determination of order of reactions? (06)
- (c) What is pseudo first order reaction? & What is its importance? (08)
- Q.4.** (a) Describe the differences between physical adsorption and chemisorption. (08)
- (b) The data of Langmuir for the adsorption of Nitrogen on mica at $90^\circ K$ given (08)
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|--|------|------|------|------|------|------|------|------|------|------|
| P(atm) | 2.8 | 3.4 | 4.0 | 4.9 | 6.0 | 7.3 | 9.4 | 12.8 | 17.9 | 23.5 |
| Amt adsorbed cumm
at $20^\circ C$ & 760mm | 12.0 | 13.4 | 15.1 | 17.9 | 19.0 | 21.6 | 23.9 | 25.5 | 28.2 | 30.8 |
- (c) Estimate the surface area of the mica sample in the Langmuir experiment? (04)
- (c) Define Homogenous catalyst & Heterogenous catalyst.
- Q.5.** (a) Discuss stereoisomerism in compounds having 2 similar asymmetric carbon atoms. (06)
- (b) Draw Fisher projection formulae for the following compounds. (08)
- R & S 2-Bromopentane
 - R & S 3-chloro-1-pentane
 - R & S 3-chloro-3Methyloctane
 - R & S 2-pentanol
- (c) What do you understand by the terms Z & E isomers? Illustrate your answer with example. (06)
- Q.6.** (a) Discuss the structure of Grignard reagent. (04)
- (b) How these compounds can be prepared by Grignard reagent? (12)
- Ethane
 - Acetic acid
 - 2-Butanol
- (c) What is diazotisation reaction? (04)
- Q.7.** How would you prepare the following compounds from benzene? Name each reaction as well. (20)
- Acetophenone
 - Bromobenzene
 - Maleic anhydride
 - Toluene
 - Benzaldehyde
- Q.8.** (a) Write main steps in the formation of following polymers: (3+3)
- Nylon 6,6 and polyester by condensation polymerization.
 - Polyethylene by Free Radical Polymerization.
- (b) Differentiate between oil, fat & wax with examples. (09)
- (c) What are alkaloids? (05)
