

FEDERAL PUBLIC SERVICE COMMISSION



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

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: (i) Candidate must write Q.No. in the Answer Book in accordance with Q.No. in the Q.Paper.
(ii) Attempt ONLY FOUR questions from PART-II. All questions carry EQUAL marks.
(iii) Use of simple calculator is allowed.
(iv) Periodic Table is on page-2.
(v) 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)
i. R & S 2-Bromopentane ii. R & S 3-chloro-1-pentane
iii. R & S 3-chloro-3Methyloctane iv. 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)
(i) Ethane (ii) Acetic acid (iii) 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)
(i) Acetophenone (ii) Bromobenzene (iii) Maleic anhydride
(iv) Toluene (v) Benzaldehyde
- Q.8.** (a) Write main steps in the formation of following polymers: (3+3)
i. Nylon 6,6 and polyester by condensation polymerization.
ii. Polyethylene by Free Radical Polymerization.
(b) Differentiate between oil, fat & wax with examples. (09)
(c) What are alkaloids? (05)
