

CHEMISTRY, PAPER-II



**FEDERAL PUBLIC SERVICE COMMISSION
COMPETITIVE EXAMINATION FOR
RECRUITMENT TO POSTS IN BPS-17 UNDER
THE FEDERAL GOVERNMENT, 2009**

CHEMISTRY, PAPER-II

S.No.	
R.No.	

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

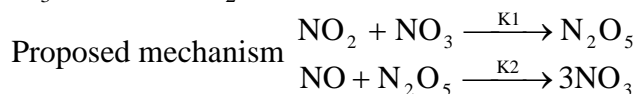
- NOTE:** (i) First attempt **PART-I (MCQ)** on separate **Answer Sheet** which shall be taken back after **30 minutes**.
(ii) **Overwriting/cutting of the options/answers will not be given credit.**
(iii) **Scientific Calculator is allowed.**

PART – I (MCQ)
(COMPULSORY)

Q.1. Select the best option/answer and fill in the appropriate box on the Answer Sheet. (20)

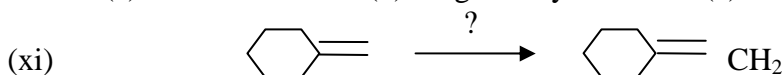
- (i) The orbitals providing the most efficient overlap are:
(a) s-s (b) p-p (c) sp-sp (d) sp²-sp²
- (ii) Nylon is a copolymer of:
(a) Urea and Formaldehyde (b) Phenol and Formaldehyde
(c) Hexamethylenediamine and adipic acid (d) Vinyl Chloride and Vinylalcohol
- (iii) Which of the following would react with one mole of Grignard's reagent to yield a ketone?
(a) RCONR' R" (b) RCONHR' (c) RCONH₂ (d) RCOOH
- (iv) Glyceraldehyde has one of the following properties:
(a) One asymmetric carbon atom (b) Two asymmetric carbon atoms
(c) A meso compound (d) Four asymmetric carbon atoms
- (v) The antifreeze compound ethylene glycol has the formula:
(a) C₂H₅OH (b) CH₃OH (c) C₂H₄(OH)₂ (d) C₃H₅(OH)₃
- (vi) Distillation is the best method for separating the two substances in which of the following:
(a) Water and salt dissolved
(b) water and a substance which does not dissolve in it
(c) Two liquids that have different boiling points
(d) Two solids that have different melting points.
- (vii) Which of the following describes "Amino" group as a substituent in electrophilic aromatic substitution.
(a) Weakly activating and O/P – directing (b) Strongly activating and O/P – directing
(c) Weakly deactivating, meta-directing (d) Strongly activating, meta-directing
- (viii) Which would be the best solvent to conduct this reaction.

$$\text{CH}_3\text{CH}_2\text{Br} + \text{Mg} \longrightarrow \text{BrMgCH}_2\text{CH}_3$$
(a) Acetone (b) Acetonitrile (c) Diethylether (d) Ethylacetate
- (ix) If K₁<K₂ which of the following rate laws is consistent with the mechanism proposed for the conversion of NO₃+NO → 2NO₂?



- (a) $\frac{d[\text{NO}_3]}{dt} = K_1 K_2 [\text{NO}_2][\text{NO}_3]$ (b) $\frac{d[\text{NO}_3]}{dt} = -K_1 K_2 [\text{NO}_2][\text{NO}_3]$
(c) $\frac{d[\text{NO}_3]}{dt} = -K_1 K_2 [\text{NO}_3][\text{NO}]$ (d) $\frac{d[\text{NO}_3]}{dt} = -K_1 [\text{NO}_2][\text{NO}_3]$

- (x) Which of the following is the best description of the geometry of PCl₅?
(a) Tetrahedral (b) Trigonal Pyramid (c) Trigonal bipyramid (d) Square pyramid.



This reaction could successfully be performed using which one of the following reagents.
(a) Ph₃PCH₂ (b) CH₃OCOCH₂COOCH₃ (c) CH₂Br₂ (d) PCC

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- (xii) Which one of the following is not a petrochemical.
(a) Cumene (b) Paraffin (c) Aluminum Chloride (d) Epoxy resin
- (xiii) The term syndiotactic is related to which one of the following?
(a) Synthetic detergents (b) Table Salt (c) Paraffin (d) Polypropylene
- (xiv) Which one of the following is used as an Antibiotic?
(a) Patulin (b) Insulin (c) Soserine (d) Trypsin
- (xv) Heroin is diacetate of:
(a) Papaverine (b) Morphine (c) Codeine (d) Thebaine
- (xvi) A reaction that practically is given by all organic compounds.
(a) Elimination (b) Friedel-Craft ecylation (c) Combustion (d) Rearrangement
- (xvii) Which functional group is present in polyester shirt?
(a) Lactam (b) Acid Chloride (c) Ether (d) Ester
- (xviii) Which statement is true for Halogen (Halo-group)?
(a) Activating and O, p-directing (b) Activating and m-directing
(c) Deactivating and O, p-directing (d) None of these.
- (xix) Which one of the following can be synthesized from Aryl Diazonium Salt?
(a) Furfural (b) Carbylamine(c) Biphenyl (d) THF
- (xx) The Methyl group in Methyl Magnesium Iodide can act as:
(a) CH₃ Radical (b) CH₃ Carbonium ion (c) CH₃ Carbanion (d) Can react with a base

PART – II

NOTE:	<p>(i) PART-II is to be attempted on the separate Answer Book.</p> <p>(ii) Attempt ONLY FOUR questions from PART-II. All questions carry EQUAL marks.</p> <p>(iii) Extra attempt of any question or any part of the attempted question will not be considered.</p>
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- Q.2.** (a) Explain the structure of Grignard's reagent. (6)
(b) How aldehydes, ketones, carboxylic acids, Hydrocarbons and alcohols can be synthesized from Grignard's reagent. (10)
(c) Complete the following reaction. (4)
- c1ccc(cc1)-c2ccc(Br)cc2 >> [Mg/Ether] c1ccc(cc1)-c2ccc(cc2)C([Mg])Br >> [Chlorianil] ?
- Q.3.** (a) How you will synthesize the following starting from benzene. (2+5+3)
(i) Acetophenone (ii) 1,3,5-tribromobenzene (iii) n-propyl benzene
(b) In electrophilic aromatic substitution "Halogens" are deactivating but O, p-directing. Explain. (5)
(c) Sulphonation is reversible reaction at high temperature. Discuss its merits.. (5)
- Q.4.** (a) Describe various methods to determine the order of reaction. (9)
(b) What is the third order reaction. Give examples. (4)
(c) Derive the Kinetic equation for 3rd order reaction. (7)
- Q.5.** (a) Can we prepare the Aliphatic diazonium salt. If yes, give examples. (3)
(b) How can the following prepared from benzene diazonium salt. (3+5+4)
(i) Benzene (ii) m-nitrophenol (iii) Biphenyl
(c) Write a note on Sandmeyer reaction. (5)
- Q.6.** (a) Describe the exact source of raw material used in Petrochemicals. (3)
(b) Give Industrial synthesis of vinylacetate. (10)
(c) Describe the production of Vitamin-C from Glucose. (7)
- Q.7.** (a) Describe the synthesis of streptomycin. (6)
(b) Discuss the role of Fermentation in Organic Synthesis. (4)
(c) Give synthesis of polypropylene and its uses. (10)
- Q.8.** (a) What is Margarine? How it is manufactured industrially? (10)
(b) Nicotine on Oxidation with KMnO₄ gave. Nicotinic acid. Write structures of nicotine, nicotinic acid and two other isomer of nicotinic acid. (6)
(c) Write a note on epimerization. (4)
