

RAJASTHAN PUBLIC SERVICE COMMISSION, AJMER

SYLLABUS FOR SCREENING TEST FOR THE POST OF *CHEMIST* (ARCHIVES DEPARTMENT, RAJASTHAN)

1. Atomic orbitals, Quantum numbers, shapes of s.p.d orbitals, Aufbau and Pauli exclusion principles, Hund's multiplicity rule, Electronic configuration of the elements.
2. Valence Bond Theory, hybridization and shape of simple inorganic molecule, VSEPR Theory, Molecular Orbital Theory, Electron deficient molecules, Dipole moment, Hydrogenbonding, Vander wall's forces.
3. Atomic and Ionic radii, ionization energy, electron affinity and electronegativity trends in periodic table with reference to s.p and d block elements.
4. Nomenclature and isomerism in coordination compounds, chelates, Structure, bonding and important reaction of transition metal carbonyls and nitrosyls.
5. Importance and basic concept of Polymerization, classification of Polymers, Polymerization – Condensation, addition, radical, chain ionic and coordination co-polymerization.
6. Properties of commercial Polymer- Polyethylene, Poly vinyl chloride, Polyester, Silicone polymer, phosphonitrilic halides, Zeolites, Cermics
7. Lanthanides and Actinides- Electronic structure, oxidation state, ionic radii and complex formation.
8. Arrhenius, Bronsted Lowry, the lux flood solvent system and Lewis concepts of acids and bases. HSAB Theory and its applications. Application of Nonaqueous solvent.
9. Nature of bonding in organic molecules- Hybridization, bond length and bond angles.
10. Inclusion compounds, Crown Ether compounds, clatherates, cryptands, resonance, hyperconjugation, aromaticity, inductive and field effects. Hydrogen bonding, electrophiles and nucleophiles.
11. Types of organic reaction reactions and mechanism. Reactive intermediates , carbocations, carbanions, carbenes, arynes and nitrenes.
12. Preperation and reactions of Alcohols and phenols.
13. Preperation and reactions of ethers, epoxides and carboxylicacids.
14. Preperation and reactions of Aldehydes and ketones.
15. Preperation and reactions of organic compounds containing nitrogen.
16. Pinacol- Pinacolone rearrangement, Claisen rearrangement, Fries rearrangement, Reimear-Tiemann Reaction, Hell-Volhard-Zelinsky Reaction, Wittig Reaction, Mannich Reaction, Cannizaro Reaction, Hoffmann Bromamide Reaction, Azo Coupling.
17. Principle and application of UV, IR, 1HNMR, Mass Spectroscopy.

18. Stereochemistry of organic Compounds - Concept and types of isomerism, elements of symmetry, chirality, threo and erythro isomers, enantiotopic and diastereotopic atoms, Stereospecific and stereoselective synthesis, Asymmetric synthesis.
19. Laws of Photochemistry, Types of Photochemical Reactions, Photochemistry of Alkenes.
20. Rate of Reaction, order of Reaction, factors affecting the rate of reaction. Zero, First, Second order Reaction, collision and transition state theory.
21. Electrolytic solution, specific conductance and equivalent conductance, migration of ions and Kohlrausch law, Debye Huckel Onsager's equation and its extension
22. Introduction and forms of corrosion, theories and prevention.
23. General awareness of Computer, hardware and Software, Input-Output Device, Binary numbers and arithmetic, Introduction to Computer Language, Programming, Operating System.
24. First, Second and Third law of thermodynamics, Concept of entropy.
25. Fundamental concepts, principles, methodology of DTA and TGA, Thermometric titrations.
26. Chemical analysis by gas-liquid chromatography, types of adsorption and partition chromatography, HPLC.
27. Introduction, principle and applications of Mossbauer, ESR and Raman spectroscopy.
28. Principle and applications of solvent extraction with special reference to U, Mo, Fe, Cu, and Ni.
29. Introduction, principle, methodology and applications of voltammetry polarography. Ilkovic equation.
30. Elements of statistics, mean, mode, median, errors, precision, accuracy t-test, chi square test.

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Pattern of Question Papers:

1. Objective Type Paper
2. Maximum Marks : 100
3. Number of Questions : 100
4. Duration of Paper : Two Hours
5. All Questions carry equal marks
6. There will be Negative Marking

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