

RAJASTHAN PUBLIC SERVICE COMMISSION, AJMER
SYLLABUS FOR SCREENING TEST FOR THE POST OF
CHEMIST
(MINES & GEOLOGY DEPARTMENT)

1. Atomic orbitals, quantum numbers, electronic configuration of the elements. Periodicity in different properties of elements. Ionic, covalent and coordinate bonds. Hybridization, VBT, MOT. Defects in ionic solids.
2. Explanation of magnetism, bonding, geometry, spectral behavior, color and coordination of transition metal complexes on the basis of VBT and CFT. General characteristics, oxidation state, magnetic & spectral properties and uses of lanthanoids and actinoids.
3. Classification, general study and applications of non-aqueous solvents with special reference to liquid NH_3 , liquid SO_2 , liquid HF and anhydrous H_2SO_4 . Arrhenius, Bronsted and Lewis concept of acids and bases. HSAB.
4. Minerals, ores, general principles of extraction of metals and their purification with special reference to Cu, Pb, Zn, Al & Fe. Ellingham Diagram. Principle and applications of solvent extraction with special reference to U, Mo, Fe, Cu and Ni.
5. Corrosion- Surface mechanism of the corrosion of the metals, thermodynamics and stability of metals, factors influencing corrosion. Measurement of corrosion rate: (i) Weight loss method (ii) Electrochemical method.
Inhibiting corrosion- prevention and control methods.
6. Soil and soil pollution- definition, types, components and fertility management of soils. Physical and chemical analysis of soil with various parameters. Types, sources and different parameters of soil pollution, its control. Behaviours of heavy metal ions and pesticides in the soil and their effects.
Water and water pollution- sources, quality parameters and analysis of water. Hardness, softening techniques, sources of water pollution. Treatment of sewage and industrial waste water.
7. General awareness of computer, basic knowledge of hardware and software, input-output devices, memory & secondary storage. Introduction to computer language and operating system, principles of Programming, Algorithm & Flow charts.
8. Chromatography- Paper, column, thin-layer chromatography, high performance thin-layer chromatography (HPTLC), high performance liquid & gas-liquid chromatography (HPLC, GLC). Basic principles & applications.

9. (a) Classification and structure of silicates, uses of silicates and zeolites in industry and technology.
(b) Cationic, anionic, chelating and liquid ion exchangers, their mechanism of action and applications. Demineralisation of sea water.
10. Introduction, principle and application of Mosbauer, Raman, ESR, IR, UV, AAS, NMR spectroscopy with special reference to structural inorganic chemistry. Principle, instrumentation and applications of inductively coupled plasma emission spectroscopy.
11. Introduction, principle, methodology and applications of voltammetry polarography. Ilkovic equation.
Fundamental concepts, principles, methodology of DTA and TGA. Thermometric titrations.
12. Precision, Accuracy, Standard Deviation, Correlation coefficient and significant figure. Laboratory, maintenance and preparation of Reagents.

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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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