

UNIVERSITY OF MADRAS
DEPARTMENT OF ANALYTICAL CHEMISTRY
M.Sc. – Entrance Examination Syllabus.

Analytical Chemistry

Data Analysis, Introduction to computers, Principles of gravimetric analysis. Principles of volumetric analysis. Purification techniques – Solvent extraction and chromatographic techniques. Introduction to gas chromatography and HPLC. Thermal analytical methods. Spectrometer. X-ray methods and Bragg's equation. Atomic absorption spectroscopy. IR & UV spectroscopy. NMR spectroscopy. Basic principles of mass spectral analysis and instrumentation, polarography, potentiometer.

MODEL QUESTION PAPER (only objective type)

Marks: 25x1= 25

1. In gravimetric analysis, precipitates are washed with dilute electrolyte to avoid-----
2. In conductometry ----- current is used
3. The quality of milk is tested with
(a) Odometer (b) Ammeter (c) Lactometer (d) Barometer
4. Among the following gases which is called as "laughing gas"
(a) Ozone (b) Nitrous Oxide (c) He (d) CO

* Entrance Examination question paper will contain 25 questions from analytical syllabus

Y. V. V. V.
06/07/23



University of Madras
Department of Physical Chemistry
M.Sc., Entrance Examination Syllabus

Syllabus: B.Sc., Chemistry syllabus studied by the candidate

Portion of the Syllabus:


Quantum Mechanics- Atomic Structure and Spectra-Dual character of electron-Chemical bonding-MOT & VBT-Basic concept of group theory- Molecular Spectroscopy-Electric and Magnetic properties-Gaseous state-Chemical equilibrium- The law of mass action-Phase equilibria-Ionic equilibrium- Colligative properties of dilute solution-Electrochemistry-Chemical kinetics- Catalysis- Solid State-Colloidal state-Surface Chemistry-Mass spectrometry-Thermodynamics-Macromolecules-Photochemistry.

Model Question Paper (only objective type)

Marks: 25 X 1=25

1. The time taken for 10% completion of a first order reaction is 20 min, for 19% completion, the reaction will take
(a) 40 mins (b) 60 mins (c) 30 mins (d) 50 mins
2. Free energy change (ΔG) is related to the e.m.f of a cell (E) as
(a) $\Delta G = - nFE/RT$ (b) $\Delta G = - (RT/nF) \times \ln E$ (c) $E = - nF\Delta G$ (d) $\Delta G = - nFE$
3. The number of degrees of freedom in an aqueous solution containing starch and 0.01N NaCl according to Gibb's phase rule will be
a) 4.0 b) 1.0 c) 2.0 d) 3.0
4. In which of the following cases does reaction not proceed spontaneously?
(a) ΔH is +ve and ΔS is zero (b) ΔH is -ve and ΔS is -ve
(c) ΔH is +ve and ΔS is -ve (d) ΔH is -ve and ΔS is +ve
5. The rotational constant of HCl^{35}
(a) is higher than HCl^{37} (b) is lower than HCl^{37} (c) is equal to HCl^{37}
(d) cannot be calculated

*Entrance Examination question paper will contain 25 questions from Physical Chemistry Syllabus


07/07/2023

Professor and Head
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UNIVERSITY OF MADRAS
DEPARTMENT OF ORGANIC CHEMISTRY
M. Sc Entrance Examination
Organic Chemistry-Syllabus

Alkanes and Cycloalkanes, Alkenes and Alkynes, Alcohols and Phenols, Ethers, Carbonyl Compounds-Preparation and Reactivity.

Carboxylic acid and its derivatives, Nitro compounds, Amines and Arene diazonium salts-Preparation and Reactivity.

Stereochemistry: R, S and E, Z notation, Asymmetric Synthesis, Aliphatic Nucleophilic (S_N1 , S_N2 and S_Ni mechanisms) and Electrophilic substitutions: Mechanism and applications. Aromaticity, Aromatic Nucleophilic and Electrophilic substitutions: Mechanism and applications. Elimination ($E1$ and $E2$ mechanisms), Condensation and addition to carbon-carbon and carbon-oxygen double bonds. Molecular rearrangements: Pinacol-Pinacolane, Cannizzaro, Wager-Meerwein, Claisen, Cope, Beckman, Hofmann, Curtius and Benzil-Benzilic acid rearrangements. Oxidation and Reduction: Mn & Cr reagents; Per-acid; $LiAlH_4$, $NaBH_4$, $H_2/Pd-C$ Catalyst; Clemmensen, Wolf-Kishner & Rosenmund reduction. Application of UV, IR, NMR and Mass for structure determination (up to C_{10}). Carbohydrate Chemistry; Organic photochemistry; Cycloadditions: Carbene and Nitrenes. Heterocyclic Chemistry: Furan, Thiophene, Pyrrole, Indole, Pyridine, Quinoline and Isoquinoline-Synthesis and Reactivity. Natural products: Terpenes and alkaloids.

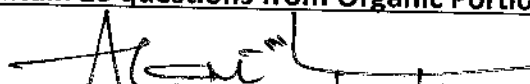
MODEL QUESTION PAPER: Marks: 25 x 1 = 25

- The **phenolic compound** among the following:
 A) Ibuprofen B) Paracetamol C) Penicillin D) Camphor
- Conversion of silver salt of **alkyl carboxylic acid** into **alkyl halide** is known as:
 A) Hunsdiecker reaction B) Finkelstein reaction C) HVZ reaction
 D) Ritter reaction
- The most suitable reagent to carry out **1,2-addition** of 2-cyclohexene-1-one
 A) $MeLi/CeCl_3$ B) $MeLi$ C) $MeMgBr$ D) Me_2CuLi
- The most appropriate **reagent** to carry out the following transformation:



- Acid mediated hydration
- Hydroboration followed by oxidation
- Oxy-mercuration followed by $NaBH_4$ reduction
- Ozonolysis followed by reduction

Entrance Examination question paper will contain 25 questions from Organic Portion


 06/07/2023

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UNIVERSITY OF MADRAS
DEPARTMENT OF INORGANIC CHEMISTRY
M.Sc. – Entrance Examination Syllabus.

Inorganic Chemistry

Atomic structure principle of Inorganic Qualitative and Volumetric Analysis, Chemical Bonding Chemistry of S-block elements. d-block elements. Chemistry of f-block elements. Chemistry of organometallic compounds, Metallic bonding. Coordination Chemistry. Organometallic compounds. Applications of coordination compounds. Special type of compounds. Chemistry of Group IIIA and Group IV families. Chemistry of Halogen and Noble Gas families. Solid state and liquid crystals.

MODEL QUESTION PAPER (Only objective type) Marks: 25 X 1 = 25

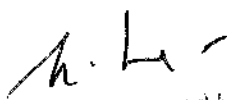
Section – A (10 x 1 = 10 Marks)

1. Which has the maximum number of unpaired electrons?
(a) Mg^{2+} (b) Ti^{3+} (c) V^{3+} (d) Fe^{2+}
2. The rusting of iron is catalysed by
(a) H_2O (b) O_2 (c) Zn (d) H^+

Section – B (15 x 1 = 15 Marks)

3. Ziegler-Natta catalyst is a mixture of and
4. Write the Spectrochemical series

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