Video Lectures by,
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Engineering Chemistry

Name of Channel: Chemistry with SK
Channel link: www.youtube.com/chemistrywithsk

Question Paper Pattern: https://youtu.be/PeXIe-uGZ1I

Name of Teacher: Mr. Kokane Surendra Jalindar

The study material is useful to the students of -

Subject: Engineering Chemistry

Course/Class: First Year Engineering (FE) 2019 Course

Semester: I & II

Paper No: 107009

Syllabus Pattern: (2019 Pattern).

Topic: Unit 1) Water Technology:

Keywords: Impurities in water, hardness of water: Types, Units. Determination of hardness (by EDTA method) and alkalinity. Ill effects of hard water in boiler - priming and foaming, boiler corrosion, caustic embrittlement, scale and sludge.


Purification of water: Reverse osmosis and Electrodialysis.
Unit 1) Water Technology

1) Impurities in water / Types of Impurities in water
2) Hardness of Water & Types of Hardness.
3) Determination of Hardness of water by EDTA Method
4) Determination of Alkalinity of Water
5) Boiler Corrosion / Causes and Prevention of Boiler Corrosion
6) Zeolite Method for softening of water / Permutit Method.
7) Ion Exchange Method / Demineralization Method for softening of water

Topic: Unit 2) Instrumental Methods of Analysis:

Keywords: Introduction: Types of reference electrode (calomel electrode), indicator electrode (glass electrode), ion selective electrode: ion selective membranes such as solid membrane, enzyme based membrane and gas sensing membrane.
[B] pHmetry: Introduction, standardization of pH meter, pH metric titration of strong acid versus strong base with titration curve.

Unit 2) Instrumental Methods of Analysis:

1) Ion Selective Electrodes with Types
2) Conductometric Titrations / Types of Conductometric Titrations

Topic: Unit 3 B) Nanomaterials:

Keywords: Introduction, classification of nanomaterials based on dimensions (zero dimensional, one-dimensional, two-dimensional and three-dimensional), structure, properties and applications of graphene and carbon nanotubes, quantum dots (semiconductor nanoparticles).
Unit 3 B) Nanomaterials:

1) **Introduction / Definition of Nanomaterials and the reasons for Different Properties of Nanomaterials than their Bulk Materials**
2) **Classification of Nanomaterials / Types of Nanomaterials**
3) **Structure, Properties and Applications of Graphene**
4) **Structure, Properties and Applications of Carbon Nanotubes (CNTs)**
5) **Structure, Properties and Applications of Quantum dots**

**Keywords:**

**Unit 4) Fuels:**

**Introduction (definition, classification of fuel based on chemical reactions and characteristics of an ideal fuel), Calorific value (CV): Higher calorific value (HCV) and Lower calorific value (LCV), Determination of Calorific value: Principle, construction and working of Bomb calorimeter and Boy’s gas calorimeter and numericals,**

**Solid fuel: Coal: Analysis of Coal-Proximate and Ultimate analysis, numericals,**

**Liquid fuel: Petroleum: Refining of petroleum /crude oil and composition, boiling range and uses of various fractions,**

**Gaseous fuel: Composition, properties and applications of CNG. Hydrogen gas as a future fuel. Alternative fuels: Power alcohol and biodiesel.**

**Unit 4) Fuels:**

1) **Fuels, Types of Fuels, Classification of Fuels with examples**
2) **Calorific Value of Fuels, Types of Calorific Values, Units of Calorific Value**
3) **Characteristics of good / ideal fuel**
4) **Bomb Calorimeter: Determination of calorific value of solid & liquid fuels**
5) **Boys Calorimeter: Determination of calorific value of gaseous fuels**
6) **Proximate Analysis of coal**
7) **Ultimate Analysis of Coal**
**Topic:** Unit 6) Corrosion Science:

**Keywords:** Introduction, Types of corrosion – Dry and Wet corrosion, mechanism of dry corrosion, nature of oxide films and Pilling-Bedworth’s rule, wet corrosion – mechanism: hydrogen evolution and oxygen absorption, galvanic cell corrosion, concentration cell corrosion, Factors influencing rate of corrosion. Methods of corrosion control and prevention: cathodic and anodic protection, metallic coatings and its types, surface preparation, methods to apply metallic coatings-hot dipping, cladding, electroplating, cementation.

**Unit 6) Corrosion Science:**

1) [Mechanism of Dry Corrosion due to Oxygen](#)
2) [Types of Metal Oxide films / Nature of Metal oxide film & Pilling Bedworth Ratio (PBR)](#)
3) [Dry Corrosion due to gases other than oxygen](#)
4) [Mechanism of Wet Corrosion (Electrochemical Corrosion) / H₂ evolution & O₂ Absorption Mechanism of Wet Corrosion](#)
5) [Cathodic Protection for corrosion control / Sacrificial Anode method / Impressed Current Method](#)
6) [Electroplating Process for corrosion control](#)

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