INTRODUCTION

When matter is very finely divided, its surface is enormously increased and its properties may change appreciably. The increased fraction of molecules in or near the surface and the asymmetric distribution of matter about them impart new properties to the surface. Surface Chemistry deals with these effects – particularly adsorption and properties of colloidal system.

Surface and colloid Chemistry is a core unit at the undergraduate level for all students pursuing chemistry related courses. The unit is aimed at introducing the learners to the various concepts and understanding of the mechanisms of surface reactions. It is hoped that this unit will help the learner to comprehend the complex nature of surfaces and how they influence chemical reactions both in nature and industry and apply the knowledge acquired in tackling real life problems.

This course requires the learner to have a good understanding of the basic units of physical and other chemistry and mathematics units. The study guide begins with definitions of surfaces and interfaces, adsorption, Langmuir, Freundlich and BET isotherms, chromatography, heterogeneous catalysis, liquid surface, action of soap solutions, the colloidal state and macromolecules.

It is expected that the learner will be able to use the study questions and activities provided in the text to evaluate his/her understanding of the concepts presented in the lectures.

SYLLABUS


UNIT OBJECTIVES

At the end of the unit the learner should be able to;

a. Define various terminologies used in surface and colloid chemistry.
b. Discuss the different types of adsorption and use the adsorption isotherms to interpret given data.
c. Discuss the various applications of adsorption.
d. Describe different types of heterogeneous catalysis.
e. Explain different phenomena related to the liquid surface.
f. Give a detailed discussion of the colloidal system.
g. Discuss the various ways of determining the molar masses of macromolecules
COURSE OUTLINE;

1. Surfaces and Interfaces.

2. Adsorption;
   2.1. Introduction
   2.2. Extent of adsorption
   2.3. Types of adsorption
   2.4. Adsorption isotherms;
      2.4.1. The Langmuir isotherm
      2.4.2. The Freundlich isotherm;
      2.4.3. Adsorption from solutions
      2.4.4. The BET isotherm
   2.5. Applications of adsorption
   2.5.1. Chromatography;
      2.5.1.1. The chromatogram
      2.5.1.2. Concepts used in Chromatography;
      2.5.1.3. Reduced parameters
      2.5.1.4. Classification of Chromatographic Techniques
      2.5.1.5. Gas Chromatography
   3. Heterogeneous catalysis;
      3.1. The Eley - Rideal mechanism
      3.2. The Langmuir – Hinshelwood mechanism
   3.3. Examples of catalysis;
      3.3.1. Hydrogenation
3.3.2. Oxidation

3.3.3. Cracking and reforming

4. Liquid surfaces;
   4.1. Surface tension
   4.2. Surfactants
   4.3. Surface excess
   4.4. Action of soap solutions

5. Colloidal systems;
   5.1. Classification of colloidal systems
   5.2. Colloids in industrial uses
   5.3. Preparation of colloids
   5.4. Properties of colloidal systems

6. Macromolecules;
   6.1. Mean molecular masses
   6.2. Colligative properties
   6.3. Sedimentation
   6.4 The Isoelectric Point.
   6.5 Viscosity
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