COURSE

Advanced chemical kinetics and catalysis
CHM 413
2units(R)

BY
OGBEBOR, CLARA

DEPARTMENT OF CHEMICAL SCIENCES
COLLEGE OF BASIC AND APPLIED SCIENCES
SAMUEL ADEGBOYEGA UNIVERSITY, OGWA
EDO STATE, NIGERIA

PREREQUISITE: CHM 221

INTRODUCTION:

Advanced Chemical Kinetics and Catalysis is a required course in Chemistry. It covers the rate of changes in the concentration of reactants or products with time and the elucidation of their mechanism using collision, absolute rate theories and chain reactions. It also involves processes at the surface and factors affecting them.

COURSE CONTENTS:

- Theories of reaction rates: The collision and absolute rate theories, chain reactions.
- Catalysis: heterogeneous catalysis, mechanism of catalyst action, catalyst surface and structure, relationship between catalyst properties and activity at surfaces, catalyst carriers and promoters and some industrial catalysts and associated catalyst processes such as hydrogenation, oxidation, cracking.
- Adsorption: physical and chemical adsorptions, adsorption isotherms: Freundlich and Langmuir.
- Mechanism of photochemical reactions

- **THEORIES OF REACTION RATE**
- Reaction rate is the change in the concentration of a reactant or product with time. Reaction rate is obtained experimentally, to determine the rate of a reaction; the concentration of the reactant or product is monitored as a function of time. In chemical reactions, emphasis is placed more on speeding up the rate of reaction more than the maximum yield. Knowledge of reaction rate is useful in drug design, pollution control and food processing. There are two basic theories of reaction rates:
- Collision Theory
- Absolute Theory

- **ADSORPTION**
- Adsorption is the accumulation of a substance on the surface of a solid or liquid. In adsorption the gas or liquid surface is called adsorbate and the substance to which it is attached to is called adsorbent. Adsorption depends on the surface area of the adsorbent and the larger the surface area, the greater the extent of adsorption.
- **Types of Adsorption**
- 1. Physical adsorption or van der Waal´s adsorption
- 2. Chemical adsorption or activated adsorption
- **ADSORPTION ISORTHERMS**
- Freundlich isotherm
- Langmuir isotherm

- **Thank you**