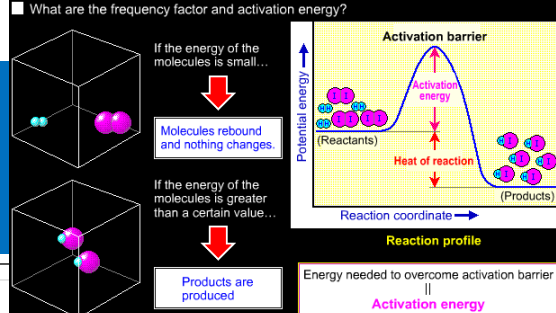


Reactions Basics Course

**Purpose**

To acquire the concept of chemical equilibrium, which is the basis of chemical reactions used on an industrial scale, along with catalyst mechanisms and calculation of reactions.

Characteristics

- ★ You can learn about the information gained from chemical equations and chemical equilibrium, which are essential for handling chemical reactions, via animated computer graphics and video.
- ★ You can also specifically learn various calculation methods necessary to control reactors by taking actual chemical reactions as examples.

Curriculum

Before You Start Studying

- Chapter 1 Perspective on Chemical Reaction Equations
- Chapter 2 Actual Chemical Reactions
- Chapter 3 Concept of Chemical Equilibrium
- Chapter 4 Rate of Reaction
- Chapter 5 Temperature Dependence of the Rate of Reaction
- Chapter 6 Reaction Mechanisms
- Chapter 7 Catalyst Function
- Chapter 8 Catalytic Reaction Mechanisms
- Chapter 9 Catalytic Reactors
- Chapter 10 Summary of Reactions

Who should take this course

Novice and mid-level employees responsible for maintenance work, operators and engineers on production-sites (plants), and workers, supervisors and administrators in the field

Course material outline

- ◆ Expected learning time: 6hours
- ◆ Number of tests: 3
- ◆ Shortest duration: 114 minutes

Supervised by

Idemitsu Kosan Co., Ltd. Technical Training Center

Curriculum**Chapter 1 Perspective on Chemical Reaction Equations**

- 101 Well-known Chemical Reactions
- 102 Chemical Equation

Chapter 2 Actual Chemical Reactions

- 201 Quantity Handled in Chemical Reactions
- 202 Heat Associated with Chemical Reactions
- 203 Reversible Reactions and Irreversible Reactions

Chapter 3 Concept of Chemical Equilibrium

- 301 How Far Do Reactions Proceed?
- 302 Chemical Equilibrium
- 303 Industrial Meaning of Chemical Equilibrium
- 304 Influence of Temperature Change on Chemical Equilibrium
- 305 Influence of Pressure Change on Chemical Equilibrium
- 306 Questions (Le Chatelier's Principle)

Chapter 4 Rate of Reaction

- 401 How Do Reactions Proceed?
- 402 How to Express the Rate of Reaction
- 403 Various Rates of Reaction
- 404 What Is a Rate Equation?
- 405 Determination of a Rate Equation
- 406 Elementary Reactions
- 407 Rate-determining Step
- 408 Heterogeneous Reactions and Overall Reaction Rate

Chapter 5 Temperature Dependence of the Rate of Reaction

- 501 Arrhenius Equation
- 502 Collisional Theory
- 503 Activated Complex Theory

Chapter 6 Reaction Mechanisms

- 601 Various Reaction Mechanisms (1)
- 602 Various Reaction Mechanisms (2)

Chapter 7 Catalyst Function

- 701 Effect of Catalysts (1)
- 702 Effect of Catalysts (2)
- 703 Influence of Catalysts on Chemical Equilibrium
- 704 Selectivity of Catalysts

Chapter 8 Catalytic Reaction Mechanisms

- 801 Shape of Catalysts
- 802 Chemisorption and Physisorption
- 803 Surface Area of Catalysts
- 804 Catalytic Reaction Mechanism
- 805 Aging of Catalysts
- 806 Poisoning
- 807 Sintering
- 808 Mechanical Rupture of Catalysts

Chapter 9 Catalytic Reactors

- 901 Reaction Conditions and the Structure of Reactors
- 902 Fixed-bed Reactor (1)
- 903 Fixed-bed Reactor (2)
- 904 Space Velocity
- 905 Pressure Drop in the Catalyst Bed
- 906 Fluidized-bed Reactor (1)
- 907 Fluidized-bed Reactor (2)
- 908 Calculation of U_{mf} and U_t (1)
- 909 Calculation of U_{mf} and U_t (2)
- 910 Calculation of U_{mf} and U_t (3)

Chapter 10 Summary of Reactions

- 1001 Determination of the Reaction Order (1)
- 1002 Determination of the Reaction Order (2)
- 1003 Determination of the Reaction Order (3)
- 1004 Determination of the Reaction Order (4)
- 1005 Calculation of the Reaction Temperature (1)
- 1006 Calculation of the Reaction Temperature (2)
- 1007 Calculation of the Reaction Temperature (3)
- 1008 Calculation of the Feed Flow Rate (1)
- 1009 Calculation of the Feed Flow Rate (2)
- 1010 Calculation of the Feed Flow Rate (3)