# Unit 9 Outline- Thermodynamics, Reaction Rates, & Chemical Equilibrium Chapters 17 & 18

#### Essential Skills/ State Standards:

9-1. Describe how temperature and heat flow in terms of the motion of molecules (or atoms). (CSS: 7a)

9-2. Know that chemical processes & phase changes can either release energy (exothermic) or absorb energy (endothermic). (CSS: 7b, 7c)

9-3. Solve problems involving heat flow and temperature changes, using known values of specific heat (q= m · c · Δ T) & latent heat of phase change (q= m Δ H). (CSS: 7d)

9-4. Know the rate of reaction is the decrease in concentration of reactants or the increase in concentration of products with time & depends on such factors as: concentration, temperature, and pressure. (CSS: 8a, 8b)

9-5. Know the definition and role of activation energy & catalyst in a chemical reaction. (CSS: 8d\*, 8c)

9-6. Know how to use Le Chatelier's principle to predict the effect of changes in concentration, temperature, and pressure (CSS:

9-7. Know that equilibrium is established when the forward and reverse reaction rates are equal. (CSS: 9b)

#### Vecabulary.

- Condensation
- Freezing
- Vaporization

Sublimation.

- Miching
- Bailing
- Condensation

- Deposition
- Heat
- Temperature
- Thermochemistry
- Exathermic
- Endothermic

- Colorimeter
- Joule
- Specific heat
- q=m-c-∆T
- q= m A H assertantes.
- q=m ΔH total

- Heat of reaction
- Le Chatlier's principle
- Equilibrium
- Activation Energy
- Cohelyst

#### Study Guide (Use notes, worksheets, and labs in addition to this study guide)

- According to the collision theory, what 3 things must happen in order for two molecules to react?
   Must collide with each other, Must collide with enough energy. & in the correct orientation
- What is the importance of the activation energy in a chemical reaction? Amount of energy needed for a reaction to occur.
- Using the collision theory, explain if the following would increase/ decrease the rate of reaction:
   HCl(aq) + Mg(s) → MgCl<sub>2</sub>(aq) + H<sub>2</sub>(g)
  - a. Increase temp: Increase, molecules collide more
  - b. Increase HCI: Increase, more collisions because more reactants to collide.

c. Increase pressure: Hard to say, wouldn't affect the reactants directly because none of them are gases.
One of the products is a gas, so it might cause the gas particles to collide more with the reactants and could slow it down. Tough call., (this one won't be on the test).

d. Remove MgCl2: Increase, less products means less chance for them to interfere with reactant collisions

e. Add H<sub>2</sub>: Decrease, more products mean they interfere more with reactants and the reactants would collide less.

- Identify the following terms with their correct letter from the graphs:
  - \* Reactants- 1

- \* Products- 2
- Activation energy (number/ letter & amount)-

A (300 Joules)

" Is this reaction exothermic or endothermic?

Endothermic

 Explain how a catalyst affects the activation energy in a chemical reaction. (Also, show on the above graph what a catalyst might do). It lowers the activation energy (see on graph) Speeds it up by lowering the activation energy.



# **Unit 10 Reaction Rates And Equilibrium Answers**

**Jin-Ying Zhang** 

# **Unit 10 Reaction Rates And Equilibrium Answers:**

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particularly for those individuals involved with environmental engineering This book is concerned with unit operations fluid flow heat transfer and mass transfer Unit operations by definition are physical processes although there are some that include chemical and biological reactions. The unit operations approach allows both the practicing engineer and student to compartmentalize the various operations that constitute a process and emphasizes introductory engineering principles so that the reader can then satisfactorily predict the performance of the various unit operations equipment This is a definitive work on Unit Operations one of the most important subjects in environmental engineering today It is an excellent reference well written easily read and comprehensive I believe the book will serve well those working in engineering disciplines including those beyond just environmental and chemical engineering Bottom line A must for any technical library Kenneth I GATE Environment Science & Engineering [ES] Question Bank 3000+ Questions Based on Exam Format MCQ/NAT/Fill the Blank DIWAKAR EDUCATION HUB, GATE Environment Science Engineering Code ES Practice Sets 3000 Question Answer MCQ NAT Fill in the Blank Highlights of Question Answer Covered All 9 Sections of Latest Syllabus Based MCQ NAT MSQ As Per Syllabus In Each Chapter Unit Given 333 MCQ NAT Fill the Blank In Each Unit You Will Get 333 Question Answer Based on Multiple Choice Questions MCQs Numerical Answer Type NAT Fill in the Blank Questions Total 3000 Questions Answer with Explanation Design by Professor JRF Qualified Faculties Oswaal IEE Main (2019-2023) Question Bank Chapterwise + Topicwise | Chemistry (For 2024 Exam) Oswaal Editorial Board, 2023-05-25 Description of the product 100% Updated with 4 Shifts Fully Solved 2023 January April Papers Extensive Practice No of Questions Physics 1000 Chemistry 1000 Mathematics 1000 Cognitive Learning with Smart Mind Maps Mnemonics Valuable Exam Insights with Expert Tips to crack JEE Main in first attempt Concept Clarity with Concept based revision notes detailed explanations 100% Exam Readiness with 5 Years Chapter wise Trend Analysis 2019 2023 Reaction Rate of Uranium Metal with Uranium Tetrafluoride in Molten Fluoride Solutions Bern Porter, Reginald E. Meaker, Thomas A. Henrie, 1966 **2024-25 NCERT** Class-XI & XII Chemistry Solved Papers YCT Expert Team , 2024 25 NCERT Class XI XII Chemistry Solved Papers 608 1195 E This book contains previous solved papers and 6070 solved objective questions with detail explanation Examcart JEE Main Physics Chapter-wise & Topic-wise Solved Papers for 2024 Exam in English Examcart Experts, Solved Model Paper Chemistry Class 12 Latest Edition 2026 SBPD Editorial, 2025-10-16 1 Solid State 2 Solution 3 Electro Chemistry 4 Chemical Kinetics 5 Surface Chemistry 6 General Principles and Processes of Extraction of Elements 7 p Block Elements 8 d and f Block Elements 9 Co Ordination Compounds 10 Haloalkanes and Haloarenes 11 Alcohols Phenols and Ethers 12 Aldehydes Ketones and Carboxylic Acid 13 Organic Compounds Containing Nitrogen 14 Biomolecules 15 Polymers 16 Chemistry in Everyday Life Latest Model Paper Set I IV With OMR Sheet Answers Board Examination Paper 2025 With OMR Sheet Solved Model Paper Chemistry Class 12 Bihar Board Latest Edition 2025 SBPD Editorial, 2025-03-30 1 Solid State 2 Solution 3 Electro Chemistry 4 Chemical Kinetics 5 Surface Chemistry 6 General

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