

# KEY

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

### Essential Skills/ State Standards:

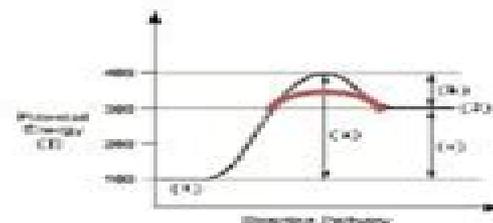
- 9-1. Describe how temperature and heat flow in terms of the motion of molecules (or atoms). (CSS: 7a)  
9-2. Know that chemical processes & phase changes can either release energy (exothermic) or absorb energy (endothermic). (CSS: 7b, 7c)  
9-3. Solve problems involving heat flow and temperature changes, using known values of specific heat ( $q = m \cdot c \cdot \Delta T$ ) & latent heat of phase change ( $q = m \cdot \Delta H$ ). (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: 9a)  
9-7. Know that equilibrium is established when the forward and reverse reaction rates are equal. (CSS: 9b)

### Vocabulary

- |                |                   |  |                            |
|----------------|-------------------|--|----------------------------|
| • Condensation | • Deposition      | • Calorimeter                                  | • Heat of reaction         |
| • Freezing     | • Heat            | • Joule  | • Le Chatelier's principle |
| • Vaporization | • Temperature     | • Specific heat                                | • Equilibrium              |
| • Melting      | • Thermochemistry | • $q = m \cdot c \cdot \Delta T$               | • Activation Energy        |
| • Boiling      | • Exothermic      | • $q = m \cdot \Delta H_{\text{vaporization}}$ | • Catalyst                 |
| • Sublimation  | • Endothermic     | • $q = m \cdot \Delta H_{\text{fusion}}$       |                            |

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

1. 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**
2. What is the importance of the activation energy in a chemical reaction?  
**Amount of energy needed for a reaction to occur.**
3. Using the collision theory, explain if the following would increase/ decrease the rate of reaction:  
 **$2 \text{HCl(aq)} + \text{Mg(s)} \rightarrow \text{MgCl}_2\text{(aq)} + \text{H}_2\text{(g)}$**
- Increase temp: **Increase, molecules collide more**
  - Increase HCl: **Increase, more collisions because more reactants to collide**
  - 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).**
  - Remove  $\text{MgCl}_2$ : **Increase, less products means less chance for them to interfere with reactant collisions**
  - Add  $\text{H}_2$ : **Decrease, more products mean they interfere more with reactants and the reactants would collide less.**
4. 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**
5. 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.**



# Chapter 18 Reaction Rates And Equilibrium Worksheet Answers

**Keith James Laidler**



## Chapter 18 Reaction Rates And Equilibrium Worksheet Answers:

**Books in Print Supplement** ,2002      *Theories of Chemical Reaction Rates* Keith James Laidler,1979      Workbook 15  
Thobeka Pete,Turret Correspondence College (Johannesburg),1988      **Rates and Mechanisms of Chemical Reactions** W.  
C. Gardiner (Jr.),William Cecil Gardiner,1969      Balancing Chemical Equations Worksheet Crispin Collins,2020-09-12  
Struggling with balancing chemical reaction Balancing chemical equations can look intimidating for lot of us The good news  
is that practice makes perfect Master balancing skill with this workbook packed with hundreds of practice problems This  
book is for anyone who wants to master the art of balancing chemical reactions First few chapters of this book are step by  
step explanation of the concepts and other chapters are for practicing problems This book help students develop fluency in  
balancing chemical equation which provides plenty of practice Methods to solve with the explanation Total of 550 problems  
to solve with answer key 450 chemical reactions to practice with answer key 100 practice problems that are needed before  
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mastering balancing skill      *Chemical Equilibria in Solution* M. J. Blandamer,1992      **A Level Chemistry Multiple  
Choice Questions and Answers (MCQs)** Arshad Iqbal,2020-04-10 Previously published as A Level Chemistry MCQs  
Multiple Choice Questions and Answers Quiz Tests with Answer Keys by Arshad Iqbal A Level Chemistry Multiple Choice  
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Compound Multiple Choice Questions 41 MCQs Carbonyl Compounds Multiple Choice Questions 29 MCQs Carboxylic Acids  
and Acyl Compounds Multiple Choice Questions 27 MCQs Chemical Bonding Multiple Choice Questions 213 MCQs Chemistry  
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Questions 50 MCQs Group IV Multiple Choice Questions 53 MCQs Groups II and VII Multiple Choice Questions 180 MCQs Halogenoalkanes Multiple Choice Questions 33 MCQs Hydrocarbons Multiple Choice Questions 53 MCQs Introduction to Organic Chemistry Multiple Choice Questions 52 MCQs Ionic Equilibria Multiple Choice Questions 56 MCQs Lattice Energy Multiple Choice Questions 33 MCQs Moles and Equations Multiple Choice Questions 50 MCQs Nitrogen and Sulfur Multiple Choice Questions 89 MCQs Organic and Nitrogen Compounds Multiple Choice Questions 54 MCQs Periodicity Multiple Choice Questions 202 MCQs Polymerization Multiple Choice Questions 36 MCQs Rates of Reaction Multiple Choice Questions 39 MCQs Reaction Kinetics Multiple Choice Questions 52 MCQs Redox Reactions and Electrolysis Multiple Choice Questions 55 MCQs States of Matter Multiple Choice Questions 66 MCQs Transition Elements Multiple Choice Questions 29 MCQs The chapter Alcohols and Esters MCQs covers topics of introduction to alcohols and alcohols reactions The chapter Atomic Structure and Theory MCQs covers topics of atom facts elements and atoms number of nucleons protons electrons and neutrons The chapter Benzene Chemical Compound MCQs covers topics of benzene arenes reaction phenol properties and reactions of phenol The chapter Carbonyl Compounds MCQs covers topics of carbonyl compounds aldehydes and ketone testing nucleophilic addition with HCN preparation of aldehydes and ketone reduction of aldehydes and ketone

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