



Principles of General Chemistry

978-1-63545-090-3



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Alta Principles of General Chemistry was developed to meet the scope and sequence of a typical two-semester introduction to chemistry course. To develop the course, Knewton used three main sources of content: Openstax, videos created by a Chemistry Professor with a graduate degree from Cal State Northridge who has taught in various undergraduate settings but specializes in organic chemistry, and a team of Subject Matter Experts (SMEs). The SMEs come from diverse backgrounds and are all accomplished academics in the field of chemistry.

Alta Principles of General Chemistry has at least two instructional sequences for every learning objective, giving students multiple opportunities to learn new concepts. Between our instructional texts, videos, and SMEs, we were able to solicit ideas from chemistry instructors and students. Alta Principles of General Chemistry covers the typical breadth of introductory chemistry topics, and also provides the necessary depth to ensure the course is manageable and engaging for instructors and students alike.

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Chapter 1: Essential Ideas

1.1 Chemistry: The Central Science

- Understand the aim, scope, and importance of chemistry
- Understand the domains of chemistry

1.2 The Scientific Method

- Understand how the scientific method works

1.3 Matter, Mass, and Weight

- Compare and contrast properties of three states of matter
- Distinguish between mass and weight
- Understand the law of conservation of matter

1.4 Atoms and Molecules

- Identify and describe atoms and molecules

1.5 Elements, Compounds, and Mixtures

- Classify matter as elements and compounds
- Distinguish between heterogeneous and homogeneous mixtures

1.6 Physical and Chemical Properties

- Understand physical properties and changes
- Understand chemical properties and changes
- Understand extensive and intensive properties of matter
- Predict physical and chemical changes

1.7 Measurements

- Understand how to use metric and SI system of units names and abbreviations
- Identify and use the SI units for length, volume, and mass

1.8 Calculations using Measurements

- Perform density and specific gravity calculations
- Survey quantities and units, understand measurements, and learn how to solve problems
- Identify and use the SI units for temperature and time

1.9 Measurement Uncertainty

- Distinguish between accurate measurements and precise measurements
- Use precision and trueness in calculations of relative error values and calculations of sample and relative standard deviation

1.10 Significant Figures

- Determine the number of significant figures in a measured number
- Use significant figures in calculations

1.11 Dimensional Analysis

- Solve single-step unit conversion problems using dimensional analysis
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1.12 Temperature Conversions

- Use Fahrenheit, Celsius, and Kelvin temperature scales and convert between them
-

Chapter 2: Atoms Molecules and Ions

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- Understand the laws of definite and multiple proportions

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- Identify and describe the subatomic particles that compose an atom

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- Calculate the average atomic mass of an element given isotopic mass and fractional abundance of each isotope

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- Read and interpret chemical symbols

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- Determine a compound's empirical formula from percent composition

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- Write and balance chemical equations

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-

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- Understand sp (1, 2, and 3) hybridization

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 - Describe the properties of solutions of solids in liquids
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- Describe how salts form from weak acids and strong bases
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