Chelsea School District Curriculum

High School Student Benchmarks

Chemistry 2

Unit 1: Structure of Matter

***THE CURRICULUM FOR CHEMISTRY 2 IS BEYOND MICHIGAN BENCHMARKS**

Matter and Energy/Standard 1: All students will measure and describe the things around us; explain what the world around us is made of; identify and describe forms of energy; and explain how electricity and magnetism interact with matter.

Changes in Matter/Standard 2: All students will investigate, describe and analyze ways in which matter changes; describe how living things and human technology change matter and transform energy; explain how visible changes in matter are related to atoms and molecules; and how changes in matter are related to changes in energy.

CHEMISTRY 2 STUDENTS WILL...

1. Explain atomic theory and atomic structure
   a. State evidence for atomic theory.
   b. Calculate atomic mass by physical and chemical means.
   c. State relationship between atomic spectra, quantum number, and atom orbitals.

2. Understand nuclear chemistry.
   a. Describe nuclear equations.
   b. Calculate half-lives and radioactivity.

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Chemistry 2

Unit 2: States of Matter

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CHEMISTRY 2 STUDENTS WILL...

1. Describe behavior of gases.
   a. Relate kinetic molecular theory to gases.
   b. Use gas laws to solve calculations.

2. Describe behavior of solids and liquids.
   a. Relate kinetic-molecular theory to solid liquids.
   b. Describe a phase diagram.
   c. Calculate energy changes during changes in state.

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Chemistry 2

Unit 3: Reactions

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Changes in Matter/Standard 2: All students will investigate, describe and analyze ways in which matter changes; describe how living things and human technology change matter and transform energy; explain how visible changes in matter are related to atoms and molecules; and how changes in matter are related to changes in energy.

CHEMISTRY 2 STUDENTS WILL...

1. Understand reaction types.
   a. Explain acid-base reactions using Arrhenious, Bronsted & Lowery concepts.
   b. Describe factors involved in precipitation reactions.
   c. Calculate oxidation numbers.
   d. Explain role of electron in redox reaction.
   e. Use theories of electrochemistry to calculate cell potentials and predict direction of redox reactions.
2. Utilize stoichiometry.
   a. Identify ionic and molecular species present in chemical reactions.
   b. Calculate mass and volume changes using the mole concept.
3. Understand equilibrium.
   a. Explain dynamic equilibrium.
   b. Describe Le Chatelier's Principle.
   c. Calculate equilibrium constants for gaseous reactions and acid-base reaction.
   d. Calculate solubility product constants.
   e. Describe common ion effect.
4. Understand chemical kinetics.
   a. Describe the concept of rate of reactions.
   b. Determine order of reaction and rate constant.
   c. Describe effect of temperature on reaction rate.
   d. Explain the relationship between the rate determining step and a reaction mechanism.
5. Understand thermodynamics.
   a. Apply the 1st law to the heat of reaction, Hess' Law, and enthalpy.
   b. Apply the 2nd law to Gibbs' free energy and free energy of reactions.

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Chemistry 2

Unit 4: Organic Chemistry

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CHEMISTRY 2 STUDENTS WILL...

1. Understand the categories of compounds.
   a. Identify compounds belonging to the following categories:
      i. alkanes
      ii. alkenes
      iii. alcohols
      iv. carboxylic acids
      v. aldehydes
      vi. ketones
      vii. aromatics
   b. State physical and chemical properties of each of the above categories.
   c. Describe addition, substitution and esterification reactions.