Updated June 5, 2024

High School Course Description: Chemistry

In middle school, GISB students receive a solid introduction to basic rules of experiments, chemical reactions, atomic structure, the periodic table, chemical bonds, and acidic and alkaline Solutions. Using this as a starting point, GISB's four-year high school chemistry curriculum addresses the topics listed below in depth. Labs are inquiry-based, and a definite emphasis is placed on conceptual and global understandings as well as on problem solving.

At the end of grade 12, our students have mastered all content from the AP Chemistry course.

For a detailed list of what is covered each year in our intensive Physics curriculum, please see below.

Grade 9

The following content is covered during this course:

- Atomic Structure and the Periodic Table
  - Empirical formulas
  - Structure of the atom and electron configuration
  - Nucleus-shell atomic model
  - Periodic trends
- Ions and Clectron Configurations, Electron Transfer Reaction
  - Formation of ions
  - Ionic bonding and ionic compounds, ionic equations, stoichiometry
  - Properties of salts and noble gases
  - Halogens producing salts
  - Oxidation-reduction reaction as electron-transfer reaction
- Chemical Bonds
  - Covalent bonding, polar and nonpolar, intramolecular forces, potential energy
  - VSEPR theory
- Acidic and Alkaline Solutions
  - Secondary bonding
  - Alkaline metals
  - Properties and reactions

Grade 10

The following content is covered during this course:

- Organic Chemistry
  - Fossil fuels
  - Hydrocarbon compounds
  - Nomenclature
  - Physical and chemical properties
  - Isomerism
  - Halogenation of hydrocarbon compounds
  - Environmental chemistry (ozone, global warming)
  - Intermolecular forces
  - Kinetics
- Oxygen-Containing Hydrocarbons
  - Alcohols
  - Carbonyl compounds
  - Carboxylic acid
  - Addictive potential of alcohol
  - Condensation reaction
  - Esterification
  - Peptide bonding
  - Proteins and lipids

Grade 11

The following content is covered during this course:

- Natural Products
  - Poteins, lipids, carbohydrates, nucleic acid
  - Properties
  - Detection reaction
  - Biological importance
  - Tensides, surfactant substances,
- Plastics
  - Polymers, structure/property relation
- Electrochemical
  - Redox reaction, oxidation number, atomic structure of the transition metals of the 4th period, galvanic cell, electrolysis, accumulators, environmental problems, calculation of potential differences in standard conditions, Law of Faraday, corrosion, and corrosion protection
  - Ionic equations, stoichiometry

GERMAN INTERNATIONAL SCHOOL | Boston

Grade 12

The following content is covered during this course:

- Reaction Speed and Equilibrium, Kinetics
  - Reaction rate, catalysis, equilibrium reaction, collision model, law of mass action, solubility equilibrium, principle of Le Chatelier, Gibbs free energy
- pH, Acids, and Bases
  - Significance of ammonia synthesis process and fertilizers, acid-base reaction, theory of Brönsted, calculation of pH values (strong and weak acids and bases), buffer solutions
- Theory of dyes, tensides, and detergents

Textbook / Informational Text Reading Amount:

Reading and problems from either/both of the textbooks listed below are assigned for homework after every class.

- **Element Chemie 7-10, Klett, 2017**
- **Elemente Chemie 2, Klett, 2018**

Types of Large Assessments in this Course:

- Unit tests, labs, quizzes, midterm exam, final exam, final project