المدرسة الأمريكية الدولية
American International School

# HIGH SCHOOL

International Baccalaureate®
Baccalauréat International
Bachillerato Internacional

## SCIENCE SCOPE AND SEQUENCE
## CHEMISTRY AND ADVANCE CHEMISTRY
## AY 24-25

| STRAND | STANDARDS/SKILLS (Common Core) | 9th | 10th | 11th/12th |
|---|---|---|---|---|
| Matter and Its Interactions (HS-PS1) | **HS-PS1-1.** Use the periodic table as a model to predict the relative properties of elements based on the patterns of electrons in the outermost energy level of atoms. | | Students use the periodic table to determine the typical reactivity of an atom. | |
| | **HS-PS1-2.** Construct and revise an explanation for the outcome of a simple chemical reaction based on the outermost electron states of atoms, trends in the periodic table, and knowledge of the patterns of chemical properties. | | Students identify the products and reactants, including their chemical formulas and the arrangement of their outermost (valence) electrons. | |
| | **HS-PS1-3**. Plan and conduct an investigation to gather evidence to compare the structure of substances at the bulk scale to infer the strength of electrical forces between particles | | Students describe the measurable properties (e.g., melting point, boiling point) of a substance and the strength of the electrical forces between the particles of the substance | |
| | **HS-PS1-4.** Develop a model to illustrate that the release or absorption of energy from a chemical reaction system depends upon the changes in total bond energy. | | Students identify bonds that are broken during the course of the reaction and the bonds that are formed during the course of the reaction. | |
| | **HS-PS1-5**. Apply scientific principles and evidence to provide an explanation about the effects of changing the temperature or concentration of the reacting particles on the rate at which a reaction occurs. | | Students construct an explanation that includes the idea that as the kinetic energy of colliding particles increases and the number of collisions increases, the reaction rate increases. In addition, students will identify that increase in concentration and Temperature will increase the rate of a reaction. | |
| | **HS-PS1-6.** Refine the design of a chemical system by specifying a change in conditions that would produce increased amounts of products at equilibrium. | | Students identify and describe* potential changes in a component of the given | |

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| | | | chemical reaction system that will increase the amounts of particular species at equilibrium | |
| | **HS-PS1-7.** Use mathematical representations to support the claim that atoms, and therefore mass, are conserved during a chemical reaction. | | Students use stoichiometric calculations to show that the number of atoms or number of moles is unchanged after a chemical reaction where a specific mass of reactant is converted to product. | |
| | **HS-PS1-8.** Develop models to illustrate the changes in the composition of the nucleus of the atom and the energy released during the processes of fission, fusion, and radioactive decay | | Students Identify an element by the number of protons. | |
| **Motion and Stability: Forces and Interactions (HS-PS2)** | **HS-PS2-4.** Use mathematical representations of Newton's Law of Gravitation and Coulomb's Law to describe and predict the gravitational and electrostatic forces between objects. | | Students will be responsible to understand coulomb's law of attraction. | |
| | **HS-PS2-6**. Communicate scientific and technical information about why the molecular-level structure is important in the functioning of designed materials. | | Student will be visualizing the molecular level using simulation | |
| **Energy (HS-PS3)** | **HS-PS3-5**. Develop and use a model of two objects interacting through electric or magnetic fields to illustrate the forces between objects and the changes in energy of the objects due to the interaction | | Students identify the nature of the interaction (electric or magnetic) between the two objects | |
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| **Waves and Their Applications in Technologies for Information Transfer (HS-PS4)** | **HS-PS4-1.** Use mathematical representations to support a claim regarding relationships among the frequency, wavelength, and speed of waves traveling in various media. | | Students identify and describe Mathematical values for frequency, wavelength, and speed of waves traveling in various specified media | |
| | **HS-PS4-3**. Evaluate the claims, evidence, and reasoning behind the idea that electromagnetic radiation can be described either by a wave model or a particle model, and that for some situations one model is more useful than the other | | Students identify the given evidence to be evaluated, including the following phenomena: i. Interference behavior by electromagnetic radiation; and ii. The photoelectric effect | |
| | **HS-PS4-4**. Evaluate the validity and reliability of claims in published materials of the effects that different frequencies of electromagnetic radiation have when absorbed by matter. | | Students determine the validity and reliability of the sources of the claims. | |
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