Integrated Chemistry and Physics Correlation Guide
2016 Science Indiana Academic Standards to 2022 Performance Expectations*

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ICP.6.4 Given the periodic table, determine the atomic mass, atomic number, and charges for any element. **ICP.6.5** Given a periodic table, understand and describe the significance of column location for the elements by calculation of molar ratios of known compounds.	**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.
ICP.7.1 Pictorially or mathematically represent chemical changes using particle diagrams and chemical equations. **ICP.7.2** Demonstrate the Law of Conservation of Matter in terms of atoms and mass of substances by balancing equations. **ICP.7.3** Differentiate the basic types of reactions, for example: synthesis, decomposition, combustion, single replacement, and double replacement.	**HS-ICP1-2.** 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.
ICP.5.6 Describe and demonstrate how the kinetic theory can be extended to describe the properties of liquids and solids by introducing attractive forces between the particles.	**HS-ICP1-3.** 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.
ICP.5.7 Analyze a heating / cooling curve to describe how adding or removing thermal energy from a system changes the temperature or state of an object and be able to identify the melting and freezing temperatures of the system.	**HS-ICP1-4.** 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.
ICP.10.3 Develop and apply simple qualitative models or sketches of the atomic nucleus that illustrate nuclear structures before and after undergoing fusion, fission, or radioactive decay. **ICP.10.4** Distinguish between fusion, fission, and radioactivity and qualitatively compare	**HS-ICP1-5.** 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.

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the amount of energy released in these processes. **ICP.10.5** Explain the potential applications and possible consequences as the result of nuclear processes such as the generation of energy at nuclear power plants, including the potential damage that radioactivity can cause to biological tissues.	
ICP.1.1 Develop graphical, mathematical, and pictorial representations (such as a motion map) that describe the relationship between the clock reading (time) and position of an object moving at a constant velocity and apply those representations to qualitatively and quantitatively describe the motion of an object. **ICP.1.2** Describe the slope of the graphical representation of position vs. clock reading (time) in terms of the velocity of the object moving in one dimension. **ICP.1.3** Distinguish between the terms “distance” and “displacement”, and determine the value of either given a graphical or mathematical representation of position vs. clock reading (time). **ICP.1.4** Distinguish between the terms “speed,” “velocity,” “average speed,” and “average velocity” and determine the value of any of these measurements given either a graphical or mathematical representation.	**HS-ICP2-1.** Analyze data to support the claim that Newton’s second law of motion describes the mathematical relationship among the net force on a macroscopic object, its mass, and its acceleration.
ICP.4.4 Qualitatively and quantitatively analyze various scenarios to describe how energy may be transferred into or out of a system by doing work through an external force or adding or removing heat.	**HS-ICP3-1.** Quantitatively analyze various scenarios to describe how the change of energy in one component in a system responds to the change in energy of the other components and flow of energy into and out of the system are known.
	HS-ICP3-2. Develop and use models to illustrate that energy at the macroscopic scale can be accounted for as a combination of

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	energy associated with the motions of particles (objects) and energy associated with the relative positions of particles (objects).
	HS-ICP3-3. Design, build, and refine a device that works within given constraints to convert one form of energy into another form of energy.
ICP.8.2 Describe the relationship among voltage, current, and resistance for an electrical system consisting of a single voltage source and a single device.	**HS-ICP3-4.** 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.
	HS-ICP3-5. Gather data to build a model to describe and explain the flow of current through series and parallel electric circuits.
ICP.9.5 Describe and provide examples of how modern technologies use mechanical or electromagnetic waves and their interactions to transmit information.	**HS-ICP4-1.** Use mathematical representations to support a claim regarding relationships among the frequency, wavelength, and speed of waves.

*Performance expectations are three dimensional. All three dimensions (Disciplinary Core Ideas, Science and Engineering Practices, and Crosscutting Concepts) must be included as part of effective instruction.

For more information, see the Indiana Department of Education's Indiana Academic Standards webpage or contact the Office of Teaching and Learning.