Iowa Science

Physical Science

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. HS-PS1-1	**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.** HS-PS1-1
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. HS-PS1-2	**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.** HS-PS1-2
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. HS-PS1-3	**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.** HS-PS1-3
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. HS-PS1-4	**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.** HS-PS1-4
Apply scientific pri to explanation about the	**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.** HS-PS1-5

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effects of changing the temperature or concentration of the reacting particles on the rate at which a reaction occurs. HS-PS1-5	
Refine the design of a chemical system by specifying a change in conditions that would produce increased amounts of products at equilibrium. HS-PS1-6	**6 Refine the design of a chemical system by specifying a change in conditions that would produce increased amounts of products at equilibrium.** HS-PS1-6
Use mathematical representations to support the claim that atoms, and therefore mass, are conserved during a chemical reaction. HS-PS1-7	**7 Use mathematical representations to support the claim that atoms, and therefore mass, are conserved during a chemical reaction.** HS-PS1-7
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. HS-PS1-8	**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.** HS-PS1-8
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. HS-PS2-1	**9 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.** HS-PS2-1
Use mathematical representations to su th a s	**10 Use mathematical representations to support the claim that the total momentum of a system of objects is conserved when there is no net force on the system.** HS-PS2-2

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conserved when there is no net force on the system. HS-PS2-2	
Apply scientific and engineering ideas to design, evaluate, and refine a device that minimizes the force on a macroscopic object during a collision. HS-PS2-3	11 Apply scientific and engineering ideas to design, evaluate, and refine a device that minimizes the force on a macroscopic object during a collision. HS-PS2-3
Use mathematical representations of Newton's Law of Gravitation and Coulomb's Law to describe and predict the gravitational and electrostatic forces between objects. HS-PS2-4	12 Use mathematical representations of Newton's Law of Gravitation and Coulomb's Law to describe and predict the gravitational and electrostatic forces between objects. HS-PS2-4
Plan and conduct an investigation to provide evidence that an electric current can produce a magnetic field and that a changing magnetic field can produce an electric current. HS-PS2-5	13 Plan and conduct an investigation to provide evidence that an electric current can produce a magnetic field and that a changing magnetic field can produce an electric current. HS-PS2-5
Communicate scientific and technical information about why the molecularlevel structure is important in the functioning of designed materials. HS-PS2-6	14 Communicate scientific and technical information about why the molecularlevel structure is important in the functioning of designed materials. HS-PS2-6
Create a computational model to calculate the change in the energy of on sy in	15 Create a computational model to calculate the change in the energy of one component in a system when the change in energy of the other component(s) and energy flows in and out of the system are known. HS-PS3-1

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component(s) and energy flows in and out of the system are known. HS-PS3-1	
Develop and use models to illustrate that energy at the macroscopic scale can be accounted for as a combination of energy associated with the motions of particles (objects) and energy associated with the relative position of particles (objects). HS-PS3-2	**16** **Develop and use models to illustrate that energy at the macroscopic scale can be accounted for as a combination of energy associated with the motions of particles (objects) and energy associated with the relative position of particles (objects).** HS-PS3-2
Design, build, and refine a device that works within given constraints to convert one form of energy into another form of energy. HS-PS3-3	**17** **Design, build, and refine a device that works within given constraints to convert one form of energy into another form of energy.** HS-PS3-3
Plan and conduct an investigation to provide evidence that the transfer of thermal energy when two components of different temperature are combined within a closed system results in a more uniform energy distribution among the components in the system (second law of thermodynamics). HS-PS3-4	**18** **Plan and conduct an investigation to provide evidence that the transfer of thermal energy when two components of different temperature are combined within a closed system results in a more uniform energy distribution among the components in the system (second law of thermodynamics).** HS-PS3-4
Develop and use a model of two objects interacting through electric or magnetic fields to illustrate the forces between objects	**19** **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-PS3-5

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due to the interaction. HS-PS3-5

Use mathematical representations to support a claim regarding relationships among the frequency, wavelength, and speed of waves traveling in various media. HS-PS4-1

20 Use mathematical representations to support a claim regarding relationships among the frequency, wavelength, and speed of waves traveling in various media. HS-PS4-1

Evaluate questions about the advantages of using a digital transmission and storage of information. HS-PS4-2

21 Evaluate questions about the advantages of using a digital transmission and storage of information. HS-PS4-2

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. HS-PS4-3

22 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. HS-PS4-3

Evaluate the validity and reliability of claims in published materials of the effects that different frequencies of electromagnetic radiation have when absorbed by matter. HS-PS4-4

23 Evaluate the validity and reliability of claims in published materials of the effects that different frequencies of electromagnetic radiation have when absorbed by matter. HS-PS4-4

Communicate technical information about how some technological devices use the principles of wave be
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24 Communicate technical information about how some technological devices use the principles of wave behavior and wave interactions with matter to transmit and capture information and energy. HS-PS4-5

information and energy.

HS-PS4-5