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Colligative properties worksheet high school biology

Lesson plans are subdivided according to Georgia Performance Standards. (All files are in PDF format unless otherwise noted.) Atoms and the Periodic Table Atoms and Changes (PowerPoint) Playing Jeopardy to learn about matter, atoms, parts of atoms and changes. Bag O' Isotopes In this activity, students will learn to calculate average atomic mass using the fictional element legumium. What's So Special About Bottled Drinking Water? Testing Water for Hardness This laboratory teaches students about water hardness, polar and non-polar molecules, and anions and cations. Classes of Matter - Part I Several types of household matter will be placed at different lab stations and students will be asked to identify if it is a solution, mixture, compound or element, and what type, if applicable. Classes of Matter - Part II This inquiry based lab builds upon the ability to classify matter and asks the student to explain the experiments used to determine the chemical and physical properties of the sample, and determine if their data matches their classification. This lab can be remediated or extended by including more identifications of less obvious classification. Using Freezing-Point Depression to Find Molecular Weight Freezing-point depression, a colligative property, is investigated. Technology is used to collect, graph and analyze both the cooling of a pure solvent and the cooling of the solvent when a solute is added. The freezing-point depression of the solvent is determined from the data. Using the freezing-point depression and the molality of the solution, the molecular weight of the solute is determined. Periodic Table of Fun This group project is meant to reinforce the concept of that the periodic table is a method of organizing the elements. Students will select a category of their choice (animals, food, etc.) and come up with a periodic table of these 'elements' organized in a way of their choosing. Points are according to attached rubric. Resume of an Element This is a worksheet that addresses properties of atoms and the periodic table. The lesson was developed for a Physical Science class. The worksheet is completed from information gathered on a specific internet site, www.webelements.com. The intention is to take a class to the library and allow students to each fill out their own worksheet on a different element. Taste the Electron (zip) This lesson is used to teach basic chemistry concepts. Emphasizing the role of valence electrons in the outer shell will highlight important biological elements and their reactions with other elements. Back to Top Chemical Bonding Classes of Matter - Part II This inquiry based lab builds upon the ability to classify matter and asks the student to explain the experiments used to determine the chemical and physical properties of the sample, and determine if their data matches their classification. This lab can be remediated or extended by including more identifications of less obvious classification. Flavor of Organic Chemistry This three-part unit introduces students to organic chemistry through the study of flavor. The unit presents basic concepts of organic chemistry such as defining organic compounds, functional groups, naming organic compounds, and the importance of organic molecules in everyday life. Lesson One, What is Flavor...and How do We Know?, introduces students to the components of flavor, taste and aroma, through interactive experiences. In Lesson Two, Making Scents of Esters, students prepare esters through the process of esterification. In Lesson Three, Flavor-"Fool", students discover how the five senses affect the perception of flavor. The lessons contained in this unit may be used together as a unit or as stand-alone lessons. Back to Top Chemical Reactions Basic Synthesis This lesson plan is a tool to use when teaching chemical reactions. Students will synthesize magnesium hydroxide and aluminum hydroxide using common household products. Teacher conclusions and review of lab will demonstrate the use of chemistry in society and how the products synthesized in this lab are used in everyday life. Chemical and Physical Reactions in Your Kitchen This lab helps students to understand the difference between chemical and physical changes. Students perform common household tasks like melting chocolate. They then have to determine what kind of change occurred during the task. Answers are not always as straight forward as those given in textbooks. The lab is geared toward Physical Science Students. Classes of Matter - Part II This inquiry based lab builds upon the ability to classify matter and asks the student to explain the experiments used to determine the chemical and physical properties of the sample, and determine if their data matches their classification. This lab can be remediated or extended by including more identifications of less obvious classification. Energy Content of Foods The energy content of foods is investigated. The energy released by a number of food samples and absorbed by water is determined using technology. Inferences about the energy content of foods with high fat content and foods with high carbohydrate content are then made. Flavor of Organic Chemistry This three-part unit introduces students to organic chemistry through the study of flavor. The unit presents basic concepts of organic chemistry such as defining organic compounds, functional groups, naming organic compounds, and the importance of organic molecules in everyday life. Lesson One, What is Flavor...and How do We Know?, introduces students to the components of flavor, taste and aroma, through interactive experiences. In Lesson Two, Making Scents of Esters, students prepare esters through the process of esterification. In Lesson Three, Flavor-"Fool", students discover how the five senses affect the perception of flavor. The lessons contained in this unit may be used together as a unit or as stand-alone lessons. Making Scents of Esters Introduces students to organic chemistry through the study of flavor. In this lesson, students prepare esters through the process of esterification. (This is activity may be used as a stand-alone lesson or as Lesson 2 of a 3-part unit entitled The Flavor of Organic Chemistry) Using Freezing-Point Depression to Find Molecular Weight Freezing-point depression, a colligative property, is investigated. Technology is used to collect, graph and analyze both the cooling of a pure solvent and the cooling of the solvent when a solute is added. The freezing-point depression of the solvent is determined from the data. Using the freezing-point depression and the molality of the solution, the molecular weight of the solute is determined. Power of Peanuts This lesson plan is for a laboratory activity demonstrating the amount of energy found in a peanut. Peanuts contain proteins, fats, and carbohydrates. Oxidation of the molecular bonds found in these compounds leads to the release of energy. Stoichiometry of S'mores In this activity, students will explore the principles of stoichiometry by building S'mores, the delicious, chocolate, marshmallow, and graham cracker treats. Back to Top Nature of Matter Atoms and Changes (PowerPoint) Playing Jeopardy to learn about matter, atoms, parts of atoms and changes. Cat Chemistry This research lab is a worksheet filled out by students, and the purpose is to analyze food labels for inorganic compounds, to gain practice writing and recognizing inorganic formulas, and converting between chemical formulas and chemical names. A table of common ions is attached, but this lab builds upon lectures of inorganic ions and other ions can be selected. Classes of Matter - Part I Several types of household matter will be placed at different lab stations and students will be asked to identify if it is a solution, mixture, compound or element, and what type, if applicable. Classes of Matter - Part II This inquiry based lab builds upon the ability to classify matter and asks the student to explain the experiments used to determine the chemical and physical properties of the sample, and determine if their data matches their classification. This lab can be remediated or extended by including more identifications of less obvious classification. Cool as Ice! In this demonstration, students will explore the principles of operation of a microwave oven in relation to molecular motion. Density and Texture of Soil With this lesson, students will understand soil texture and bulk density as well as the importance of these characteristics to both scientific and agricultural applications. Endothermic and Exothermic Reactions This lesson focuses on the use of technology to collect, graph and analyze data from an exothermic and an endothermic reaction. Energy Content of Foods The energy content of foods is investigated. The energy released by a number of food samples and absorbed by water is determined using technology. Inferences about the energy content of foods with high fat content and foods with high carbohydrate content are then made. Freezing and Melting of Water The cooling and warming behavior of water is investigated. With the use of technology, water temperature data is collected, graphed and analyzed. The freezing and melting points of water are determined and compared. Using Freezing-Point Depression to Find Molecular Weight Freezing-point depression, a colligative property, is investigated. Technology is used to collect, graph and analyze both the cooling of a pure solvent and the cooling of the solvent when a solute is added. The freezing-point depression and the molality of the solution, the molecular weight of the solute is determined. Heating and Cooling of Land Forms The purpose of this lab is to observe heating and cooling rates of samples of soil, grass, saltwater, fresh water, and sand. The sun's energy warms different types of materials at different rates. This activity will demonstrate the different rates at which common substances seen in nature are heated by the sun's energy. I Second That Emulsion Students explore mixtures and emulsions by making mayonnaise. I'm Eating What!?!? Students will be introduced to one another, as well as to the field of food science, as they match raw ingredients with finished food products. In The Mix! A Separation Lab In this inquiry exercise, students will devise a procedure to separate and quantify the components of a mixture containing sand, salt, and iron filings. Physical Properties of Wood This is a hands-on lesson in which students investigate the relationship between physical properties of wood and its suitability for construction purposes. Students will investigate the density, stiffness, and elasticity of several species of wood. Splat! In this lab, students will perform the viscosity splat test to measure the relative viscosities of several common food liquids. Using the splat diameter measured during the tests, students will construct a standard curve and use the curve to estimate the viscosity of glycerin. Viscosity Funnel Lab In this lesson, students will investigate the concept of viscosity as it relates to some common food products. Students will gain an understanding of properties that affect viscosity and the importance of viscosity in food related industries. What's Happening to My Food? Students will observe and classify physical and chemical changes commonly occurring in foods. Back to Top Organic Chemistry Cell Organelle Review Game This is a quick and easy game that students can play to review the organelles inside of a both plant and animal cells. Students will use the definition to identify the appropriate cell structure and its role inside the cell. They also will identify if these structures are present in both plant and animal cells. 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In this lesson, students learn about the components of flavor, taste, and aroma through interactive experiences. (This is activity may be used as a stand-alone lesson or as Lesson 1 of a 3-part unit entitled The Flavor of Organic Chemistry). I'm Eating What!?!? Students will be introduced to one another, as well as to the field of food science, as they match raw ingredients with finished food products. Tomato...Flavorful or Flavorless? In this activity, students will explore the principles of sensory evaluation by participating in and analyzing the results of a consumer acceptability test. *This lesson plan was created as a component of the Product Development Competition materials. Back to Top Solids, Liquids, and Gases Freezing and Melting of Water The cooling and warming behavior of water is investigated. With the use of technology, water temperature data is collected, graphed and analyzed. The freezing and melting points of water are determined and compared. Using Freezing-Point Depression to Find Molecular Weight Freezing-point depression, a colligative property, is investigated. Technology is used to collect, graph and analyze both the cooling of a pure solvent and the cooling of the solvent when a solute is added. The freezing-point depression of the solvent is determined from the data. Using the freezing-point depression and the molality of the solution, the molecular weight of the solute is determined. Phases of Matter (PowerPoint) Playing Jeopardy to learn phases of matter, scientific methods and measurements. Viscosity Funnel Lab In this lesson, students will investigate the concept of viscosity as it relates to some common food products. Students will gain an understanding of properties that affect viscosity and the importance of viscosity in food related industries. Back to Top Solutions, Acids, and Bases Back to Top

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