Science

Brunswick School Department
Grade 9
Classification of Matter

Draft 9/10/12

Essential Understandings	▪ Causation: Nothing "just happens". Everything is caused ▪ Interrelatedness: Everything in the universe is connected to everything else in the universe. ▪ Dynamism: Everything is changing in some way all the time. ▪ Entropy: Change has direction. Generally, simple precedes complex. Generally, order changes toward disorder. ▪ Uniformitarianism: The way the universe works today is the way it worked yesterday and the way it will work tomorrow.
Essential Questions	▪ How do substances and mixtures differ? ▪ What constitutes a chemical property and chemical change? ▪ What is the difference between chemical properties and physical properties? ▪ What is the difference between chemical change and physical change? ▪ How do physical changes obey the Law of Conservation of Matter? ▪ How is the Law of Conservation of Matter observed in chemical changes? ▪ What is solubility and how is it calculated? ▪ What is Archimedes' Principle? ▪ What is Pascal's Principle? ▪ What are the basic gas laws?
Essential Knowledge	▪ Elements and compounds are substances. ▪ Mixtures are either homogeneous or heterogeneous. ▪ Chemical changes result in the formation of new substances. ▪ Physical changes do not result in new substances. ▪ Solubility is a physical property that can be quantified ▪ Density is a physical property that can be quantified ▪ Solve problems using Archimedes' Principle ▪ Solve problems using Pascal's Principle ▪ Solve problems using the basic gas laws (Boyle, Charles, Gay-Lussac and Combined)
Vocabulary	▪ Terms: ○ Elements ○ Compounds ○ Solutions ○ Mixture ○ Suspensions ○ Colloid ○ Tyndall Effect ○ Archimedes' Principle ○ Pascal's Principle ○ Boyle's Law ○ Charles' Law ○ Gay-Lussac's Law

	○ Combined gas law
Essential Skills	▪ Safely use laboratory burner. ▪ Distinguish between chemical and physical properties. ▪ Distinguish between chemical and physical changes. ▪ Classify solutions, suspensions and colloids.
Related Maine Learning Results	B1 Skills and Traits of Scientific Inquiry **Students methodically plan, conduct, analyze data from, and communicate results of in-depth scientific investigations, including experiments guided by a testable hypothesis.** a. Identify questions, concepts, and testable hypotheses that guide scientific investigations. b. Design and safely conduct methodical scientific investigations, including experiments with controls. c. Use statistics to summarize, describe, analyze, and interpret results. d. Formulate and revise scientific investigations and models using logic and evidence. f. Recognize and analyze alternative explanations and models using scientific criteria. g. Communicate and defend scientific ideas. D3 Matter and Energy **Students describe the structure, behavior, and interactions of matter at the atomic level and the relationship between matter and energy.** a. Describe the structure of atoms in terms of neutrons, protons, and electrons and the role of the atomic structure in determining chemical properties. b. Describe how the number and arrangement of atoms in a molecule determine a molecule's properties, including the types of bonds it makes with other molecules and its mass, and apply this to predictions about chemical reactions. d. Describe how light is emitted and absorbed by atoms' changing energy levels, and how the results can be used to identify a substance. e. Describe factors that affect the rate of chemical reactions (including concentration, pressure, temperature, and the presence of molecules that encourage interaction with other molecules). f. Apply and understanding of the factors that affect the rate of chemical reaction to predictions about the rate of chemical

	reactions. g. Describe nuclear reactions, including fusion and fission, and the energy they release. h. Describe radioactive decay and half-life. i. Explain the relationship between kinetic and potential energy and apply knowledge to solve problems. j. Describe how in energy transformations the total amount of energy remains the same, but because of inefficiencies (heat, sound and vibration) useful energy is often lost through radiation or conduction. k. Apply an understanding of energy transformations to solve problems. l. Describe the relationship among heat, temperature, and pressure in terms of the actions of atoms, molecules and ions.
Sample Lessons And Activities	▪ Lab: Classify Chemical And Physical Changes ▪ Lab: Alchemist Dream (Penny Lab) ▪ Tyndall Effect demonstration ▪ CO_2 Flame Extinguish demonstration ▪ Research Archimedes, Pascal or one of the gas law scientists and write a paper about their work.
Sample Classroom Assessment Methods	▪ Classification of Matter Quizzes ▪ Chapter Tests ▪ Laboratory Reports ▪ Student Classification Auxiliary Measurements
Sample Resources	▪ Publications: ○ Glencoe Physical Science ○ MARVEL Data bases* ○ GALE Resource Data bases** ▪ Videos: ○ Connections Series ○ The World of Chemistry
Technology Link	▪ http://www.brunswick.k12.me.us/curriculum ▪ * Data base may also be accessed from home http://www.maine.gov/marvel ▪ ** Data base may also be accessed from home with logon and password http://infotrac.galegroup.com/itweb