Chemistry activities and demonstrations to support Core Content for Science in Grade 7

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The Kentucky core content provides the following goal for middle school science.
"Goal 2: Students shall develop their abilities to apply core concepts and principles from mathematics, the sciences, the arts, the humanities, social studies, practical living studies, and vocational studies to what they will encounter throughout their lives."

Below we list components of Kentucky's core content for middle school science, and provide the numbers of demonstrations or activities that would support each component. The demonstration numbers refer to our "list of demonstrations", which is a separate document available from http:/www.chem.uky.edu/outreach. Please see the list of demonstrations to see each indicated demonstration's name and other demonstrations related to it. Anything on the demonstration list is already a working component of our repertoire. However WE ENTHUSIASTICALLY ENCOURAGE requests for new demonstrations to address whatever topic your class is interested in, or struggling with. If you have a new demonstration idea or request, please email Dr. Anne-Frances Miller (afm@uky.edu) so we can have a conversation and come up with something that addresses your class' needs.

The suggested demonstrations and activities have been designed to include colorful demonstrations as well as many that utilize substances and processes encountered in everyday life. These teach that the science lessons learned in school apply far beyond the textbooks, and encourage students to repeat the activities on their own at home.

Grade 7

Structure and Transformation of Matter: Physical Science

SC-07-1.1.1 Students will: classify substances according to their chemical/reactive properties; infer real life applications for substances based on chemical/reactive properties. (In chemical reactions, the total mass is conserved. Substances are often classified into groups if they react in similar ways. The

patterns, which allow classification, can be used to infer or understand real life applications for those substances.)

Demonstrations 1.2, 1.7, 1.8, 2.1, 2.2, 2.3, 2.4, 2.6, 4.1, 4.2, 4.3, 4.4, 4.5, 4.6, 4.7, 4.8, 4.9, 6.8, 8.5

SC-07-1.1.2 Students will: Classify elements and compounds according to their properties; compare properties of different combinations of elements. (Observations of simple experiments illustrate that the atoms of chemical elements do not break down during normal laboratory reactions such as heating, exposure to electric currents, or reaction with acids. Elements combine in many ways to produce compounds. Common patterns emerge when comparing and contrasting the properties of compounds to the elements from which they are made. Understanding of these patterns allows for evidence-based predictions of new or different combinations of elements/compounds.)

Demonstrations 1.2, 1.7, 1.8, 2.1, 2.2, 2.3, 2.4, 2.6, 4.1, 4.2, 4.3, 4.4, 4.5, 4.6, 4.7, 4.8, 4.9, 6.8, 8.5

Unity and Diversity: Biological Science

SC-07-3.4.1 Students will: describe the roles of genes/chromosomes in the passing of information from one generation to another (heredity); compare inherited and learned traits. (Every organism requires a set of instructions for specifying its traits. This information is contained in genes located in the chromosomes of each cell that can be illustrated through the use of models. Heredity is the passage of these instructions from one generation to another and should be distinguished from learned traits.)

Demonstrations 3.7, 3.8, 3.9, 8.11, 8.12, 8.14

Energy Transformations: Unifying Concepts

SC-07-4.6.2 Students will: Describe the transfer and/or transformations of energy which occur in examples that involve several different forms of energy (e.g., heat, electrical, light, motion of objects and chemical); explain, qualitatively or quantitatively, that heat lost by hot object equals the heat gained by cold object. (The transfer and transformation of energy can be examined in a variety of real life examples. Models are an appropriate way to convey the abstract/invisible transfer of energy in a system. Heat energy is the disorderly motion of molecules. Heat can be transferred through materials by collisions of atoms or across space by radiation. If the material is fluid, currents will be set up in it that aid the transfer of heat. To change something's speed, to bend or stretch things, to heat or cool them, to push things together to expand or contract them or tear them apart all require transfers (and some transformations) of energy. Heat lost by hot object equals the heat

gained by cold object. This is an energy conservation statement. Whenever hot and cold objects are put in contact, heat energy always transfers from the hot object to the cold object and this continues until all the mass is at the same temperature. Students should understand that heat produced by burning comes from the release of chemical energy of the substance.)

Demonstrations 1.2, 2.1, 2.2, 2.3, 2.4, 2.5, 3.1, 3.2, 3.3, 3.4, 3.5, 3.6, 3.7, 3.8, 3.9, 3.10, 3.11, 3.12, 3.13, 3.14, 3.15, 6.1, 6.2, 6.3, 6.4, 6.5, 6.6, 6.7, 6.8, 6.9, 8.1, 8.2, 8.5, 8.6, 8.7, 8.8, 8.9, 8.11, 8.12, 8.13, 8.14

SC-07-4.6.3 Students will understand that waves are one way that energy is transferred. Types of waves include sound, light, earthquake, ocean, and electromagnetic.

Demonstrations 1.2, 2.1, 2.2, 2.5, 6.0, 8.11

SC-07-4.6.4 Students will describe or represent the flow of energy in ecosystems, using data to draw conclusions about the role of organisms in an ecosystem. (For most ecosystems, the major source of energy is sunlight. Energy entering ecosystems as sunlight is transferred by producers into chemical energy through photosynthesis. That energy then passes from organism in food webs.)

Demonstrations 6.6, 6.7, 8.1, 8.2, 8.3, 8.4, 8.5, 8.6, 8.7, 8.8, 8.9, 8.10, 8.11, 8.12, 8.13, 8.14