Think-Tac-Toe: Chemistry

Overview: These Think-Tac-Toe options allow students to choose their own ways of showing what they have come to know and understand about the nature of chemistry and the chemical substances that surround our daily lives. The tasks are structured according to Gardner's Theory of Multiple Intelligences, with each of the eight intelligences being represented. Students may choose any three options going across, down or diagonally within the grid. This Think-Tac-Toe can be used as one of the culminating activities for a unit on chemistry and/or the structure of matter and can be combined with other formal assessments to evaluate student learning.

Standards:

- Build an understanding of chemistry and chemical concepts
- Investigate matter to discover its properties
- Evaluate the periodic chart to recognize the more than 100 elements and to discover that each element has distinct properties and atomic structures
- Discover that all forms of matter are composed of one or more elements
- Identify areas of life in which chemicals play an important role

Objectives:

The students will **KNOW**

- The structure and composition of an atom.
- The states of matter and their relationship to molecular motion.
- Chemical properties that distinguish one element from another.

The students will **UNDERSTAND THAT**

- All matter is made up of atoms.
- Chemicals play an important role in everyday life.
- Substances can be identified based upon their physical and chemical properties.
- All forms of matter are composed of one or more elements.

The students will **BE ABLE TO**

- Conduct research.
- Read and interpret the periodic chart of the elements.
- Determine the solubility of a substance.
- Identify the use and significance of chemicals in everyday life.
- Describe and illustrate atomic structure.
- Interpret the role of molecular motion in determining the state of matter.
- Justify thinking and defend choices.

Basis for Differentiation: Student learning profile (Gardner's Multiple Intelligences)

Science

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Many of the elements in the Periodic Table were named in ancient times. Research the word origins of elements whose symbols don't relate to their English names. Identify ten elements named by the ancient Greeks and Romans. Create a spreadsheet on your computer to show the element's ancient name, its symbol, and its modern name. *(Verbal/Linguistic)*	Choose at least five elements, compounds, or a combination of the two. Create cartoon characters out of their chemical symbols. Design a comic strip based on your characters and draw enough panels to describe an adventure, based on your knowledge of chemistry concepts. For example, your strip might show how the elements combined to form a compound. *(Visual/Spatial)*	Conduct an interview with a doctor, nurse, or any type of health care professional. You may interview this individual in person, over the phone, via e-mail or instant messaging. Design questions to discover how chemicals might play a part in the following diseases or syndromes: cancer, diabetes, heart disease, birth defects, asthma, learning disorders, and behavior disorders. *(Interpersonal)*
You are a drop of water that has fallen from the sky during a thunderstorm. Compose an autobiography of your life. Focus on your feelings as the matter in your body changed states. Describe a time when you were frozen into a solid and another instance when you were heated to evaporate into a gas. Where were you when these changes occurred? How did your atoms and molecules react to the changes in state? Discuss their movement. Include as many chemistry vocabulary words as possible in your story. *(Intrapersonal)*	Water is known as the universal solvent because it dissolves so many substances. A water molecule is polar. Research the difference between polar and non-polar molecules. Polar molecules will mix with each other and non-polar molecules will do the same. However, polar and non-polar molecules won't mix together. Using liquids or emulsions (such as mayonnaise) found around your home, discover 5 that will dissolve in water and 5 that won't. Display your results in a chart or demonstration for the class. What conclusions can you draw? *(Bodily/Kinesthetic, Verbal/Linguistic*)	Secure a bag of gumdrops that contains six different colors. Each gumdrop represents one atom. Assign a color to each of these elements: carbon, hydrogen, oxygen, chlorine, nitrogen, and sulfur. Using toothpicks as bonds, construct models of the following molecules: Carbon dioxide, water, nitrogen dioxide, sulfur dioxide and hydrochloric acid. Create a chart that identifies the chemical symbol for each molecule and the color associated with each element. *(Bodily/Kinesthetic, Visual/Spatial)*
Identify 8 common chemical compounds found in an average home. Using either their common names or their chemical formulas, create a rap naming them and explaining their importance to our lives. Perform the rap for your class. *(Musical/Rhythmic)*	Using a digital or video camera, take pictures of places and/or objects in the natural world where elements from the periodic table occur. Download your images onto a computer and create a slide show or movie, using a voice-over or labels to identify which elements are being illustrated. *(Naturalist)*	Choose a family of elements from the Periodic Table. Using your computer software, create a bar, circle, or line graph that compares/contrasts the number of protons, neutrons, and electrons found in each member element of the family. *(Mathematical/Logical)*