**Middle School STEM Science Lab/Activity Planner**

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| Name of Lab/Activity: Physical and Chemical Changes | | Grade: 8 |
| California Science Standard(s): (please copy and paste standards taught during this lesson)  5 a.*Students know* reactant atoms and molecules interact to form products with  different chemical properties.  *7. Students know* substances can be classified by their properties, including their  melting temperature, density, hardness, and thermal and electrical conductivity.  3 b.*Students know* that compounds are formed by combining two or more different  elements and that compounds have properties that are different from their  constituent elements. | | |
| Learning Objective/Goal:  Identify and explain the difference between a physical and a chemical change.  Recognize the signs of a physical and chemical changes. | | |
| Language Objective/Goal: (based on California Common Core Standards)  Reading Standards (Science & Technology) : 7: Integrate quantitative or technical information expressed in words in a text with a version of that information expressed visually.  9. Compare and contrast the information gained from experiments, simulations, video, or multimedia sources with that gained from reading a text on the same topic.  Writing Standards (Science and Technology): 2d: Use precise language and domain –specific vocabulary to inform about or explain the topic.  2e. Establish and maintain a formal style and objective tone.  2f. Provide a concluding statement or section that follows from and supports the information or explanation presented. | | |
| Materials & Resources:  Paper, matches, salt, popcorn, hot plate, water, candle, glass, alka-seltzer, beaker, vinegar, milk, oil, food coloring. | | |
| Procedure:  1. **Demo 1:**  a. Demonstrate the popcorn popping in a beaker on a hotplate.  b. Ask the students to elaborate on the reason that  popcorn popped. What happens to the water trapped inside the kernel? What kind of a change is it and why? What happens to the kernels that got burned or scorched?  2. **Demo 2:**    a. Take a heaping tablespoon of baking powder into a  beaker. Discuss the physical properties like color, texture, odor. Pour 10 ml of vinegar into a test tube. Observe it’s physical properties. Pour the vinegar into the beaker containing baking powder.  b. Ask the students to discuss their observations. Was a new substance formed? Are the properties of the new substance similar to baking powder or vinegar? What kind of a change is it and why?  3. Have a class discourse to reiterate the differences  between chemical and physical changes.  4. Set up 7 stations showing physical and chemical changes. A lab group visits each station, performs the activity, draws their observation and writes their conclusion. (For details, see the attached pdf)  5. Safety precautions will be discussed for each station – wearing goggles, tying back hair etc.  6. Once all the groups are seated, teacher will ask each group to present their conclusion for one activity. Other groups will be invited to agree or disagree with their answer. Students will be asked to use evidence collected during the activity to support their conclusions. | Teaching Notes: (include timing)  Popcorn Kernels have water trapped inside that convert into gas and so the kernel pops. It’s a physical change.  For explanation of the reaction between baking powder and vinegar, refer to  <http://library.thinkquest.org/3347/vinegar+bsoda4.html> | |
| Math Connection:  Connect with prior knowledge of measuring mass and volume.  Using these qualities to determine density.  Application of accurate and appropriate units of measurement.  Using density as a characteristic property to identify objects through application of knowledge and deductive reasoning. | Teaching Notes:  Math makes life better: Have fun! ☺ | |
| Technology Extension of Learning:  Document Camera used to enhance observations made during demonstrations.  Electrolysis and Fuel Cell Technology can be used to lead into a unit on alternative energy.  \*\*Fuel Cell Animation to enhance electrolysis extension | Teaching Notes:  Animation:  <http://www1.eere.energy.gov/hydrogenandfuelcells>  /fuelcell\_animation.html | |
| Formative Assessment: (please see the following documents:   1. Physical and Chemical Change Worksheet 2. Physical and Chemical Change(s) Worksheet .pdf 3. ChemPhyschangetableinstructions 4. Understanding ChemicalPhysicalpropertieschanges.pdf | Teaching Notes:  The concepts that are addressed in this lesson can be supported and extended upon with the resources listed. We are planning to incorporate a fuel cell car activity to support the real-world application of eletrolysis. | |
| Strategies for EL and Special Needs Students:  Modified worksheet  Extended time to complete assignment  Small group speaking  Whiteboard matching of words to concepts (as pictures) | Vocabulary:  Mass, Volume, Density  Malleability, Ductility, Electrical Conductivity  Solubility  Thermal Conductivity  Reactivity  Effervescence  Flammability  Energy  Property  Characteristic Property | |

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| Alignment in science unit: (Brief description of lessons taught **prior to & after** this lab/activity)  **Before**: Mass, volume, density  **After:** Chemical Properties, Physical properties, Chemical changes, and physical changes   1. Electrolysis of water using a 9V battery to decompose water into two parts hydrogen and one part oxygen. (For details, refer to the pdf file attached) 2. Ask the students : what elements make up water ? Have students write down chemical equation for what is taking place. Have the students draw what is taking place inside the beaker as water is being broken down. What kind of a change is it and why? | |
| Brief description of lessons taught **after** this lab/activity:   * Chemical Changes * Comparing chemical and physical properties and changes including signs of chemical changes * Chapter Assessment (including mass, volume, density, chemical properties, physical properties, chemical and physical changes). | |
| Lab/Activity adapted from: (Enhancing student  understanding of physical  and chemical changes  by Julie McIntosh, Sandra | Formative Assessment adapted from:  Our Noggins |
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| This lesson was developed by: | |
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