

FIFTH GRADE CHEMISTRY STUDY

CLASS: CHEMISTRY: THE WATER MOLECULE

Pre Activity:

Do!

Bonding Time

Introduce students to the periodic table of elements. To find a black and white printable table, click here: <http://chemistry.about.com/library/PeriodicTableall.pdf>

Explain to students that everything in the universe is made up of mixtures of these elements. Point out some elements that students will recognize (e.g. hydrogen, helium, silver, neon, etc), and show the class the cards below illustrating their atomic structure. Explain that different atoms link together to make molecules. Share the scientific names of some important molecules, such as CO₂ (carbon dioxide), H₂O (dihydrogen monoxide), CH₄, (carbon tetrahydride) and NH₃ (nitrogen trihydride).

Show the class the molecule cards below illustrating the atomic structure of these simple molecules.

After discussing the structure of these molecules, provide students with materials to create their own model molecules using the correct element cards. Ask them to be creative: how can you show a bond between these elements? Provide paper, glue, string, a stapler, paper clips, and other connecting pieces to see if students can pick the appropriate element cards to create one or two of the molecules you have discussed: CO₂, H₂O, CH₄ and NH₃. Allow them to share their creative bond ideas with each other!

When bond building is complete, it may be fun to identify the molecules by their more common names (CO₂ - carbon dioxide, H₂O - water, CH₄ - methane, NH₃ - ammonia).

Think! Discuss or Write

Brainstorm a list of the amazing properties of water: how it behaves, how it contributes to the world, and how we utilize it everyday of our lives.

Post Activity:

Do!

Surface Tension

Provide groups of students with a cup of water and a small collection of paper clips. Ask students what will happen if the paper clip is dropped into the water. (They should guess that it will sink. Ask them why.) Next, encourage students to gently place a paper clip onto the water surface and see if they can make it float. This may take a few tries! (Tip: it may help to gently bend the end of the clip so that students can use it as an arm as they gently lower the clip onto the water without touching the surface with their fingers.) Explain that the surface tension of the water allows the paper clip to “float” on the surface of the water. The strong bond between the tightly organized and polar water molecules causes the water surface to act like an elastic skin supporting the paper clip. Next, have students break the surface tension by adding a drop of dish-washing soap into the cup. The paper clip will sink to the bottom of the cup. Ask students what they think the soap does to the water molecules. Explain that the soap disrupts the tight order of the bonded molecules and weakens their intermolecular forces. To extend this activity, let students try to float other flat objects in water or provide them with other materials to disrupt the surface tension of the water.

Think! Discuss or Write

How do you think molecules are packed into water in its different phases: solid (ice), liquid and gas (vapor or steam)? Discuss how this “packing” determines the behavior of these states of matter.

FIFTH GRADE CHEMISTRY STUDY

CLASS: CHEMISTRY: MIXTURES AND SOLUTIONS

Pre Activity:

Do!

Salt Water Solutions

Provide groups of students with a scale, a paper cup, a tablespoon, salt, and warm water. Clearly explain the steps of the activity before students begin. First, have students scoop one tablespoon of salt into the cup. Measure and record the weight of the cup and salt. Next, fill the cup approximately 1/3 full with hot water and stir until all the salt has dissolved into the solution. Draw a line on the cup marking the water level. Place the cups somewhere they will be undisturbed for a few weeks while the water evaporates. Ask the class to make a prediction: what will happen to the salt when the water evaporates? When the water has completely evaporated, record your observations of the cup and its contents. Measure and record the weight of the cup and the material in the cup. Lead a classroom discussion about the material left in the cup. What is it? Did dissolving change the salt drastically or is it nearly the same from when the experiment began?

Think! Discuss or Write

Why do some substances dissolve in liquids and others do not? Ask students to write their hypotheses, explaining their thoughts by discussing specific examples of substances and liquids.

Post Activity:

Do!

Saturate Your Solutions

Provide groups of students with sugar cubes (or sugar and a teaspoon), a cup with cold water, and a cup with an equal amount of hot water. Drop and stir one cube/teaspoon of sugar into the cold water. Keep track of how many cubes are dropped before the water is fully saturated (it no longer dissolves the sugar and simply lets it collect at the bottom of the cup). Ask students to predict if the warm water will hold more, less or equal amounts of sugar before reaching its saturation point. Repeat the procedure with the warm water. When finished, ask students to hypothesize why warm water was able to dissolve more sugar before becoming saturated. Provide the answer: warm water molecules move faster and are further apart from one another. Sugar fits into these little spaces as it dissolves.

Learning Goals Reinforced:

- Some materials (solutes) can dissolve into liquids.
- Liquids can only accept so much solvent before they become oversaturated.

Think! Discuss or Write

Ask students to explain in their journal why warm liquids can hold more of a solute before becoming saturated than a cold liquid can.

Link:

http://www.chem4kids.com/files/matter_solution.html

http://www.chem4kids.com/files/matter_mixture.html

FIFTH GRADE CHEMISTRY STUDY

CLASS: CHEMISTRY: CHEMICAL REACTIONS

Pre Activity:

Do!

A Scientific Property Riddle

Encourage your students to pay close attention to the physical properties of matter. Provide groups of students with a mystery substance in a sealed canister (so that other groups cannot view their material). Two groups should have the same substance, while all the others have different substances. For example, give two groups a sample of sugar, one salt, one cinnamon and another rock salt. Explain the challenge to the class: each student will describe on paper their substance using the following physical characteristics: appearance, color, odor, texture and hardness (you may also choose to allow them to describe taste). Make sure to note that they cannot use any actual names for the substance! Next, invite each group to share the physical properties with the class. After each group has shared their descriptions, they should be able to identify the two groups that were examining the same substance. At this time, allow those student groups to share their substances and confirm the identity of their substances. Allow students to guess the identity of the other substances and share those with the class to finish the lesson.

Think! Discuss or Write

What is a chemical reaction? Let students share their stories of creating chemical reactions at home or in school.

Post Activity:

Do!

Sugar Cube Challenge

Provide each student with a sugar cube and a simple direction: Do whatever you want to change it. Make a number of tools and materials available for students to choose from, including a fork, a tooth pick, cold water, warm water, yeast, a magnifying glass and any other tool or material you can think of. Give students five to ten minutes to change their sugar cubes. Next, share the results and ask students to categorize the changes. Did the sugar cube undergo a physical or chemical change? There should be at least one combination (yeast, warm water, and sugar) that produces a chemical change, but provide your students with enough materials to see if they can find another one.

Learning Goals Reinforced:

- Matter can go through both physical and chemical changes.
- Physical changes alter the appearance of matter, but the matter remains the same chemically.
- Chemical changes result in the formation of a new substance.

Think! Discuss or Write

What are signs of a chemical reaction? List as many property changes that you can think of. (change in temperature, color, state, etc)

Link:

http://www.chem4kids.com/files/react_intro.html

FIFTH GRADE CHEMISTRY STUDY

CLASS: CHEMISTRY: CELL ANATOMY/MICROSCOPE USE

Pre Activity:

Do!

Microscopes

Encourage students to learn about compound microscopes. The following website helps introduce the basic parts of a microscope and may serve as excellent preparation for their upcoming science class.

<http://www.microscope-microscope.org/basic/microscope-parts.htm>

For a printable test of their retention, consider printing out a diagram here:

<http://www.enchantedlearning.com/devices/microscope/label/>

Think! Discuss or Write

Before the invention of advanced microscope technologies, how did scientists study their subjects? Think of different tools and procedures that might have been used to further their study. Consider some advantages and disadvantages of those tools and procedures.

Post Activity:

Do!

Make a Jello Cell

Make a delicious model of a cell. Begin by preparing a lightly colored gelatin (with slightly less water than the directions call for.) Pour the slightly cooled jello into a sturdy ziplock bag, and place the bag into a refrigerator so that it may begin to set. After about an hour, take out your bag and show your students the newly formed cytoplasm (jello) within the cell membrane (ziplock bag). Add small treats to represent each important cell organelle discussed in class. You can use M & Ms for lysosomes, raisins for mitochondrion, and gummy worms for the endoplasmic reticulum. Eat.

For more detailed instructions and advice, see

<http://www.enchantedlearning.com/subjects/animals/cell/jello/>.

Learning Goals Reinforced:

- Every cell has a full set of organelles that do specific jobs for that cell.

Think! Discuss or Write

Ask students to imagine how cells would be different if they lacked a specific organelle discussed in class. Consider what a cell would be like if it lacked a cell membrane or endoplasmic reticulum. How would the physical structure and functioning of the cell change?

Link:

<http://learn.genetics.utah.edu/content/begin/cells/>

ELEMENT CARDS

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