3-5 Physical Science
3-5 Nature of Science

Southern Nevada Regional Professional Development Program

Mixtures Unit

INTRODUCTION

Children are naturally curious about what happens when they mix two different materials together. They test this every time they make a mud pie or help out in the kitchen. This unit investigates what happens when you combine different materials.

WHERE'S THE SCIENCE?

A **mixture** is a combination of two or more materials uniformly distributed. Mixtures can be separated by physical means. The properties of the materials being mixed together do not change. The mass of the two materials will not change when mixed together. To illustrate this, find the mass of 10mL of salt and then the mass of 50mL of water. Combine these two materials to create a mixture. The combined mass of the mixture will be 60mL (10mL + 50mL). To separate this type of mixture, evaporation works best. The end result will leave salt crystals behind, as the water has been transformed into water vapor.

MATERIALS

(per group)

- Gravel
- Iron filings
- Salt
- Magnet
- Large screen

www.thenutfactory.com

- Small screen
- Coffee filter
- Funnel
- Beaker
- Clear bottle with cap
- Plastic cups
- Plastic containers of varying sizes
- Chart paper
- Markers
- Digital cameras
- Safety goggles
- Science notebooks

www.bluebirdnut.com/Feeding.htm

PROCEDURES

Lesson One

1. Ask the students, "What is a mixture?" Chart their responses. Tell them a mixture is a combination of two or more materials stirred together. Ask for examples of mixtures. Use a graphic organizer to record their responses. Then ask, "Can a mixture be separated?" Tell them that they are going to investigate this question today in class. Also, tell them they must wear safety goggles to protect their eyes when working with the mixtures.
2. Show the groups the materials that they will be working with today- gravel, iron filings, and salt. Mix these three materials together. Challenge the students to come up with a plan to separate the mixture. Ask them to record their plan in their science notebook. Discuss their ideas.
3. Introduce the other items at the materials table- a large and small screen, magnet, water, coffee filter, funnel, and beaker.
4. Remind them that their goal is to separate out each material in the mixture. Once they have come up with a plan, instruct them to carry out their plan and investigate. Periodically remind them to stop and record observations in their science notebooks.

5. Once the groups have successfully separated their mixtures, ask them to meet at the carpet area to share their results. A successful separation entails each of the original materials placed together in a plastic cup. They will have a gravel cup, an iron filings cup, and a salt (or salt water) cup. For those students who used water and the filter to separate the iron from the salt, ask them what they now need to do to separate the salt from the water. If they don't say it, suggest evaporation.
6. Set up the evaporation investigation for those students who need to separate the salt from the water. Pour 25mL of the salt water into a small clear dish and leave out overnight. **NOTE**: Look at this dish the following day to view the salt crystals left behind.
7. Ask the students how they separated their salt water solution. Chart their responses and compare the different methods used to separate the mixtures. Ask, "Was there a method that was the most efficient way to separate the mixture?" Tell them to reflect on the following question in their science notebooks, "If you were to conduct this same investigation again, how could you improve your plan?" Share out whole group.

Lesson Two

1. Review mixtures by referring back to the graphic organizer created yesterday. Tell the students that today they are going to use their knowledge of mixtures to go on a mixtures hunt.
2. Distribute a digital camera and science notebook to half of the groups and just science notebooks to the other half. Instruct them to use their tool (either camera or notebook) to document mixtures around the school. Start in the classroom and work your way outside with the groups. Halfway through the hunt (before you go outside) have the groups switch tools. The students with the cameras should give their tool to a group with science notebooks. Remind each group that it is a good idea to record in the science notebook, even if you have a camera at the time. If you have enough cameras for all groups, then let them use the cameras during the entire investigation. **NOTE:** Possible mixtures would

include gram pieces in a classroom mass set, fruit cup, items on bulletin boards, items in a garbage can, landscaping rocks, etc.

3. Upon entering the classroom, print out the pictures of mixtures for the students. Give each group an opportunity to go through the pictures one last time to ensure they are mixtures.
4. In closing, gather all students at the group area to share the mixtures found around the school. Decide as a group if the picture is a mixture by referring back to the definition of a mixture. If it is, place it on a piece of chart paper to create a class collage of mixtures. Once the pictures are posted, go through the science notebooks to create a class graphic organizer of mixtures. Post this on chart paper and leave displayed next to the mixtures collage.

www.freewebs.com/srdetailing/

Lesson Three

NOTE: This lesson requires additional materials provided by the teacher that are not on the materials list. You will get this list from your students' ideas. Some items to have available are spoons of different sizes with holes in them, sifters, screens, and filters.

1. Challenge the students to create their own mixtures by using readily available materials from the classroom or items from home. They must also include a plan on how to separate their mixture. The tools must be available for separation of their mixture. Instruct them to separate their mixture according to their plan to ensure that it can be done. **NOTE**: Preview the students' mixtures and plans to make sure they are all safe materials to use.
2. Working in groups, assemble the mixtures using both teacher provided materials and anything extra that the students may need from home. Once the mixtures are created, switch mixtures with

another group and begin the separation. Record all steps taken to separate the mixture.

3. Once the mixture has been successfully separated, share the steps taken with the original group. Compare the method used to separate the mixture with their drafted plan of separation. How is it the same? Different?
4. Close the lesson by referring back to the original questions, "What is a mixture? How can a mixture be separated?" Discuss and chart their responses. Record any further investigating they would like to do to explore this concept.

Additional Resources

http://www.s-cool.co.uk/gcse/chemistry/atomic-structure/separating-mixtures.html
Online simulations on mixtures and how to separate them.

Walker, S., *Matter*. Lerner, 2005. ISBN: 0-822-55131-4
Hauser, J., *Super Science Concoctions*. Williamson Publishing, 1997.

Vocabulary

Balance: A tool used for weighing objects; when the balance beam is level the objects on either side are equal in mass.
Dissolving: The process of a material becoming incorporated uniformly into another or mixing together evenly.
Evaporation: The process of a liquid turning to gas and dispersing into the air, leaving any dissolved solid material behind.
Evidence: Data used to support claims. Evidence is based on observation and scientific data.
Matter: Anything that has mass and takes up space.
Mixture: A substance containing two or more materials with different properties.
Property: A characteristic of an object that can be observed, such as size, color, shape, or texture.
State: A kind or form of matter. The three common states of matter are solid, liquid, and gas.

Safety Reminder
Students should wear safety goggles when mixing and separating materials.

Nevada State Science Standards
P5A1 Students know matter exists in different states (i.e., solid, liquid, gas) which have distinct physical properties. E/S
P5A3 Students know materials can be classified by their observable physical and chemical properties (e.g., magnetism, conductivity, density, and solubility). E/S
P5A4 Students know that, by combining two or more materials, the properties of that material can be different from the original materials. E/S
N5A1 Students know scientific progress is made by conducting careful investigations, recording data, and communicating the results in an accurate method. E/S
N5B3 Students know the benefits of working with a team and sharing findings. E/L