

Hands-On Experiments

EARTH SCIENCE

REM 6524

WRITTEN BY: **Harold Silvani**
ILLUSTRATIONS BY: **Joe Garcia**
COVER BY: **Mike Muncy**

A TEACHING RESOURCE FROM



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Introduction

In order to become active learners, students must learn to describe things, pose questions, acquire knowledge, explain phenomena of nature, test explanations in various ways, and communicate thoughts and ideas with others.

In addition to traditional lecture and textbook reading, students need to develop the skills of scientific inquiry if they are to develop true scientific literacy. The activities presented in this book are both 'hands-on' and 'minds-on' in that they are inquiry-oriented.

Scientific inquiry describes the various ways to study the natural world and suggest explanations based on evidence gathered during inquiry. It includes making observations; asking questions; examining publications to discover what is already known; creating and executing investigations; casting evidence against known information; gathering, analyzing, and interpreting data; suggesting solutions, explanations, and predictions; and communicating results with others. Critical thinking, recognizing assumptions, and considering alternative solutions is also emphasized.

Although not all inquiry-based science activities include every component of inquiry, the goal is to present enough varied experience so that students will be repeatedly exposed to the full experience of inquiry over time.

Standards-based learning should integrate cumulative knowledge within a subject with other academic disciplines. The extension activities in this book are specifically designed to meet this goal by encouraging the teacher to infuse science within other subject areas hereby linking and reinforcing content areas. The activities not only measure students' ability to analyze, solve problems, and synthesize information but also indicate their mastery of knowledge and skills.

To The Teacher

The activities included in *Earth Science* have been selected especially for use with elementary and middle grade students. The activities provide teachers and students with interesting, easy-to-do science investigations. The necessary materials are commonly found around the house and in school supply closets or resource centers. Because the materials are readily available, the activities can be conducted at home. A caution statement, suggesting adult supervision, is included on all activity sheets that require lighting a match, working near a hot plate, using dry cell batteries, etc. Health and Safety lessons, which discuss proper use of the materials, can be integrated when presenting these science demonstrations in the classroom. A form letter is provided which may be reproduced and sent home to inform parents of the science activities and encourage their participation when activities are assigned for homework.

When these activities are presented to lower elementary students at the preconceptual or awareness level, the emphasis is on the sensory-motor, observation, and communication skills. In the upper elementary and lower intermediate grades (after the students have developed readiness for a particular concept through awareness level activities), a formal classroom lesson that involves using comparison and organization skills may be presented. Upper intermediate and middle school students can be involved in the activities at the mastery and reinforcement level. This level requires them to relate the concept to new or untested experiences, hypothesize, test variables, and use other high level thinking skills.

Suggestions for Using Materials

- The activity book can be placed in the school library and made available for students to use at home.
- The materials can be placed in the Media Center and used by teachers as a resource prior to presenting activities in the classroom.
- Assign to a cooperative learning group for sharing with the rest of the class.
- Students can use some of the suggested extension activities for Science Fair projects.
- The letter to parents may be attached to selected activities and sent home. Encourage students to involve parents in setting up and conducting the experiments.

Although many of the concepts can be keyed to grade level objectives, the *Hands-On Experiments* series has been developed to be used as a supplement to the basic grade level program. It is designed to give students opportunities to perform meaningful science investigations that focus on concepts that are applicable to everyday life situations.

Special Suggestions To Teachers

AWARDS

The reproducible *Super Scientist Award* and the *Recycling Award* at the end of this book are designed for elementary teachers to use as motivational awards when appropriate.

INTRODUCING THE LESSON

The *General Information* at the top of each teacher page may be read to the class before each experiment to introduce the activity. With older students, the *General Information* portion of the teacher page could be reproduced and given to the students. Italicized words found on the teacher pages are also found in the glossary. Glossary words can be incorporated into spelling or vocabulary lessons.

THOUGHT QUESTIONS

Some activities include “Thought Questions” under the heading *Extension Activities* on the teacher page. The questions are designed for oral presentation to the students during the lesson. Some questions may be used to introduce the activity, while others work better at the close of the lesson. Encourage oral participation and creative thinking when posing “Thought Questions” to the students.

HOME PARTICIPATION

Students should be encouraged to share selected investigations with family members at home. A reproducible *Letter To Parents* is included in the book which may be used to introduce these activities to the adults at home.

Mixing Oil And Water

GENERAL INFORMATION

Oil, whose chief chemical elements are carbon and hydrogen, is classified as any greasy substance that does not dissolve in water but can be dissolved in ether. Oils are classified as animal, mineral, or vegetable, according to their origin. They are further classified as fixed or volatile oils, according to their behavior when heated.

Fixed oils have many uses. We use them in food, soap, paint, and for lighting and lubricating. Fixed oils may be either animal or vegetable and they tend to remain fixed in a liquid state.

Volatile oils turn to gas and evaporate quickly when heated. This type of oil has many uses which include flavorings for food and beverages. They are also used in products such as perfumes, chewing gum, and tobacco.

MATERIALS

A glass jar, such as an empty pint mayonnaise jar, works well for this activity. However, it would be much safer to use an empty plastic soft drink or dish detergent bottle. This will eliminate the danger and mess of broken glass if it is dropped.

PROCEDURE

1. Use a salad oil that has a yellow tint so it can easily be distinguished from the water.
2. Use cool tap water to fill the bottle to approximately the halfway mark.
3. Hold the bottle so the class can see what happens to the contents when it's inverted.
4. Secure the lid tightly and shake the bottle. Place it at eye level so the results can be observed.
5. If possible, add about five drops of red food coloring.
6. Secure cap, shake vigorously and observe.

POSSIBLE ANSWERS

1. When the water is poured into the oil, bubbles of air and/or water drops can be observed mixing with the oil.
2. When the bottle is shaken, the water, oil, and air mix together.
3. Bubbles of air, drops of water and oil swirl around inside the jar. After many seconds the solution begins to separate. The lighter oil floats to the top and the heavier colored water (or clear water) settles to the bottom.
4. The longer the mixture is allowed to sit, the more nearly complete the separation will be. It will take many hours for all of the oil to reach the top and for all of the air bubbles to rise.

EXTENSION ACTIVITIES

Students may have observed the application of this particular concept in many ways around the home, in the community, and on television. Ask them to list some of the applications. The list might include the following:

1. *Salad Dressing*—when vinegar and oil are mixed, the oil rises to the top. (Analytical question—when making the salad, should the vinegar or oil be poured first?)
2. *Streets and Highways*—after the first few rains, oil can be seen floating to the top of puddles of water. This mixture contributes to many traffic accidents because the surfaces become very slippery.
3. *Oil Spills*—every year television newscasts show the results of oil spills in the ocean and the destruction of plant and animal life.
4. *Bath Water*—will leave an oil ring on the tub (oil from the soap) after it is drained.

Encourage the students to repeat and extend this investigation at home. Some adaptations and extensions could include: (1) use warm or hot water instead of cool water; (2) use a carbonated drink, such as Coke or Pepsi, instead of tap water; and (3) after the solution separates (after procedure #6) drop an ice cube onto the surface of the oil. What eventually happens?

Mixing Oil And Water

You Will Need

empty pint jar or
clear plastic or glass
soda bottle with lid



water

salad oil

food coloring



Before performing the experiment,
read through the procedure and
predict what you think will happen.

Procedure

1. Fill the bottle (or jar) $\frac{1}{4}$ full with salad oil.
2. Add water so the bottle is about $\frac{1}{2}$ full.
3. Cap the bottle and slowly turn it upside down and then right side up.
4. Shake it vigorously for about ten seconds, then place it on a flat surface and observe.
5. Remove the cap and add several drops of food coloring.
6. Replace the cap and repeat steps 3 and 4.



Questions

1. As the water was added to the oil, what was observed happening inside the jar?
2. Describe what happened after the bottle was shaken.
3. What was the condition inside the bottle after the oil, water, and food coloring were mixed?
4. Explain what the condition of the mixture might be after an hour. A day. A week.

