

Sample Body of Evidence

Science

Grade 5 – Second Reporting Period

FOSS California Mixtures and Solutions Physical Science/Investigation & Experimentation

This sample is intended to demonstrate the essential elements of a body of evidence. The evidence includes:

- Expected Student Responses to Grade Level Prompts (Science Notebook Sheets) identified in the Recommended Body of Evidence

This sample includes Expected Student Responses on Student Notebook Sheets identified in the Recommended Body of Evidence. This sample will be replaced with San Diego Unified School District proficient student work when it becomes available.

Important Note:

For the first two grading periods, students are evaluated based upon their progress toward end-of-year standards. Students who receive a mark of “proficient” for the first and second grading periods are making consistent and adequate progress toward achieving end-of-year expectations. In the final reporting period, the report card marks reflect a student’s actual achievement of the cumulated skills, strategies, and concepts identified in the California frameworks and content standards (SBRC, 2007).

Prompt #1

Name _____

Date _____

THINKING ABOUT MIXTURES

1. What is a mixture?

two or more materials put together

An example of a mixture is Answers will vary.

2. What is a solution? a mixture in which a solid substance (solute) dissolves
(disappears) in a liquid (solvent), resulting in a clear, transparent liquid

An example of a solution is Answers will vary.

3. Is salt and water a mixture, a solution, or both? Explain.

Both. Salt and water are stirred together, so it is a mixture. The salt dissolves,
producing a clear liquid, indicating a solution.

4. How do you know when a solid and a liquid form a solution?

The solid disappears in the liquid, and the liquid is clear.

5. How can mixtures be separated?

Evaporation. The liquid will disappear into the air, leaving the solid substance
behind, possibly in the form of crystals.

6. How are screens and paper filters alike?

Both have holes.

How are they different?

Size of hole. Filter-paper holes are much smaller.

Prompt #2

Name _____

Date _____

RESPONSE SHEET—SEPARATING MIXTURES

Martin wrote in his science notebook:

Water and salt make a solution. I know that because when you mix them, you can't see the salt anymore. It can't be a mixture because mixtures are always made of two or more solids.

Is Martin confused? Rewrite his paragraph as you think it should be written.

Water and salt make a solution. The salt disappears in the water, forming a clear solution. It is also a mixture because any two (or more) materials put together results in a mixture. The substances in a mixture can be in any state: solid, liquid, and/or gas.



FOSS

INVESTIGATION 1: SEPARATING MIXTURES

GUIDING THE INVESTIGATION PART 3: SEPARATING A DRY MIXTURE

1. MAKE A DRY MIXTURE

Move to the chemical storehouse and tell students you are going to make a mixture of three solid materials. Put on your safety goggles. As students watch, measure one 5-ml spoon of gravel into a 1/2-liter container. Then add 5-ml spoons of powder and salt. Stir the mixture of these three solid materials.

2. INTRODUCE THE CHALLENGE

Set the challenge.

Your challenge is to design a method to separate this mixture of three solid materials so that the gravel ends up in a G cup, the powder in a P cup, and the salt in an S cup.

Pass out science notebook sheet no. 6, *Separating a Dry Mixture*, to each student. Ask students to read it over in their groups.

3. MAKE THE DRY MIXTURE

After the groups have read the sheet, let a Getter go to the chemical storehouse and make up a dry mixture.

- Get one of the empty cups. Label the cup "dry mixture."
- Put one 5-ml spoon of each of the three dry materials in the cup: gravel, powder, and salt.
- Stir the dry mixture.

4. PLAN THE SEPARATION

Allow time for students to plan how they will separate the mixture. When they agree, students should write a detailed plan on the sheet.

5. ASSESS PROGRESS: TEACHER OBSERVATION

- * While students work on their plans, visit the groups to check their ability to develop a systematic plan for separation. Without influencing their plans, see if they propose adding water at the start, have a sequential plan for using screens and filters, and recognize the need for evaporation.

6. START THE SEPARATION

When the groups have developed their plans, let them start their separation. As students complete their plans, let Getters get the materials they need for the separation.

FOCUS ON STANDARD 1&6C

Have students make simple measurements and use them to answer questions. Encourage students to ask questions and make predictions. Others can help to carry out the procedure.

FOCUS ON STANDARD 1&6F

- Select appropriate tools (e.g., thermometers, meter sticks, balances, and graduated cylinders) and make quantitative observations.

MATERIALS FOR STEPS 2-3:

- 4 *Separating a Dry Mixture* sheets
- 1 Container, 1/2-liter
- 1 Craft stick
- Three solid materials

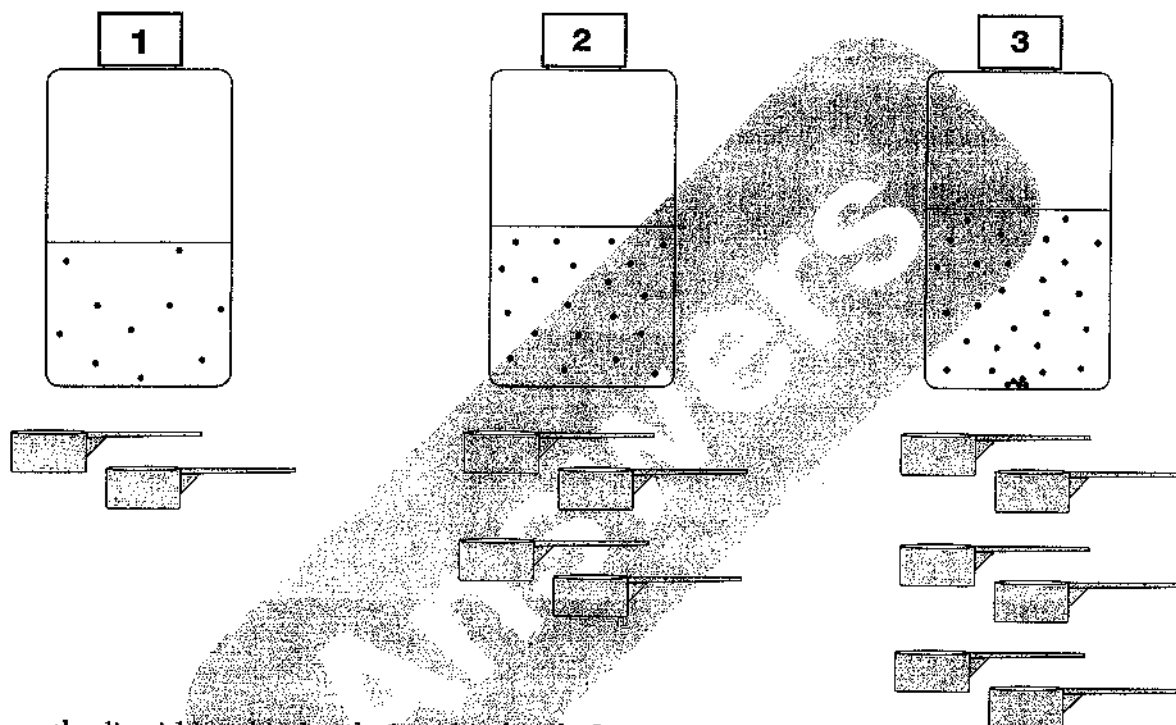
NOTE: Students may ask if they should add water. Tell them that if it will help to separate the parts, they should add water.

RESPONSE SHEET—REACHING SATURATION

Karin wrote in her notebook:

I made three solutions of water and sugar. I put the same amount of water in each bottle. Then I put 2 spoonfuls of sugar in bottle 1, 4 spoonfuls in bottle 2, and 6 spoonfuls in bottle 3. I shook each bottle for 1 minute. When I was done I knew I had a saturated solution in bottle 3.

Karin's three bottles are shown below. In bottle 2 she drew the liquid level and her idea of where the sugar was in the solution.



Draw the liquid level in bottle 1 and in bottle 3.

Draw dots in bottle 1 and in bottle 3 to show where you think the sugar is.

Karin knew she had a saturated solution in bottle 3. Why do you think she was sure the solution was saturated?

No more solute (sugar) would dissolve. Additional solid sugar added to the solution piled up on the bottom of the bottle.



INVESTIGATION 2: REACHING SATURATION



7. ASSESS PROGRESS: TEACHER OBSERVATION

Visit students as they work. Check to see if they are conducting a systematic procedure for determining saturation and using data to identify the mystery substance.

8. IDENTIFY CITRIC ACID

As the activity progresses, you might become aware of a rumor running around the classroom that the mystery material is citric acid. Neither confirm nor deny this rumor; simply ask students to generate evidence to support one substance or another.

When students have determined the amount of mystery chemical needed to saturate 50 ml of water, call for attention and ask,

- *What is the mystery substance?*
- *What evidence do you have to support your conclusion?*

Students should be confident that the mystery substance is citric acid, based on its solubility, which is greater than salt and Epsom salts.

9. SEE WHAT CITRIC-ACID CRYSTALS LOOK LIKE

Ask,

- *Does citric acid form crystals? How could we find out?*

Have Getters get an evaporation dish. Remind students that they need only enough solution to cover the bottom of the dish. Set the solution to evaporate in two FOSS trays.

In a few days, when the water has evaporated, take a few minutes to examine the crystals and have students record the shape in their science notebooks.

10. RETURN EQUIPMENT TO THE MATERIALS STATION

Have students dispose of the rest of the citric-acid solution.

Assign a group to wash the equipment and spread it out to dry.

11. REVIEW SOLUBILITY RESULTS

Ask students to make sure they have the solubility results for salt, citric acid, and Epsom salts recorded in their notebooks. Ask,

- *Which of the three chemicals we tested is most soluble in water? [Citric acid] Which is least soluble? [Sodium chloride.]*
- *If you wanted to make 10 liters of saturated salt solution to pickle some fish, about how much salt would you need? [About 2.8 kg.]*

MATERIALS FOR STEP 9:

- Evaporation dish
- Scratch paper
- FOSS trays
- Vials

WARNING — This set contains chemicals that may be harmful if misused. Read cautions on individual containers carefully. Not to be used by children except under adult supervision.

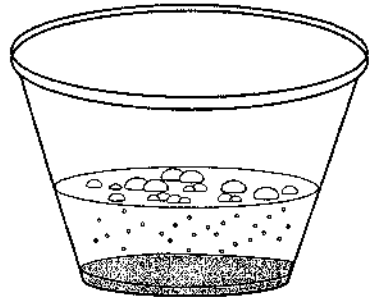
Name _____

Date _____

FIZZ-QUIZ OBSERVATIONS *Prompt #6*

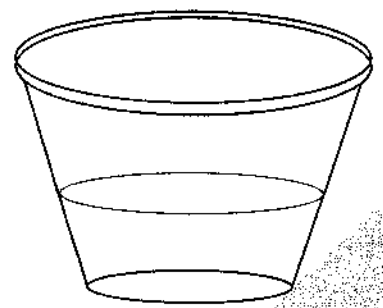
Follow the *Fizz-Quiz Place Mat* directions to make the mixtures. Record the results. Draw and describe what you observed.

Cup ① 1 spoon of calcium chloride, 1 spoon of baking soda, and 50 ml of water



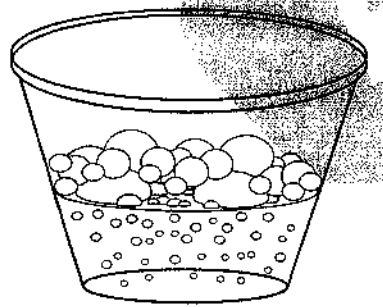
The mixture slowly started to make tiny bubbles.
They kept forming for several minutes. A white precipitate formed and settled to the bottom.

Cup ② 1 spoon of calcium chloride, 1 spoon of citric acid, and 50 ml of water



The solid materials dissolved. The solution was clear.

Cup ③ 1 spoon of baking soda, 1 spoon of citric acid, and 50 ml of water



The mixture immediately made lots of large bubbles.
The bubbling lasted a short time. The mixture was then clear.

1. Which substances reacted to form a gas?
calcium chloride and baking soda, citric acid and baking soda
2. Which substances reacted to form a precipitate?
calcium chloride and baking soda

WARNING — This set contains chemicals that may be harmful if misused. Read cautions on individual containers carefully. Not to be used by children except under adult supervision.

Name _____

Date _____

Prompt #7

REACTION ANALYSIS

1. You mixed two substances in cup 1. What were they?

calcium chloride and baking soda

2. A reaction occurred when you added water to cup 1. What was the evidence?

New substances formed a gas and a precipitate, and possibly heat.

3. What were the reactants in the reaction?

calcium chloride and baking soda

4. What were the products of the reaction?

a gas (carbon dioxide) and a solid precipitate (calcium carbonate)

5. What properties of the products allowed you to identify the products?

Calcium carbonate reacts with acid to form a gas. The

precipitate from the reaction reacted with acid to form gas.

The precipitate could be calcium carbonate.

The crystals that formed as a result of evaporation were

square with diagonal lines. The crystals are sodium chloride

(table salt).

Prompt #8

RESPONSE SHEET—FIZZ QUIZ

Marc wanted to make a model volcano. His aunt told him that a mixture of vinegar, baking soda, and soap would make good "lava." He made the mixture to see what would happen. Here are his observations.

First I mixed the soap and baking soda. Nothing happened. Then I added vinegar. The mixture bubbled and spilled over the edge of the cup! After the bubbling stopped, the liquid was clear. There was no precipitate.

Marc said,

I think I made a mixture, a solution, and a reaction.

Do you think Marc made a mixture? yes Explain your answer.

Marc put three materials together. Two or more materials put together makes a mixture.

Do you think Marc made a solution? yes Explain your answer.

The liquid was clear. The solid materials disappeared in the liquid. The solids dissolved in the liquid. That makes a solution.

Do you think Marc made a reaction? yes Explain your answer.

Marc observed a new material—a gas. When you mix substances and new materials form, that is evidence of a reaction.

PROPERTIES OF MATERIALS

Part 1. Record data for the six materials you observed.

Material	Kind of matter (element, mixture, etc.)	Conducts electricity		Conducts heat		
		Yes	No	Yes	No	Time (minutes)
Aluminum	element	X		X		
Brass	mixture (alloy)	X		X		
Copper	element	X		X		
Plastic	substance		X		X	
Steel	mixture (alloy)	X				
Wood	mixture		X		X	

Part 2. Write your ideas about materials and conduction.

1. Which materials conducted both heat and electricity?

aluminum, brass, copper, and steel

2. What is the same about those materials?

They are all metals.

3. Which metal conducted heat best and which one conducted heat worst? What is your evidence?

copper best, steel worst: time needed to melt the margarine

4. Check the elements you think are good conductors of heat and electricity and explain why.

Zirconium (40) Iodine (53) Vanadium (23) Sulfur (16)

Krypton (36) Silver (47) Cesium (55) Nitrogen (7)

These four are metals. Metals are good conductors of heat and electricity.