

SEPARATING MIXTURES—1 OF 2

Part A. Label three cups: gravel, powder, and salt. Put one level spoon (5-mL spoon) of each solid material in the cup labeled with its name. Observe the three solid materials. Fill in the property table below.

	Gravel	Powder (diatomaceous earth)	Salt (sodium chloride)
Color			
Texture			
Particle shape			
Particle size			
Other			

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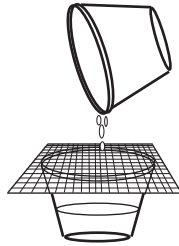
	Gravel	Powder (diatomaceous earth)	Salt (sodium chloride)
Color			
Texture			
Particle shape			
Particle size			
Other			

SEPARATING MIXTURES—2 OF 2

Part B. Add 50 mL of water (one full syringe) to each cup. Stir and observe. Write your observations.

Part C. Separate all three mixtures with filters.

- Place a screen over an empty, labeled cup.
- Stir the mixture thoroughly.
- Pour the mixture through the screen filter.
- If the screen filter doesn't separate the mixture, repeat the process with a filter paper.



How can a mixture be separated?

Record your results.

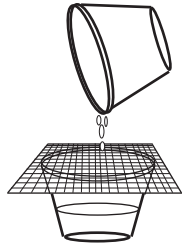
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THINKING ABOUT MIXTURES

.....

1. Is salt and water a mixture? a solution? or both?
2. Explain your answer.
3. Why can't you see salt when it dissolves in water?
4. Why was the screen or the filter successful in separating some mixtures, but not others?

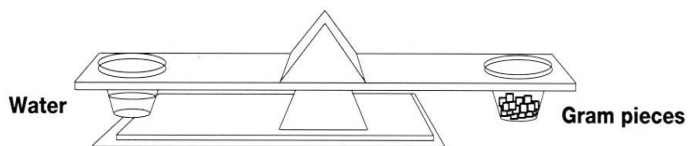
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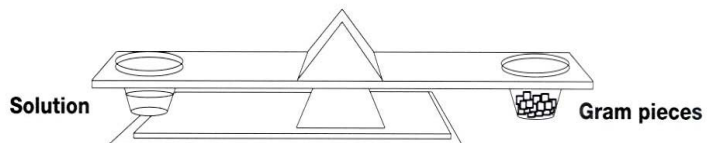
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MAKING A SOLUTION

1. Weigh 50 ml of water. Record its mass on line 2 in the box below.



2. Make a solution with one level spoon of salt and 50 ml of water.
3. Carefully weigh the solution. Record its mass on line 1 in the box below.



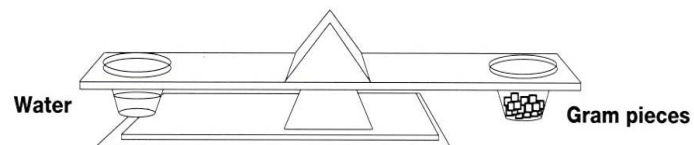
4. Calculate the number of grams of salt you put in the water to make the solution, by subtracting to find the difference.

1. Mass of salt-and-water solution	_____	g
2. Mass of 50 ml of water	_____	g
3. Mass of salt	_____	g

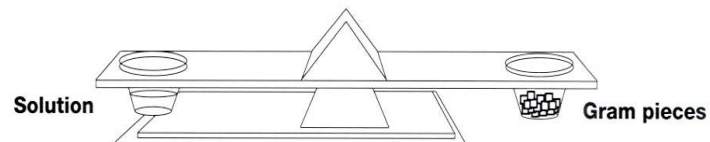
How could you separate the salt from the water in the solution?

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How could you separate the salt from the water in the solution?

RESPONSE SHEET—INVESTIGATION 1

Ms. Randall’s class was studying mixtures and solutions, just like your class. Unfortunately, the gravel, powder, and salt got mixed up together. They needed to separate the materials so they could be used by another class.

Write Ms. Randall’s class step-by-step directions that describe exactly what they should do to separate the gravel, powder, and salt. You may use water and any equipment you have used so far.

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HOW MUCH SALT WILL DISSOLVE?—1 OF 3

How much salt will dissolve in 50 mL of water?

Directions—work in pairs

- Pour 50 mL of water into a bottle.
- Mark the water level with a sticky note.
- Use the funnel to pour one level spoon of salt into the bottle. Shake 50 times. Check for dissolving. Record your observations using the first bottle on notebook sheet no. 7. Use three Xs to represent the spoon of salt in the water.
- Add another spoon of salt and shake. If it all dissolves, add another spoon of salt. Continue to add spoons of salt until no more dissolves. (Be sure you keep track of how many spoons of salt you add.)
- When no more salt will dissolve, record your observations in the second bottle on notebook sheet no. 7. Use plain Xs to represent dissolved particles and circled Xs to represent particles of salt that did not dissolve. Remember to use three Xs (circled or plain) to represent each spoon of salt.

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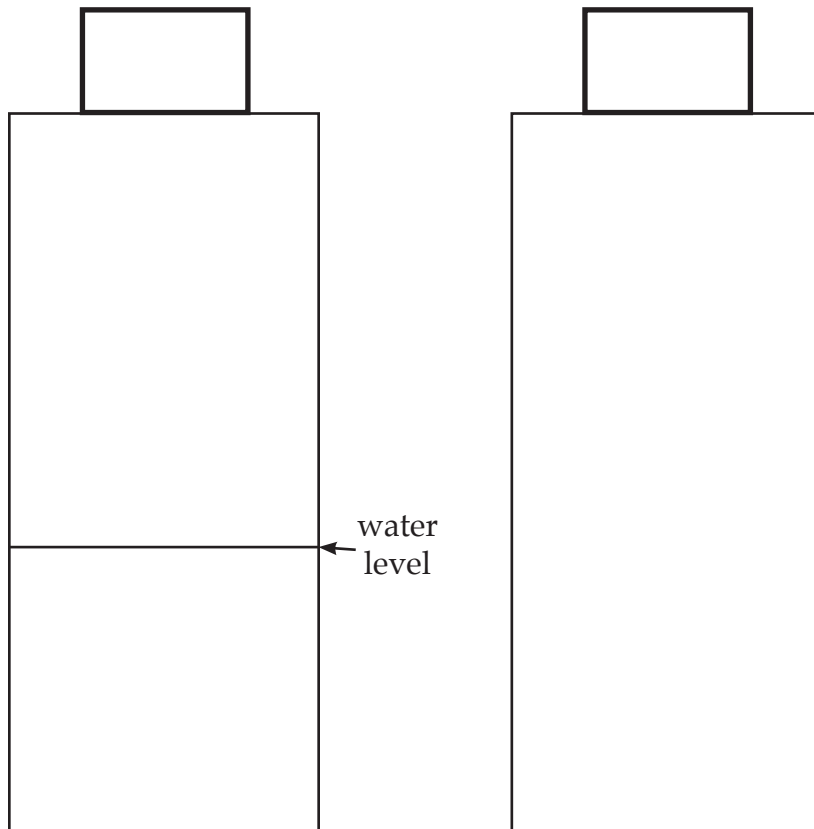
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HOW MUCH SALT WILL DISSOLVE?—2 OF 3

Use "X"s to represent the particles of dissolved salt.

Use "⊗"s to represent the particles of salt that did not dissolve.



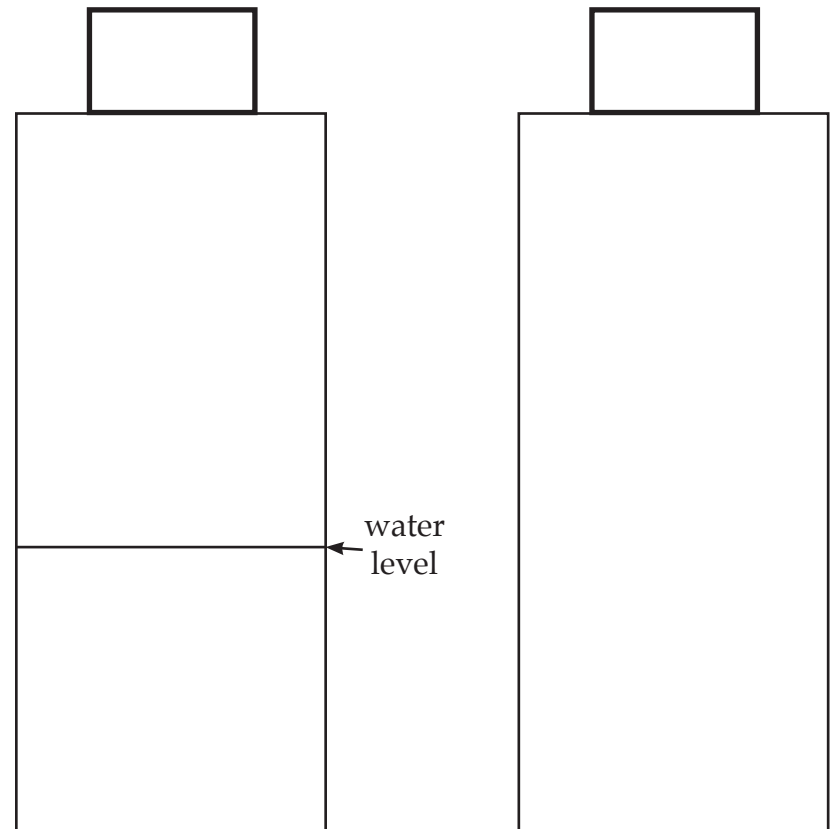
bottle with
one spoon of salt
and 50 mL water

bottle with
_____ spoons of salt
and 50 mL water
(no more salt will
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HOW MUCH SALT WILL DISSOLVE?—3 OF 3

How can you determine the amount of salt required to saturate 50 mL of water?

- a. Place a labeled cup under the funnel.
- b. Filter the solution using a *wet filter paper*. The saturated solution will pass through the filter; the undissolved salt won't.
- c. Zero the balance.
- d. Place the cup with the saturated salt solution on one side of the balance and a cup of 50 mL of plain water on the other side.
- e. Add gram pieces to the plain water cup until the balance levels. The amount of mass pieces added to the water is equal to the mass of salt dissolved in the saturated salt solution.
- f. Record the number of grams of salt it takes to saturate 50 mL of water.

1. What does it mean when you say a solution is saturated?
2. How do you know when a solution is saturated?
3. Why do you need to filter the solution before finding the mass?
4. Why must you weigh the solution (rather than just count spoons of salt added) to determine how much salt it takes to saturate a solution?

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CITRIC ACID INVESTIGATION

.....

How can you determine the amount of citric acid needed to saturate 50 mL of water?

Talk to your group and decide what you will do to answer the question above.

- What step-by-step procedure will you follow?
- What data will you record that will provide evidence about whether or not it takes the same amount of citric acid to saturate a solution as it does salt?

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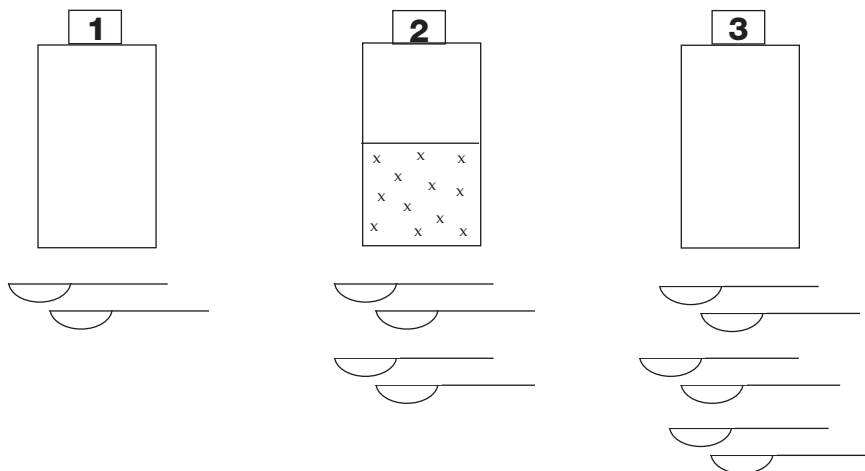
RESPONSE SHEET—INVESTIGATION 2

Becky wrote in her notebook:

I made three solutions of water and sugar. I put the same amount of water in each bottle. Then I added 2 spoonfuls of sugar to the first bottle, 4 spoonfuls to the second bottle, and 6 spoonfuls to the third bottle. I shook each bottle for one minute. When I was done I knew that I made a saturated solution in the third bottle.

Becky's three bottles are shown below.

1. Draw the level of the solution and show the sugar particles in the first and third bottles.
2. Use "X"s to represent the particles of sugar that dissolved. Use "⊗"s to represent the particles of sugar that did not dissolve. For each spoonful, use a total of three "X"s or "⊗"s. The second bottle has been completed as an example.



3. Explain what happens to sugar when it is added to water and when the solution becomes saturated.

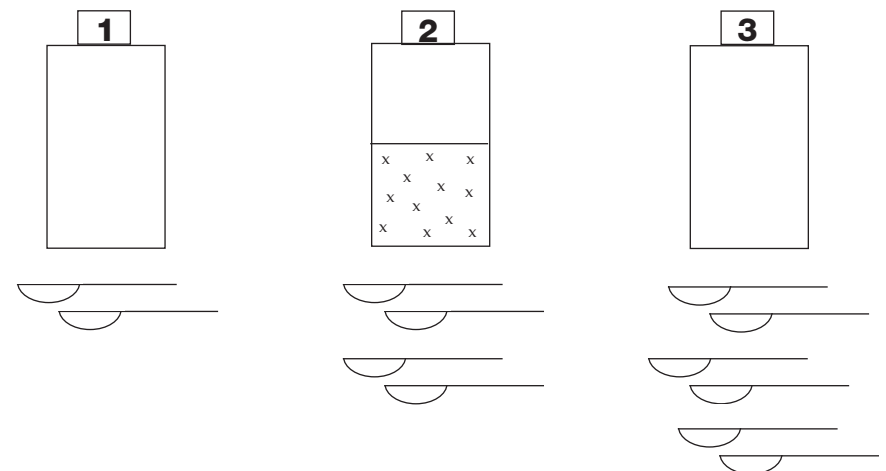
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CHEMICAL DATA SHEET

Can you find a way to find out what the mystery chemical is?

Here is a table of properties for five chemicals.

Material	Size and Color	Solubility (in 50 mL of water)
Salt	Small white grains	____ grams
Baking soda	Small white grains	3 grams
Epsom salts	Small white grains	35 grams
Citric Acid	Small white grains	____ grams
Alum	Small white grains	6 grams

1. Fill in the solubilities above for citric acid and salt.
2. Write a procedure to determine the unknown chemical.
3. Explain why you know your procedure will help you find the mystery chemical.

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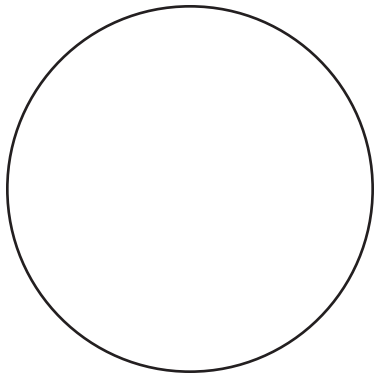
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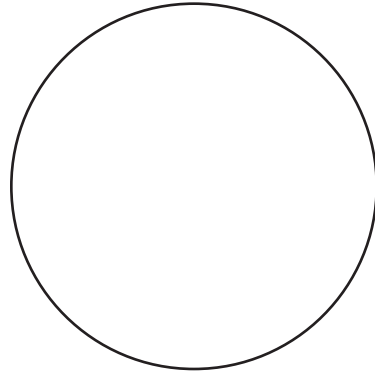
OBSERVING CRYSTALS

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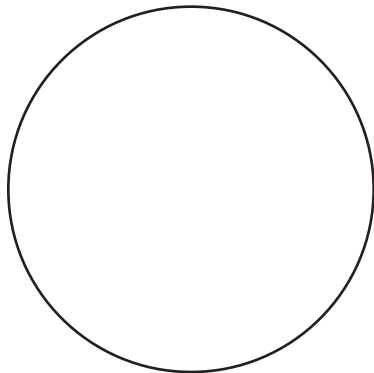
1. Draw pictures of the crystals for salt, citric acid, and Epsom salts (in the evaporation dishes below).



Salt (sodium chloride)



Citric acid



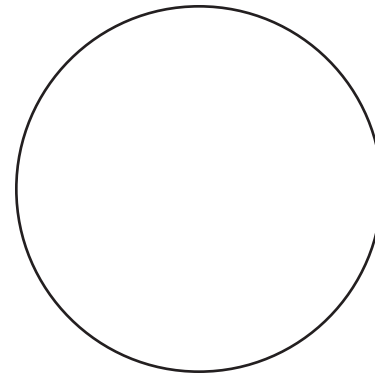
Epsom salts

2. How can observing crystals help you identify a substance?

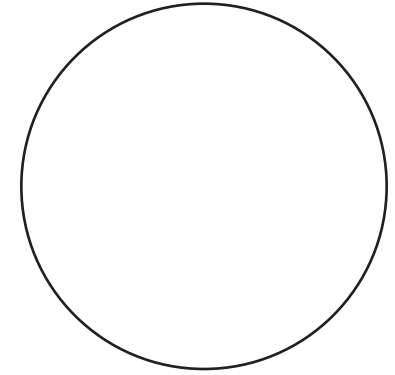
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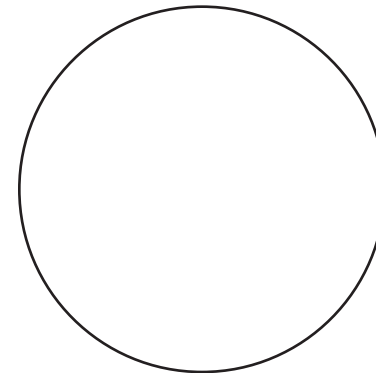
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Salt (sodium chloride)



Citric acid



Epsom salts

2. How can observing crystals help you identify a substance?

SOFT-DRINK RECIPES—1 OF 2

Solution 1: 1 spoon powder in 1000 mL of water

Solution 2: 3 spoons of powder in 1000 mL of water

Observe the two solutions.

1. List all the ways that solutions 1 and 2 are the same.
2. List all the ways that solutions 1 and 2 are different.
3. Which solution is more concentrated? How do you know?

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SOFT-DRINK RECIPES—2 OF 2

Solution A: 2 spoon powder in 1000 mL of water

Solution B: 2 spoons of powder in 500 mL of water

Observe the two solutions.

4. List all the ways that solutions A and B are the same.
5. List all the ways that solutions A and B are different.
6. Which solution is more concentrated? How do you know?

SOFT-DRINK RECIPES—2 OF 2

Solution A: 2 spoon powder in 1000 mL of water

Solution B: 2 spoons of powder in 500 mL of water


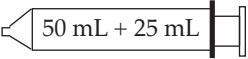

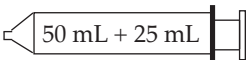
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SALT CONCENTRATION—1 OF 2

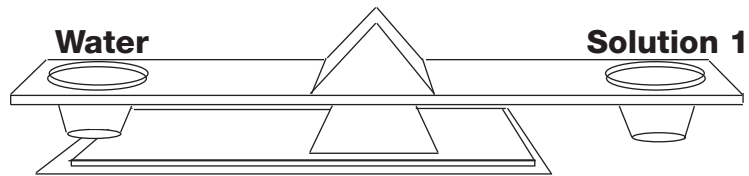
Part 1. Make salt solutions 1 and 2.

- Label two cups "Solution 1" and "Solution 2."
- Use the 5-mL spoon to measure salt for solutions 1 and 2.
- Use the syringe to measure the water.
- Stir with a stirring stick.

Solution 1	1 spoon of salt 75 mL of water	 
Solution 2	3 spoons of salt 75 mL of water	 

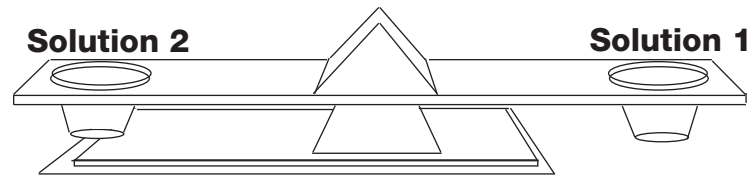
Part 2. Use the balance to make the comparisons below.

- Compare 50 mL of water and 50 mL of Solution 1.



Circle the solution that is heavier.

- Compare 50 mL of Solution 2 and 50 mL of Solution 1.


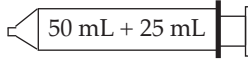

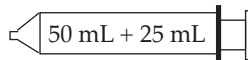


Circle the solution that is heavier.

SALT CONCENTRATION—1 OF 2

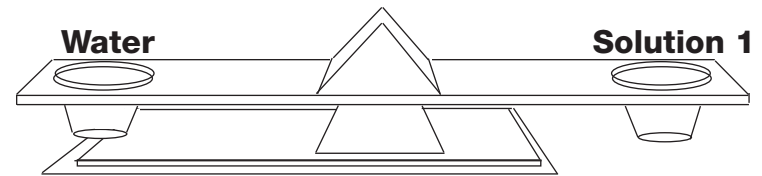
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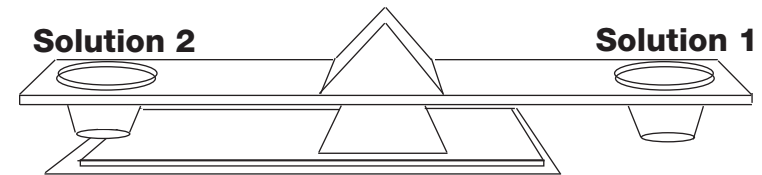
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
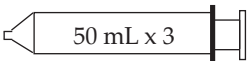
Circle the solution that is heavier.

SALT CONCENTRATION—2 OF 2

Part 3.

Is Solution 3 more concentrated, less concentrated, or the same concentration as the other two solutions?

Recipe for third solution.

Solution 3	2 spoons of salt 150 mL of water		
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Discuss in your group how you will compare the concentrations of the solutions.

3. Write predictions in your notebook.

- How will solution 3 compare to solution 1? How do you know?
- How will solution 3 compare to solution 2? How do you know?

4. Make solution 3 and compare it to the other two solutions.

Summarize your results.


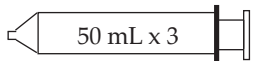
5. Write a few sentences that summarizes what you did and what you found out.

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Summarize your results.

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RESPONSE SHEET—INVESTIGATION 3



50 mL of water
1 spoon of salt



100 mL of water
2 spoons of salt



150 mL of water
3 spoons of salt

Comparing three solutions, Julie wrote in her science notebook that Solution 3 was the most concentrated because it had the most water and the most salt. Is Julie correct? Explain why or why not.

RESPONSE SHEET—INVESTIGATION 3



50 mL of water
1 spoon of salt



100 mL of water
2 spoons of salt



150 mL of water
3 spoons of salt

Comparing three solutions, Julie wrote in her science notebook that Solution 3 was the most concentrated because it had the most water and the most salt. Is Julie correct? Explain why or why not.

WHICH SOLUTION IS MORE CONCENTRATED?

Determine which of the two solutions are more concentrated. Explain how you decided which was more concentrated.



100 mL of water
3 spoons of salt



100 mL of water
5 spoons of salt



25 mL of water
1 spoon of sugar



150 mL of water
1 spoon of sugar



50 mL of water
3 spoons of citric acid



100 mL of water
6 spoons of citric acid

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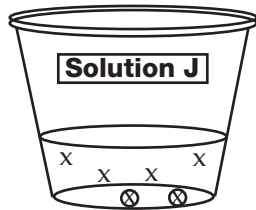


100 mL of water
6 spoons of citric acid

DO THESE SOLUTIONS HAVE THE SAME CONCENTRATION?

Do these two solutions have the same concentration?
Explain how you found if the concentrations are the same.

1.



75 mL of water
2 spoons of mystery
chemical A

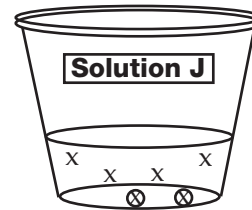


75 mL of water
3 spoons of mystery
chemical A

DO THESE SOLUTIONS HAVE THE SAME CONCENTRATION?

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Explain how you found if the concentrations are the same.

1.



75 mL of water
2 spoons of mystery
chemical A



75 mL of water
3 spoons of mystery
chemical A

2.



50 mL of water
1 spoon
of mystery
chemical B



100 mL of water
4 spoons
of mystery
chemical B

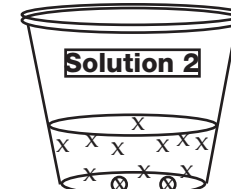


150 mL of water
6 spoons
of mystery
chemical B

2.



50 mL of water
1 spoon
of mystery
chemical B



100 mL of water
4 spoons
of mystery
chemical B

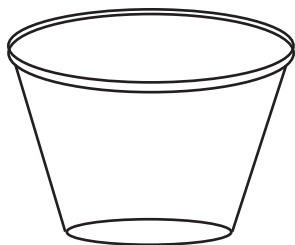


150 mL of water
6 spoons
of mystery
chemical B

FIZZ-QUIZ OBSERVATIONS

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

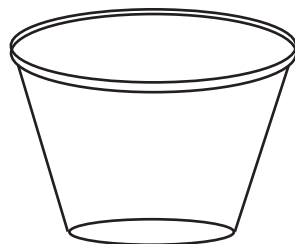
Cup ① 1 spoon of calcium chloride, 1 spoon of baking soda, and 50 mL of water



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



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

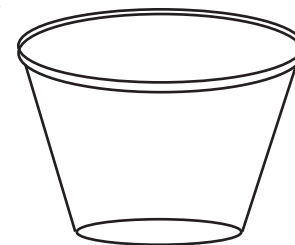


1. Which cup(s) had chemicals react to produce a gas?
2. Which cup(s) had chemicals react to produce a precipitate?

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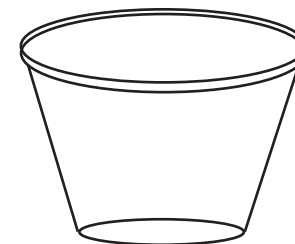
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1. Which cup(s) had chemicals react to produce a gas?
2. Which cup(s) had chemicals react to produce a precipitate?

RESPONSE SHEET—INVESTIGATION 4

Marc made a model volcano for a science project. His aunt told him that vinegar, baking soda, and a little liquid soap would make good “lava” for his model. So he mixed some in a cup to see what would happen. Here are his observations.

First I mixed the liquid soap and baking soda together. Nothing happened. Next I added vinegar and stirred. The mixture bubbled and oozed up, spilling out of the cup! After the bubbling stopped, the liquid looked clear. There was no precipitate.

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

1. Do you think Marc made a mixture?
Explain your answer.
2. Do you think Marc made a solution?
Explain your answer.
3. Do you think Marc made a reaction?
Explain your answer.

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1. Do you think Marc made a mixture?
Explain your answer.
2. Do you think Marc made a solution?
Explain your answer.
3. Do you think Marc made a reaction?
Explain your answer.