

## Section 3

### Understanding Matter and Energy

EXPLORATION  
**2**

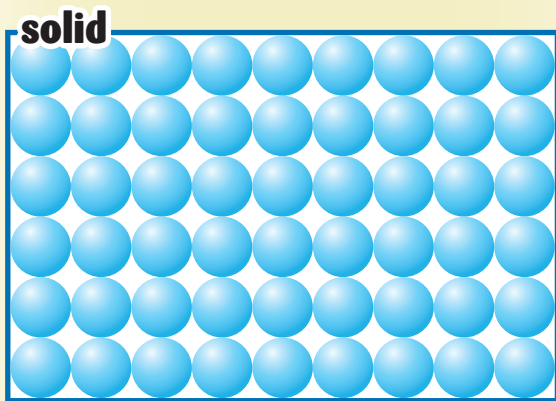
## “Shrinking” Liquids

Discover how the properties of liquids affect their volume.

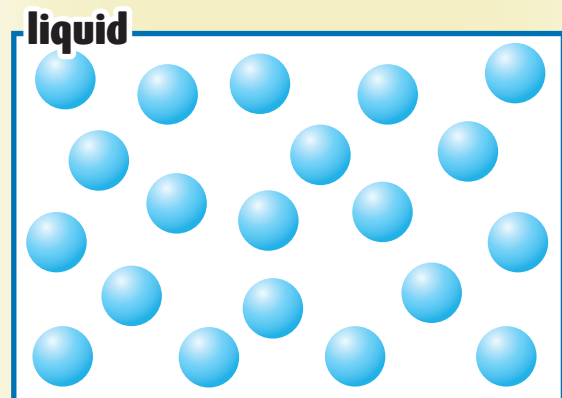
All matter is made of particles that are in constant motion. All the particles have empty spaces between them. Gas particles are farthest apart as compared to the particles of solids and liquids.

All the particles of a substance are the same size, but the particles of a different substance may have a different size. If the particles of one substance fit in between the particles of another substance (like the way small pebbles fill the space between rocks), do you think the combined volume of the two substances is equal to the sum of their individual volumes? Try this experiment to discover how the properties of liquids affect their volume.

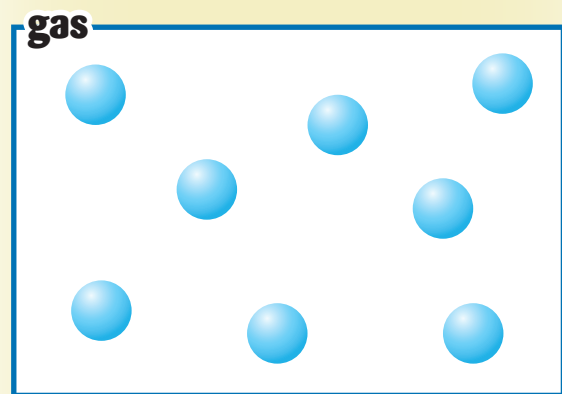
### Particle Theory of Matter



particles - closely packed



particles - loosely packed



particles - widely spaced

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EXPLORATION  
**2**

## “Shrinking” Liquids

In this experiment, you will discover how the properties of liquids affect their volume.

**Level of Difficulty:**

easy

**Time Needed:**

10 minutes

### Hypothesis:

**Circle the word(s) to show your hypothesis.**

The volume of the combined liquids (water and rubbing alcohol) **is / is not** equal to the sum of their individual volumes.

### Materials:

- 100 mL of rubbing alcohol
- 100 mL of water
- a paper cup
- a small measuring cup
- food colouring

### Steps:

1. Measure and pour 100 mL of rubbing alcohol into the cup.
2. Add a few drops of food colouring to 100 mL of water.
3. Pour the rubbing alcohol into the water.
4. Stir to mix the liquids thoroughly.
5. Check the volume of the combined liquids and record it below.

Food colouring helps make the result more obvious.

Combined volume: \_\_\_\_\_ mL

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#### EXPLORATION 2

## “Shrinking” Liquids

### Conclusion:

**Circle the correct words after conducting the experiment.**

The volume of the combined liquids (water and rubbing alcohol) **is / is not** equal to the sum of their individual volumes.

My hypothesis was **correct / incorrect** .

### Explanation:

In this experiment, you should have noticed that the combined volume was not 200 mL. Instead, it was visibly reduced. This is because the rubbing alcohol particles slip in between the spaces of the water particles; therefore, the total volume is reduced. Also, both water and rubbing alcohol have polar molecules, so the slightly negative particles of the water attract the slightly positive particles of the rubbing alcohol, forming a special bond. This special bond helps bring the water and the rubbing alcohol molecules closer; therefore, the volume decreases. You will study this special bond in more detail in Grade 9.