

RS•C

36. Experiments with particles

Topic

Mixing of materials. Particle theory of matter.

Timing

45 min.

Description

Students measure any changes in volume when solids are mixed with solids, salt is dissolved in water, and alcohol is mixed with water.

Apparatus and equipment (per group)

- ▼ Stirring rod
- ▼ Two 100 cm³ measuring cylinders
- ▼ Spatula.

Chemicals (per group)

- ▼ Sodium chloride
- ▼ Water
- ▼ Sand
- ▼ Dried peas
- ▼ Ethanol (**Highly flammable**).

Teaching tips

Ensure that the students understand what is meant by prediction.

Students should be encouraged to suggest explanations for their results, even if the inferences seem not to support their predictions
– eg 25 cm³ peas + 25 cm³ sand = 46 cm³ total volume.

A student may feel that water and alcohol are continuous materials with the heavier one resting on the other – therefore squashing the lighter one. The effect would be to have a lower total volume.

Students may need reminding not to try and measure 25 cm³ accurately but to pour approximately then take an accurate measurement.

Background theory

Particulate nature of matter.

Safety

Wear eye protection.

Answers

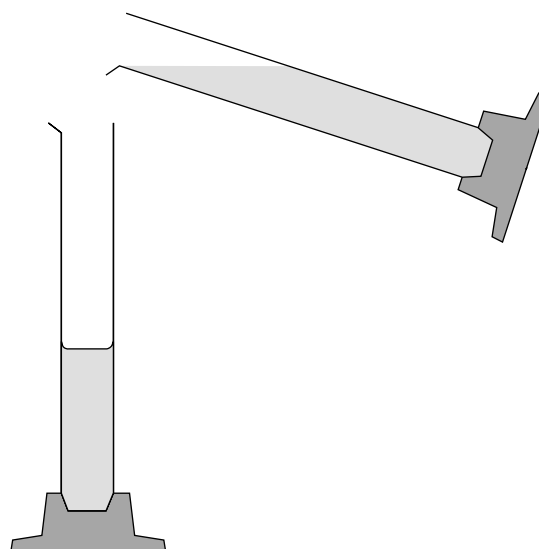
1. Both activities involve the mixing of particles, combined volumes are less than the sum of the parts.
2. Salt particles mix between the water particles is a simple explanation.

Experiments with particles

Introduction

When materials are added together, they may acquire new properties. When a solid and a liquid are mixed, the solid may or may not dissolve. When two liquids are mixed they may become one liquid or stay separate. These experiments provide an opportunity to predict and then observe what happens.

Take measurements when eye is level with liquid surface



What to record

Activity 1

Volume of peas/cm ³	Volume of sand/cm ³	Combined volume/cm ³

Activity 2

Volume of alcohol/cm ³	Volume of water/cm ³	Combined volume /cm ³

Activity 3

Initial volume of water/cm ³	Final volume of salt solution/cm ³

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What to do**Activity 1**

1. Add approximately 25 cm^3 of dried peas and 25 cm^3 of sand to separate measuring cylinders. Accurately measure and record the volumes.
2. The contents of one cylinder is added to the other and shaken until the two substances are mixed together.
3. Place the measuring cylinder on the bench and gently shake from side to side to allow the mixture to settle.
4. Read the combined volume.

Activity 2

1. Add approximately 25 cm^3 of ethanol (**Highly flammable**) and 25 cm^3 of water to separate measuring cylinders. Accurately measure and record the volumes.
2. The contents of one cylinder is added to the other and shaken from side to side for 15–30 seconds until the two substances are mixed together and then left to stand for one minute.
3. Read the combined volume.

Activity 3

1. To the measuring cylinder add approximately 75 cm^3 of water. Accurately measure and record the volume.
2. Spatulas of salt should then be added one at a time until the salt begins to be left at the bottom of the cylinder, despite continued stirring.
3. The volume reading on the side of the cylinder should again be recorded.

Safety

Wear eye protection.

Questions

1. What is the similarity between the first two activities?
2. What is an explanation for the result in the last activity?