Is It Water?

Topic

Tests for water

Introduction

If you have a sample of a colorless, odorless liquid, how do you know if it is water? There are many such liquids, and not all of them are pleasant or safe to drink! In this experiment you will be exploring the properties of water and seeking to answer the question "Is it water?"

Time required

30 minutes

Materials

pure water (distilled)
sodium chloride
anhydrous copper sulfate
cobalt chloride paper or anhydrous cobalt (II) chloride
Pyrex test tubes
test tube rack
eyedroppers
–10°C to 110°C laboratory thermometer
Bunsen burner
ring clamp and stand
glass rod
spatula
meter rule

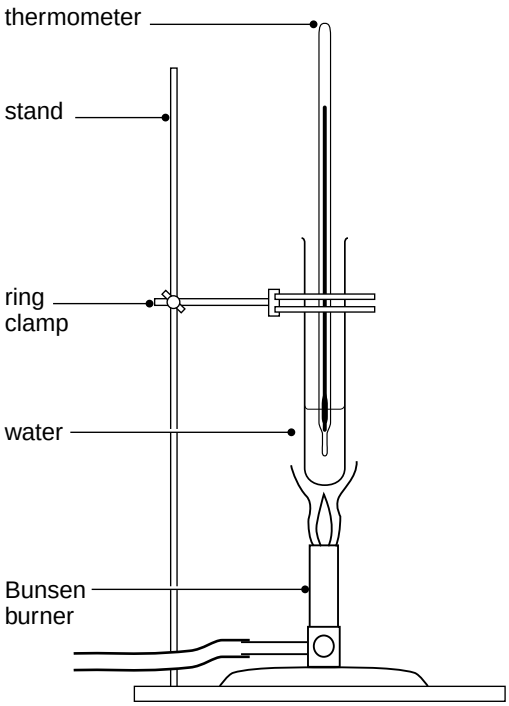
Safety note

Do not taste any of the chemicals used. Take care when heating liquids with a Bunsen burner. Safety glasses must be worn and long hair pulled back. Copper sulfate solution is harmful if swallowed.

Procedure

1. Place half a spatula of anhydrous copper sulfate in a test tube. Note the color of the crystals.
2. With an eyedropper, add 5–10 drops of distilled water to the test tube. Note the new color of the crystals.
3. Take a dry piece of cobalt chloride paper and note its color.
4. Using an eyedropper, add a few drops of distilled water to the paper. Note the new color.
5. To establish if the sample is pure water, you must test its boiling point. To do this, place the sample of distilled water in a test tube to a depth of about 3 cm.

6. Support the test tube above the Bunsen burner, as shown in the diagram, using the stand and ring clamp.



7. Place the thermometer in the water in the test tube. Hold it in the liquid, but not touching the bottom of the test tube.
8. Light the Bunsen burner and gently heat the water until it starts boiling.
9. Note the reading on the thermometer when the water boils.
10. Take about 20 ml of distilled water and add sodium chloride until no more will dissolve. Use a glass rod to stir the liquid to dissolve the sodium chloride, giving you a solution of salty water.
11. Repeat the three tests described in stages 1 to 9 with the salty water.
12. Record your observations in the data table below.

DATA TABLE

	Without water (dry)	With distilled water	With salty water
color of copper sulfate crystals			
color of cobalt chloride paper			
boiling point of distilled water	.....°C		
boiling point of salty water	.....°C		

Analysis

1. What happened to the anhydrous copper sulfate when you added distilled water?
2. What happened to the cobalt chloride paper when you added distilled water?
3. What temperature did the distilled water boil at?
4. What happened to the anhydrous copper sulfate when you added salty water?
5. What happened to the cobalt chloride paper when you added salty water?
6. What temperature did the salty water boil at?
7. Which of the tests you carried out show that the liquid was pure water and which show that the sample contained water?
8. Can you suggest any other tests you could carry out to prove the sample is pure water?

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4.02 Is It Water?

1. Water turned white anhydrous copper sulfate into blue hydrated copper sulfate.
2. Water turned blue cobalt chloride paper pink. Blue anhydrous cobalt (II) chloride crystals will turn into pink hydrated cobalt (II) chloride when water is added.
3. Pure water boiled at 100°C provided atmospheric pressure was 1 atm.
4. Salty water changed copper sulfate from white to blue.
5. Salty water turned cobalt chloride paper from blue to pink.
6. Salty water boils at a different temperature. This is higher than 100°C.
7. Boiling at 100°C is a test for pure water. The tests with copper sulfate and cobalt chloride are tests to see if the sample contains water. Any liquid that contains some water will give the results described in 1 and 2.
8. Pure water freezes at 0°C.