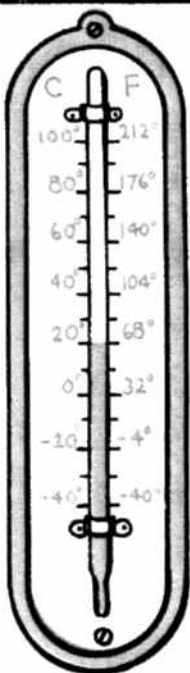


# WHAT HAPPENS TO WATER WHEN IT IS HEATED?

8c



**water vapor:** water in the gas state

**boiling point:** the temperature at which a particular liquid changes to a gas

**evaporate:** to change from a liquid to a gas

# AIM | What happens to water 3 | when it is heated?

Brrrrr. . . Did you ever take a bath in cold water? Few of us have. Almost everyone bathes in hot water.

Heated water is very important. We use it in many ways—for cleaning—for cooking. Some homes are heated by hot water. Doctors use boiling water to kill germs on instruments. The steam from boiling water runs ocean liners and navy ships—even submarines.

What happens when water is heated? Follow what happens step-by-step. As you read, check with the Figure A.

(1) When water is heated, its temperature rises (a).

(2) At first you see *tiny* bubbles. They form on the sides and bottom of the container (b). They are *air* bubbles. They had been dissolved in the water. The heat is forcing them out of the water.

(3) The temperature keeps rising as you keep heating the water.

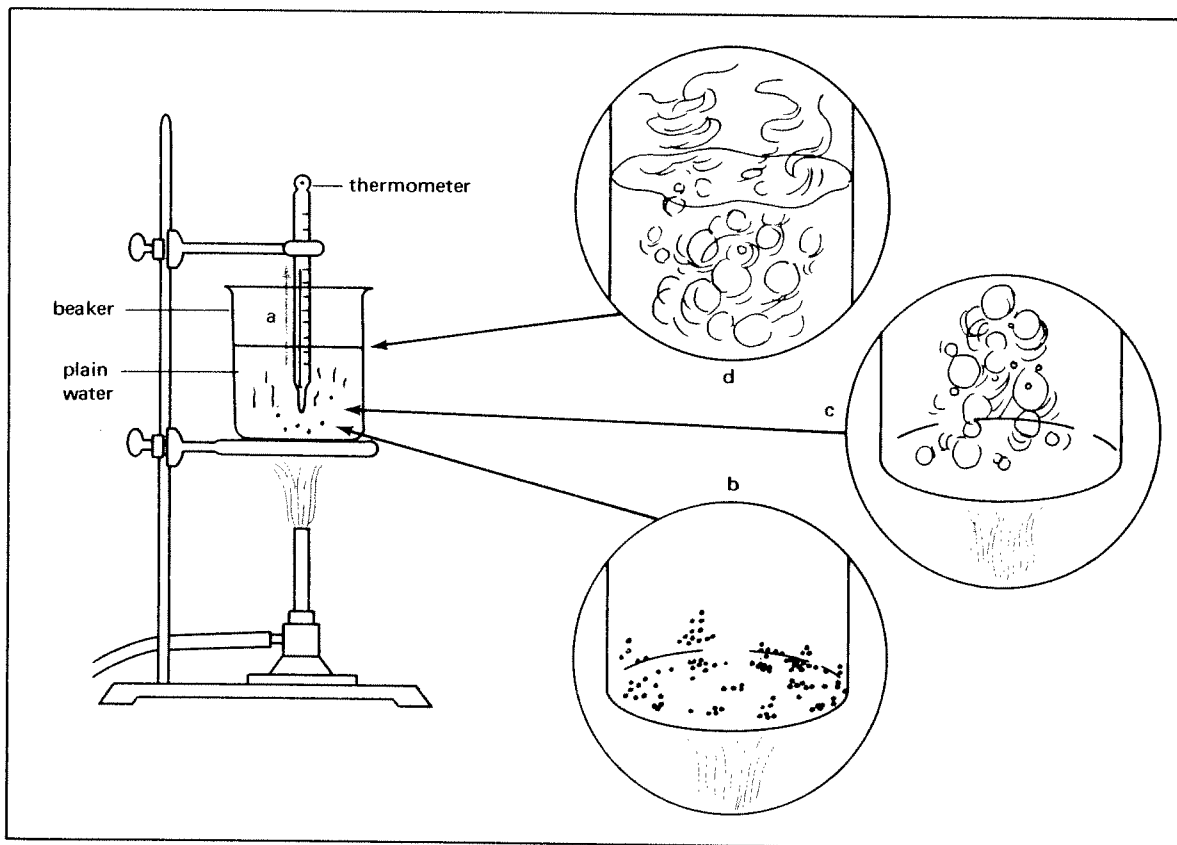
When the temperature reaches  $100^{\circ}\text{C}$  ( $212^{\circ}\text{F}$ ), you see *large* bubbles. They rise *quickly* from the bottom of the water (c). These bubbles tell us that the water is *boiling*.

The bubbles are *water vapor*—water that has changed to a gas. The water *evaporates* [ee VAP uh rates]—the liquid changes to a gas. The gas escapes into the air. First the vapor is hot, invisible *steam*. It quickly changes to a fine cloud of tiny drops of liquid water. It is this fine cloud that most people call *steam* (d).

(4) The water keeps boiling. But its temperature does *not* rise any higher. *It stays at  $100^{\circ}\text{C}$ .*

Unless something special happens, plain water does not get hotter than  $100^{\circ}\text{C}$ . Adding more heat just makes the water evaporate more rapidly. Soon all the water boils away.

## WHEN WATER IS HEATED



**Figure A**

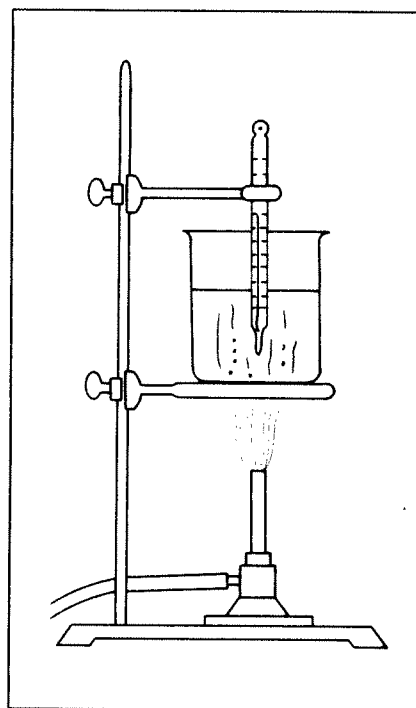
See for yourself what happens to water when it is heated.

**What You Need** ringstand and clamp  
Pyrex beaker  
plain water  
thermometer (F° & C°)  
Bunsen burner  
watch or clock

Set up the materials (Figure B).

- What To Do**
1. Take the temperature of the water before it is heated. Write it down on the chart on the next page.
  2. Light the flame under the beaker. Take the water temperature again at the times listed on the chart. Write down the temperature each time.

During all this time watch the water. See what happens. (Notice the water level too!)



**Figure B**

		Temperature
Before Heating		
During Heating	1 minute	
	2 minutes	
	3 minutes	
	at boiling	
	1 minute after boiling	
	2 minutes after boiling	
	3 minutes after boiling	

### What You Saw and Learned

3. What happened to the temperature of water when it was heated? \_\_\_\_\_
4. a) At what temperature did the water boil? \_\_\_\_\_ °C  
 b) This is the same as \_\_\_\_\_ °F.
5. How did you know that the water was boiling? (What did you see?) \_\_\_\_\_  
 \_\_\_\_\_
6. a) You kept the water boiling for three minutes. Did the water get any hotter while boiling? \_\_\_\_\_  
 b) What does this prove about water? \_\_\_\_\_
7. a) What happened to the water level as the water kept boiling? \_\_\_\_\_  
 b) Why did this happen? \_\_\_\_\_
8. What would happen to the water if you were to keep the water boiling? \_\_\_\_\_  
 \_\_\_\_\_
9. Think back to when the water was starting to heat up.
  - a) Did you notice small bubbles? \_\_\_\_\_
  - b) What were these bubbles? \_\_\_\_\_
  - c) What kind of mixture does this prove tap water is? \_\_\_\_\_

## TRY THIS AT HOME

1. Fill a glass with cold tap water.
2. Let it stand overnight.
3. Describe what you see the next day.

\_\_\_\_\_

\_\_\_\_\_

4. Draw a picture of what you see on Figure C.

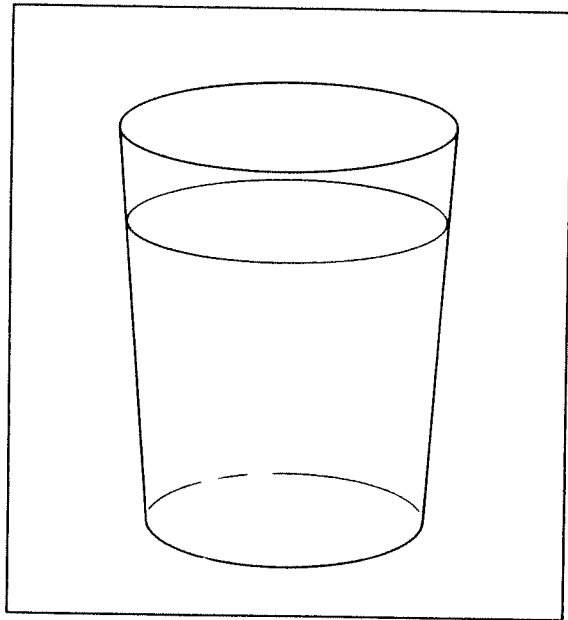


Figure C

## COMPLETING SENTENCES Complete the sentences with the choices below.

rises  
water vapor  
liquid  
does not

liquid solution  
100° C or 212° F  
thermometer

large bubbles  
dissolved air  
gas

1. A \_\_\_\_\_ measures temperature.
2. When matter is heated, its temperature \_\_\_\_\_.
3. The water you drink is in the \_\_\_\_\_ state.
4. Tiny bubbles form soon after water is heated. They are bubbles of \_\_\_\_\_.
5. The tiny air bubbles prove that water is a \_\_\_\_\_.
6. When water boils, \_\_\_\_\_ quickly rise to the surface.
7. The large bubbles are \_\_\_\_\_.
8. Water vapor is water in the \_\_\_\_\_ state.
9. Tap water boils when its temperature reaches \_\_\_\_\_.
10. If we keep on boiling water, its temperature \_\_\_\_\_ rise any higher.

**TRUE OR FALSE** Write T on the line next to the number if the sentence is true.  
Write F if the sentence is false.

1. \_\_\_\_\_ Tap water has air dissolved in it.
2. \_\_\_\_\_ Water can hold more dissolved air when it is heated.
3. \_\_\_\_\_ A thermometer tells us how long something is heated.
4. \_\_\_\_\_ Heat raises temperature.
5. \_\_\_\_\_ Tiny bubbles on the side of a pot of water means that the water is boiling.
6. \_\_\_\_\_ Plain water boils at  $212^{\circ}\text{C}$ .
7. \_\_\_\_\_  $212^{\circ}\text{F}$  is the same as  $100^{\circ}\text{C}$ .
8. \_\_\_\_\_ If water boils for a long time, its temperature rises above  $100^{\circ}\text{C}$ .
9. \_\_\_\_\_ Boiled water has gases dissolved in it.
10. \_\_\_\_\_ Water is always evaporating.
11. \_\_\_\_\_ Water evaporates faster when it is heated.
12. \_\_\_\_\_ Water evaporates fastest when it boils.
13. \_\_\_\_\_ You can see water vapor.
14. \_\_\_\_\_ There is water in the air.

## REACHING OUT

What happens to the water vapor that goes into the air?

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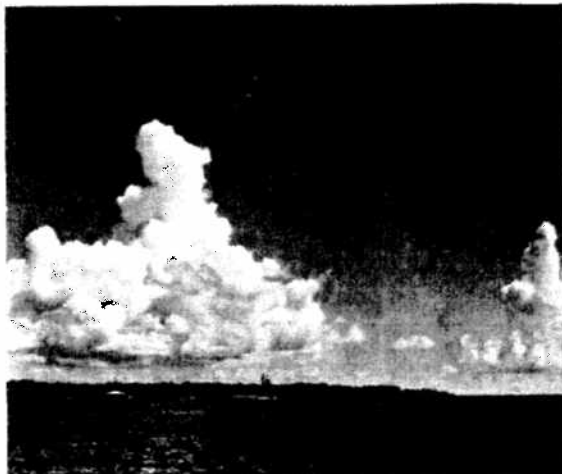
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**Figure D**