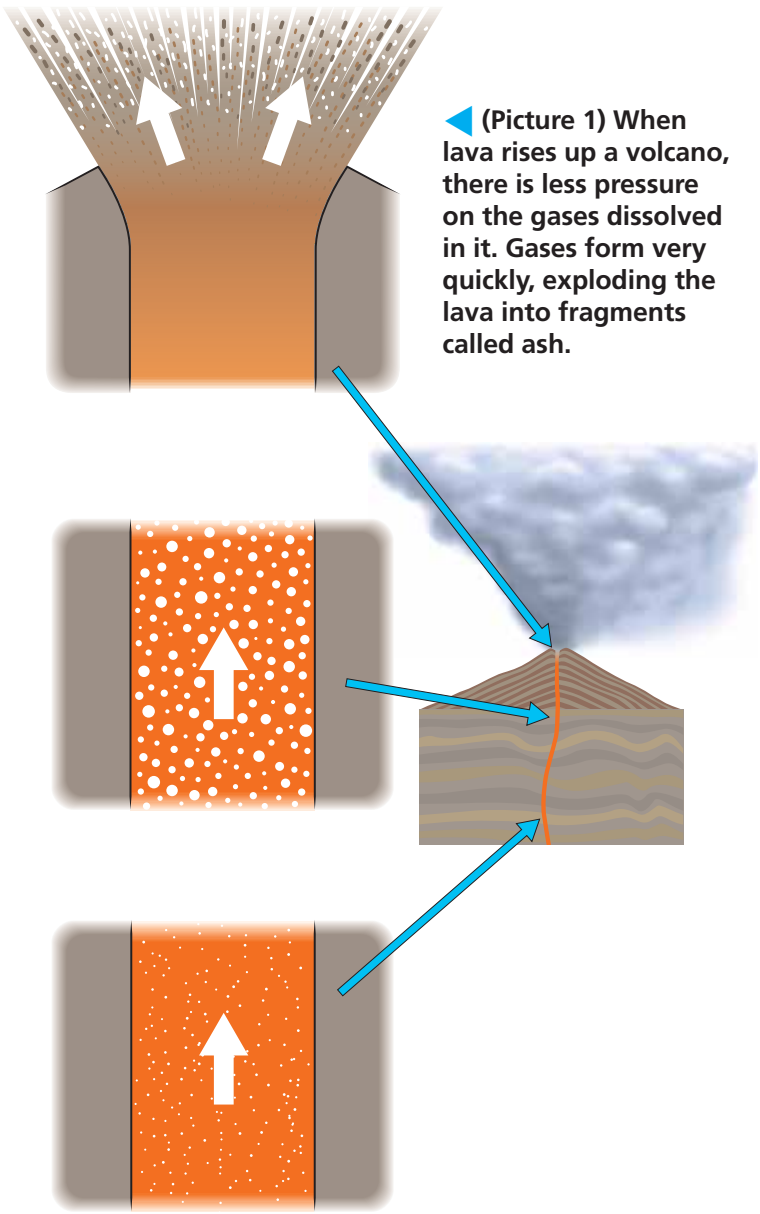
Dissolving gases

Gases dissolve in liquids. A hot liquid can hold much less gas than a cold one and liquids under pressure hold much more gas.

Gases can be dissolved in liquids naturally, for example, in the lava that comes from a volcano (Picture 1), at the surface of the ocean, a lake or a river. This is how oxygen gets into water so that fish and other water-living animals can breathe.



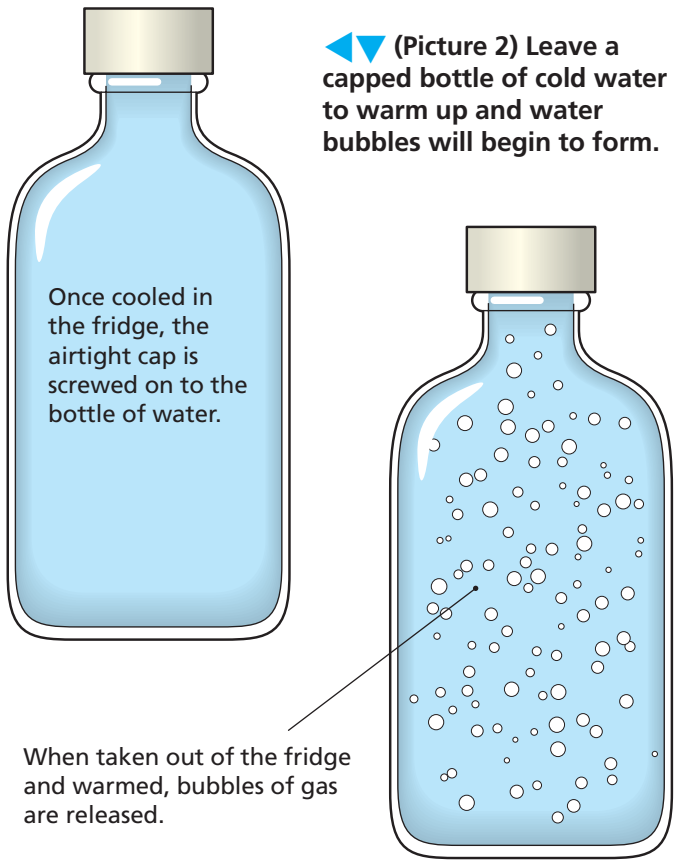
(Picture 1) When lava rises up a volcano, there is less pressure on the gases dissolved in it. Gases form very quickly, exploding the lava into fragments called ash.

Where would you go in your home or school to find gas dissolved in water? The answer is only as far as the nearest tap, because all water contains dissolved air.

Getting the air out of water

Cold water can hold more air than hot water, so one way to see that water contains dissolved air is to heat it.

If you warm water, a few bubbles of air may be driven out (Picture 2). This is because you need to put a lot of energy into the water to drive the gas out. If



(Picture 2) Leave a capped bottle of cold water to warm up and water bubbles will begin to form.

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you let water boil for a long time, you can drive most of the air out. (However, when you boil water you also cause the water to turn into a gas – water vapour, or steam – so then the bubbles you see contain mostly steam.)

Getting the fizz into a drink

If you take the cap off a bottle of fizzy drink, the liquid immediately fills with bubbles which burst out at the surface (Picture 3).

The bubbles are made of a gas called carbon dioxide (the same gas that we breathe out from our lungs).

Very little carbon dioxide dissolves in fizzy drinks at room temperature. But under pressure, enormous amounts of gas can be made to dissolve in the drink.

To add the fizz to soda or cola, it is first cooled so that it will soak up more gas. Then the liquid is placed in a chamber, with gas, under pressure. The liquid is then quickly bottled.

When the bottle is opened, the liquid is no longer under pressure and it cannot hold as much gas. This is why the gas bursts out and makes the fizz.

Diver's 'bends'

Although the amount of air that will dissolve in a liquid is normally quite small, the more pressure the liquid is put under, the more gas it can hold.

If you were to dive deep into the ocean, you would feel the pressure of water on your body very quickly. When a scuba diver descends, the deeper they go, the more of the air they are breathing dissolves in their blood. If the diver comes back to the surface quickly, the pressure goes down quickly, and the air comes back out of the blood and forms bubbles just as in a fizzy drink bottle. This condition is known as 'the bends'. It is extremely painful and may cause death. This is why divers have to return to the surface slowly enough for the air to come out of their blood without forming large bubbles.

(Picture 3) The stages of gas release when a fizzy drink cap is unscrewed slowly.

Summary

- **Gases dissolve in liquids.**
- **Gases are less soluble in hot liquids.**
- **Gases dissolve more easily under pressure.**