

Student experiment  
(1st - 4th grade)

## Fizzy tablets in ice-cold and hot water

🕒 Time: max. 15 min.

### Safety:

### Instruments:

- a large crystallization dish (a flat, deep glass bowl)
- a large graduated cylinder
- cardboard, watch glass or rubber stopper
- thermometer

### Chemicals:

- several water-activated, fizzy multivitamin tablets
- ice cubes
- hot water

### Experiment:

- Pour water over a large quantity of ice cubes so the water temperature falls below 5°C.
- Fill the crystallization bowl and graduated cylinder with this water. Invert the completely full graduated cylinder in the bowl (seal it with cardboard or a watch glass to prevent spillage until inverted).
- Place a multivitamin tablet under the opening of the cylinder without lifting it above the water's surface.
- Then repeat the experiment using hot water and then water at room temperature and compare the results.

### Advice for the teacher:

In cold water only about 30 ml of gas are collected, with hot water perhaps 200 ml and in the third attempt with room temperature water roughly 100 ml. The experiment shows that carbon dioxide is much more soluble in cold water. We can see that carbon dioxide is not readily soluble in hot water.

Water at 0°C dissolves double the amount of carbon dioxide than water at room does (2 liters of carbon dioxide in 1 liter water starting condition). At 60°C, 1 liter of water can only absorb about 300 ml of carbon dioxide.

The students should learn that carbon dioxide is more soluble in cold water than in warm water. This can be transferred to many other gases, since this solubility rule is also valid for them. Oxygen is also less soluble in warm water and is therefore not available for fish to breathe at warmer temperatures.