

dissolution process



Chemistry

General Chemistry

Chemical reactions

Basics of chemical reaction

Nature & technology

Substances in everyday use



Difficulty level

easy



Group size

2



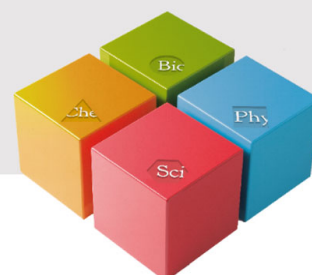
Preparation time

10 minutes



Execution time

30 minutes



General information

Application



Effervescent tablets are dissolved in water

Solids can be dissolved using suitable solvents. During the dissolving process, the solvent particles push themselves between the solid particles and dissolve them out of their lattice. Usually the solvent is a liquid. The solubility is best understood by putting a small piece of sugar in water. The piece of sugar disappears after a short time. However, the sugar has not actually disappeared completely, it is just dissolved in the water. You can prove this by tasting the water, as it tastes sweet. In everyday life, solids are often dissolved in liquids. Examples are potassium permanganate to fight fish diseases, washing powder to clean laundry, calcium or magnesium preparations as effervescent tablets to take.

Other teacher information (1/2)

Previous knowledge



- The solubility of a substance indicates the extent to which a pure substance can be dissolved in a solvent.
- Qualitative solubility indicates whether a substance dissolves at all.
- Quantitative solubility indicates the exact amount of substance that dissolves maximally in a given solvent.

Scientific principle



- In this experiment, students will learn about the concept of solubility.
- You will investigate the process of dissolving a sugar cube in water.
- Sugar dissolves in water because "like dissolves in like" (a polar substance in a polar solvent).

Other teacher information (2/2)

Learning objective



- Students learn about solubility as a concept.
- The aim is to understand that the solubility of a substance depends on the solvent and the temperature.

Tasks



- Students investigate the dissolution process of a sugar cube in water at different temperatures.
- They observe crystallization, as the reverse process of dissolving sugar in water.

Safety instructions

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- Wear protective goggles!
- For H- and P-phrases please refer to the safety data sheet of the respective chemical.

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Student Information

Motivation

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Sweets such as lollipops are dissolved by saliva

A lollipop consists primarily of sugar. Sugar dissolves in water, as you can also see in this experiment. It may take some time, but gradually the lollipop dissolves even in cold water. In the mouth, saliva is the liquid element and therefore the solvent. One learns in the experiment that the temperature influences the dissolving process and that a higher temperature usually accelerates the dissolving process.

In the mouth, the saliva has body temperature, which favors the dissolution process compared to cold water. The dissolving in the mouth is also favoured by the fact that the palate and tongue rub against it again and again. This influences the process just like stirring sugar in water.

Tasks

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- Investigate the dissolution process of a sugar cube in water at different temperatures.
- Let a hot sugar solution cool and watch the process.
- Note down your experimental observations and answer the questions in the protocol.

What influences the dissolution process of sugar?



Does temperature affect the dissolution of sugar in water?

☐ Yes☐ No

Equipment

Position	Material	Item No.	Quantity
1	Beaker, Borosilicate, low form, 250 ml	46054-00	2
2	Graduated cylinder, 25 ml, transparent, PP	36635-00	1
3	Spoon, stainless steel, 210mm	40874-00	1
4	Dropping pipette with bulb, 10pcs	47131-01	1
5	Crucible tongs, 200 mm, stainless steel	33600-00	1
6	Glass rod, boro 3.3, l=200mm, d=5mm	40485-03	1
7	Protecting glasses, clear glass	39316-00	1
8	Digital stopwatch, 24 h, 1/100 s and 1 s	24025-00	1
9	Portable Balance, OHAUS YA302	49213-00	1
10	D (+)-Sucrose 100 g	30210-10	1
11	Water, distilled 5 l	31246-81	1
12	Heating + cooking hotplate, 230V	04025-93	1

Additional material

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Position	Material	Quantity
1	Sugar cubes	1

Implementation (1/4)

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- Place a beaker on the hot plate and fill it with 25 ml of water.
- In the second beaker, weigh out 100 g of sugar using the scale.
- Now heat the water in the beaker and gradually add the sugar to the water.



Implementation (2/4)

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- The mixture must be heated while stirring until you get a clear solution.
- Then, using the crucible tongs, place the beaker with the hot sugar solution on a fireproof surface and allow the solution to cool.
- Caution hot !
- Record your observations in the log.

Implementation (3/4)

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- Fill the second beaker with 100 ml of cold water.
- Carefully dip a sugar cube slowly into the water without making the water move.
- The sugar cube should slowly sink to the bottom.
- Observe the dissolving process of the sugar cube, stopping the time until the sugar cube has dissolved.
- Pour the sugar water into the sink and fill the beaker with 100 ml of water.
- Heat it on the hot plate while stirring.



Procedure (4/4)

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- Remove the beaker from the hot plate with the crucible tongs and place it on a fireproof surface.
- Also carefully add a sugar cube to the hot water and time it until the sugar cube dissolves.

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Report

Task 1

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Write down your observations of the cooling of a sugar solution and compare the dissolving process in hot and cold water.

Task 2

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Does the sugar dissolve faster if you stir with a glass rod?

☐ No☐ Yes

Task 3

Order the following operations according to their chronological order.

1.
2. Dissolved sugar particles disperse between water particles.*
5. All the sugar particles have dispersed evenly in the water.

Sugar particles dislodge from the cube.

3. Dissolution of the sugar cube continues from the outside in.
- 4.

The sugar cube sinks to the bottom of the beaker.

✓ Check

Slide

Score/Total

Slide 8: Temperature dependence of solubility	0/1
Slide 17: Influence of solubility	0/2
Slide 18: The dissolution process	0/2

Total  0/5 Solutions Repeat Export text