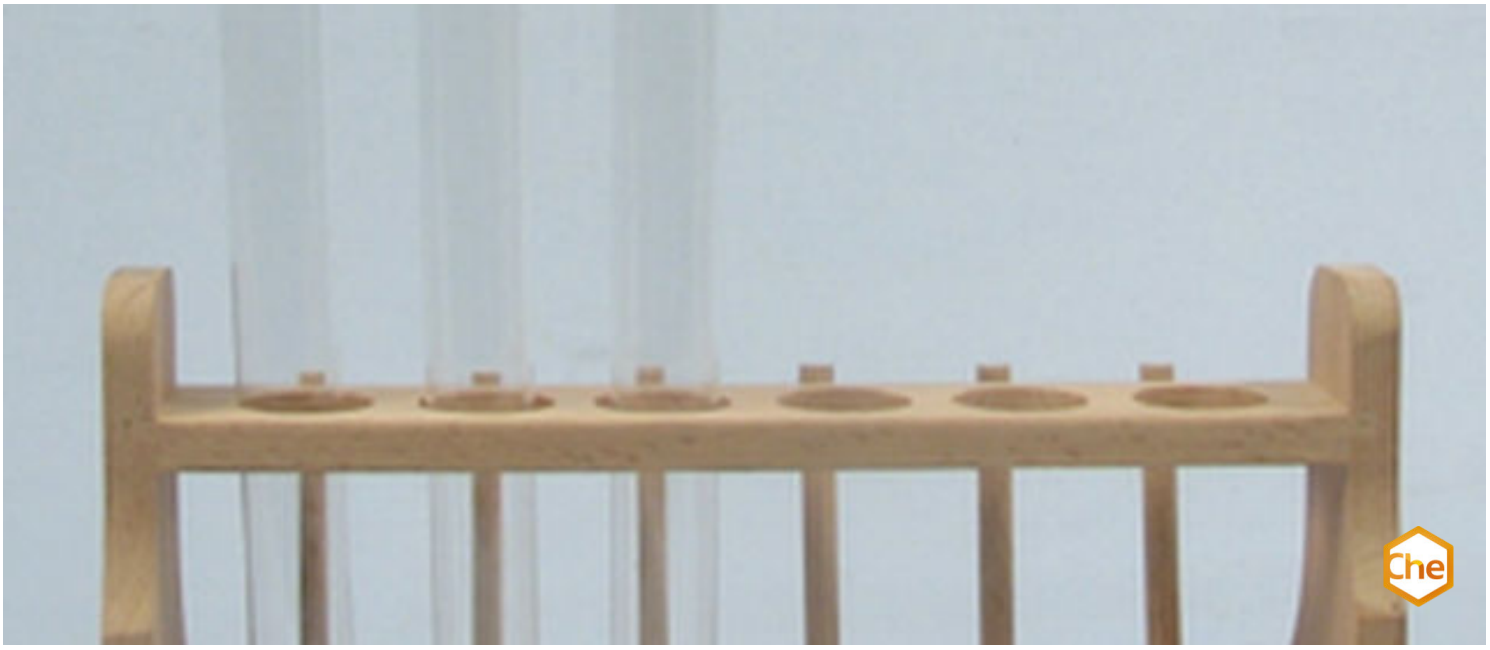
Properties of mixtures



Chemistry > General Chemistry > Substances mixtures & separation

Difficulty level	Group size	Preparation time	Execution time
easy	1	10 minutes	10 minutes

This content can also be found online at:

http://localhost:1337/c/6165814688d1350003fc759e

Teacher information

Application

Air is a homogeneous mixture of substances

Mixtures of substances exist everywhere, in nature, in industry and in the household.

A distinction can be made between homogeneous and heterogeneous mixtures of substances. The air we breathe, for example, is a homogeneous mixture of different gases, whereas solid mixtures are usually heterogeneous mixtures.

Understanding the different properties of mixtures of substances is very important in order to be able to carry out different separation processes afterwards. Following this experiment, for example, evaporation, filtration and magnetic separation can be investigated.

PHYWE
Robert-Bosch-Breite 10
37079 Göttingen
Tel.: 0551 604 - 0
Fax: 0551 604 - 107
info@phywe.de
www.phywe.de

Other teacher information (1/2)

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Previous

Students should be familiar with the concept of substance properties (such as state of matter or color).

Furthermore, the students do not need any special prior knowledge to carry out the experiment.

Principle

In this experiment, mixtures of substances and their properties (water solubility) are investigated. This experiment shows that finely divided substances and gases can be mixed in any way.

The experiment clearly shows that mixtures of solids usually appear heterogeneous, the individual components are visible to the naked eye, whereas solutions appear homogeneous.

Other teacher information (2/2)

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Learning

- Finely divided substances and gases can be mixed as desired.
- Mixtures of solids usually appear non-uniform. Such mixtures are referred to as heterogeneous.

Tasks

- Students make three different mixtures of sand, sodium chloride, sulfur, and iron powder.
- The mixture of salt and sulfur is then dissolved in water to observe solubility as a distinguishing substance property.

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Robert-Bosch-Breite 10
37079 Göttingen

Tel.: 0551 604 - 0
Fax: 0551 604 - 107

info@phywe.de
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Safety instructions

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- Make sure that the stoppers are firmly seated on the test tubes so that the contents cannot splash out!
- Put on protective goggles!

General Notes:

- Sulphur powder is less suitable for this experiment.
- The contents of test tubes 1 and 2 can be disposed of in the normal way. The contents of test tube 3 can be used for experiment "Mixture separations: Filtering, Magnetic Separation". It can also be used after mortaring for iron sulphide production or disposed of as heavy metal waste.

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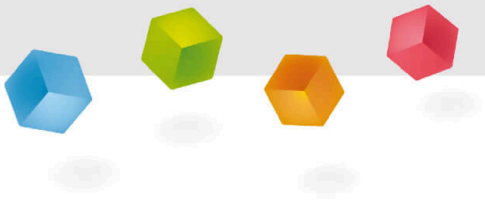

Student Information

PHYWE

Robert-Bosch-Breite 10
37079 Göttingen

Tel.: 0551 604 - 0
Fax: 0551 604 - 107

info@phywe.de
www.phywe.de

Motivation

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Air is a homogeneous mixture of substances

All around us there are mixtures of different substances, in nature, in industry and at home. A distinction is made between substances that mix well and produce a uniform mixture and substances that only produce an inconsistent mixture.

Uniform mixtures are called homogeneous, non-uniform mixtures are called heterogeneous.

Air, for example, is a homogeneous mixture of different gases, whereas your muesli could be described as a heterogeneous mixture of milk and cornflakes.

Tasks

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- Prepare several mixtures of substances and investigate their properties.
- Investigate the solubility of a sand-sulfur mixture.
- Before you start the experiment, answer (right) which substances are soluble in water.
- Record your observations in the log and answer the questions.

What properties do mixtures of substances have?

Sodium chloride (salt) is highly soluble in water.

Correct

false

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Robert-Bosch-Breite 10
37079 Göttingen

Tel.: 0551 604 - 0
Fax: 0551 604 - 107

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Equipment

Position	Material	Item No.	Quantity
1	Protecting glasses, clear glass	39316-00	1
2	Rubber gloves, size M (8), one pair	39323-00	1
3	Wash bottle, 250 ml, plastic	33930-00	1
4	Sulphur, pieces, 500 g	30277-50	1
5	Quartz sand, coarse, 1000 g	CHE-881318041	1
6	Spatula, powder, steel, l=150mm	47560-00	1
7	Sodium chloride 250 g	30155-25	1
8	Iron powder, techn. 500 g	30067-50	1
9	Test tube, 180x18 mm,100pcs	37658-10	1
10	Test tube rack f. 6 tubes, wood	37685-10	1
11	Test tube brush w. wool tip,d20mm	38762-00	1
12	Rubber stopper, d=22/17 mm, without hole	39255-00	3
13	Laboratory pen, waterproof, black	38711-00	1

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Robert-Bosch-Breite 10
37079 Göttingen

Tel.: 0551 604 - 0
Fax: 0551 604 - 107

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Set-up

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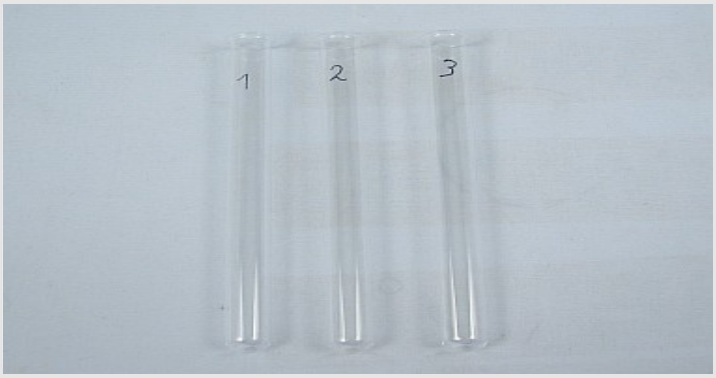
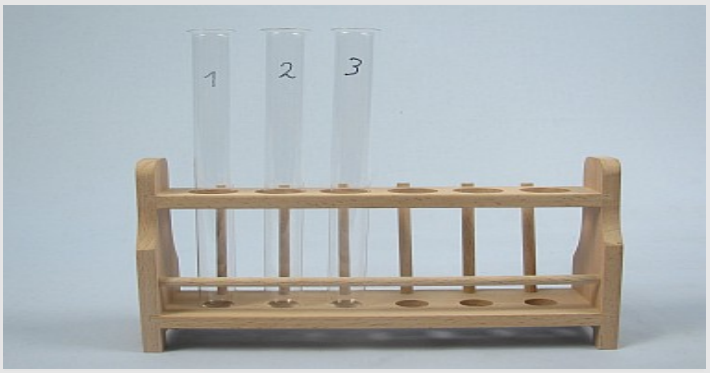
- Take three test tubes and label them 1, 2, and 3.
- Place the test tubes side by side in the test tube rack.





Procedure (1/3)

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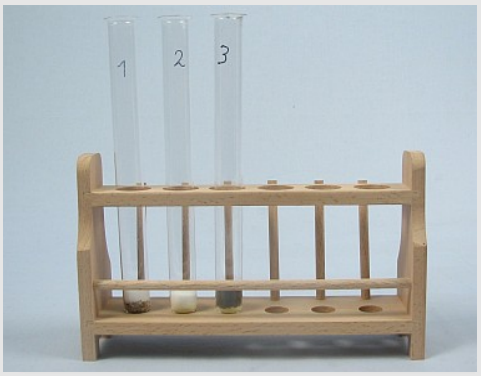
- Fill test tube 1 about 1 cm high with sand and fill the same amount of sodium chloride on top.
- Fill test tube 2 first with sulphur pieces and then with table salt. Then add sulphur pieces and iron powder to test tube 3 (filling height also 1 cm each).



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Robert-Bosch-Breite 10
37079 Göttingen
Tel.: 0551 604 - 0
Fax: 0551 604 - 107
info@phywe.de
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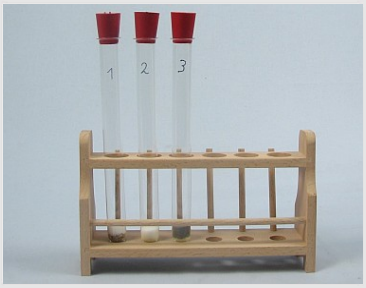
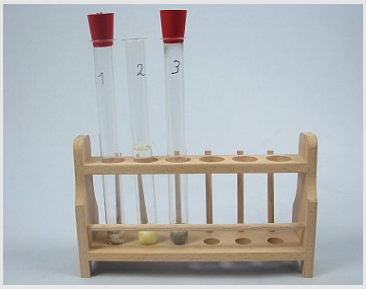
Procedure (2/3)



- How do the mixtures exist at room temperature? Note the states of aggregation of the substances in the protocol.
- Close all three test tubes with a stopper each.
- Shake the test tubes vigorously (note: thumb on the stopper so that it does not fly out!).
- Are the individual substances (of the mixture) still visible in the test tube or does the mixture appear uniform? Write down your observations in the protocol.

Procedure (3/3)



- Add water to test tube 2, which still contains sulphur and table salt, until it is half full.
- Close the reagent glass with a stopper (hold the stopper!) and shake vigorously for a long time.
- Note down your observations here as well and record them in the protocol.

Disposal

Robert-Bosch-Breite 10
37079 Göttingen
Tel.: 0551 604 - 0
Fax: 0551 604 - 107
info@phywe.de
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Report

Result

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Enter the agregate states in the table!

Fabric	Sand	Sodium chloride	Sulphur	Iron
Agregate state				

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37079 Göttingen

Tel.: 0551 604 - 0
Fax: 0551 604 - 107

info@phywe.de
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Observation

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What do you observe during and after shaking the test tubes?

What do you observe in the last part of the

Task 1

PHYWE

Explain your experimental observations:

The sulfur pieces mix _____ with the iron powder and sodium chloride because they are larger. Sand and salt, on the other hand, mix _____ because the grains are about the same size. That's why the first mixture of substances is called _____ and the second and third mixtures _____ .

heterogeneous
homogeneous
well
badly

Check

PHYWE
Robert-Bosch-Breite 10
37079 Göttingen
Tel.: 0551 604 - 0
Fax: 0551 604 - 107
info@phywe.de
www.phywe.de

Task 1

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Explain your experimental observations:

The sulfur pieces mix _____ with the iron powder and sodium chloride because they are larger. Sand and salt, on the other hand, mix _____ because the grains are about the same size. That's why the first mixture of substances is called _____ and the second and third mixtures _____.

heterogeneous
homogeneous
well
badly

Check

Task 2

PHYWE

Explain your experimental observations

If you mix the third mixture with water, _____ dissolves, while _____ remains unchanged. This could be used to separate a mixture of these two substances.

the salt
the sulfur

Check

In what way can you separate salt and sulfur?

Dissolve in water and then boil.
Dissolve in water and filter.
Separate with a magnet.

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