

Comparison of physical process and chemical reaction



Chemistry

General Chemistry

Chemical reactions

Basics of chemical reaction



Difficulty level

easy



Group size

1



Preparation time

10 minutes



Execution time

10 minutes

PHYWE
excellence in science

General information

Application

PHYWE
excellence in science

Heating a test tube over the butane burner

Chemical reactions and physical processes cannot always be strictly separated in practice. However, the distinction is easy to make in the laboratory and corresponds to the age-appropriate thinking of the students. The experiment is a basic component of the introduction to chemistry.

To illustrate the difference between chemical reactions and physical processes, in this experiment sugar and stearic acid will be heated over a butane burner and the observations written down.

Other teacher information (1/2)

PHYWE
excellence in science

Previous knowledge



Students should be familiar with the work in the laboratory and the equipment used. They should be able to distinguish between the terms mixture and compound.

Scientific principle



Heating can trigger chemical reactions and physical processes.

Other teacher information (2/2)

PHYWE
excellence in science

Learning objective



Chemical reactions can be distinguished from physical processes. In chemical reactions, substances undergo permanent changes, new substances with new properties are created.

Tasks



- Compare the results of heating stearic acid and sugar.

Safety instructions

PHYWE
excellence in science

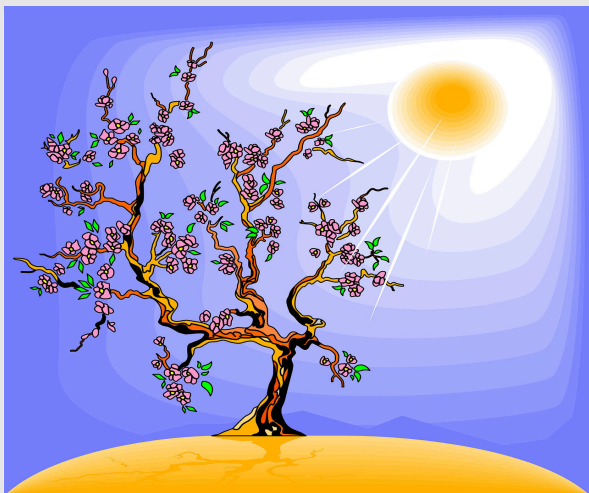
- Stearic acid is flammable. Heat carefully!
- Put on protective goggles!
- For H- and P-phrases please refer to the safety data sheet of the respective chemical!

PHYWE
excellence in science

Student Information

Motivation

PHYWE
excellence in science



Photosynthesis is a chemical reaction that takes place in plants as a result of sunlight

In the natural sciences, a distinction is traditionally made between physical processes and chemical reactions. The former describe the change of a substance without changing its chemical composition. An example of this is the conversion of water into steam by heating. The state of aggregation changes, but the chemical composition remains the same.

Chemical reaction is the change of chemical compounds in it. From the reactants, bonds create a product that can have new properties. Chemical reactions can be seen everywhere in everyday life, for example, photosynthesis in plants. In this process, glucose and oxygen are formed from carbon dioxide and water.

Tasks

PHYWE
excellence in science



- Compare the results of heating stearic acid and sugar.

Equipment

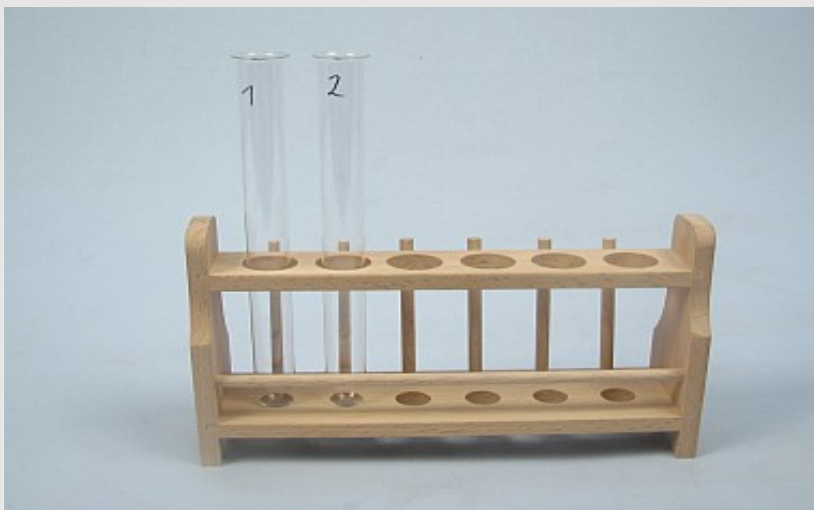
Position	Material	Item No.	Quantity
1	Protecting glasses, clear glass	39316-00	1
2	Rubber gloves, size M (8), one pair	39323-00	1
3	Laboratory pen, waterproof, black	38711-00	1
4	Spatula, powder, steel, l=150mm	47560-00	1
5	Test tube, 180x18 mm,100pcs	37658-10	1
6	Test tube brush w. wool tip,d20mm	38762-00	1
7	Test tube rack f. 6 tubes, wood	37685-10	1
8	Stearic acid 250 g	30228-25	1
9	Glass wool 10 g	31773-03	1
10	Butane burner with cartridge, 220 g	32180-00	1
11	Test tube holder, up to d 22mm	38823-00	1

Additional material

PHYWE
excellence in science

Position	Equipment	Quantity
1	Sugar	1

Set-up (1/2)

PHYWE
excellence in science

Labeled test tubes in stand

- Number the two test tubes 1 and 2 and place them in the test tube rack.

Set-up (2/2)

PHYWE
excellence in science

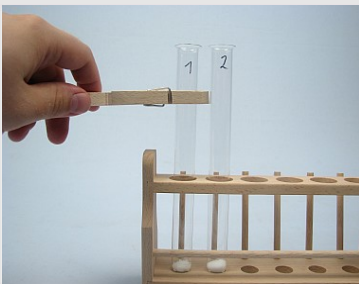
- Put a spatula of stearic acid into test tube 1 and a spatula of sugar into test tube 2.



Filled test tubes

Procedure (1/2)

PHYWE
excellence in science



- Remove test tube 1 with the test tube clamp, close the opening with a glass wool pad and heat the lower part of the test tube in the non-luminous burner flame. Observe the processes and record your observations on slide 17 under "Table 1 - Observation".
- Now remove test tube 2 with the clamp, close it with a glass wool pad and heat it. Observe the processes and record your observations on slide 17 under "Table 1 - Observation".

Procedure (2/2)



Filled test tube during heating over the butane burner

- Look closely at test tubes 1 and 2 during and after the cooling phase and also record these observations in "Table 1 - Observation" on slide 17.

Disposal



- Fill test tube 2 with water and return both test tubes to the test tube rack.

PHYWE
excellence in science

Report

Task 1

PHYWE
excellence in science

Write down your observations:

Test tube 1: Stearic acid**Test tube 2: Sugar****Heating****Cooling
down**

Task 2

PHYWE
excellence in science

In which test tube did which process take place?

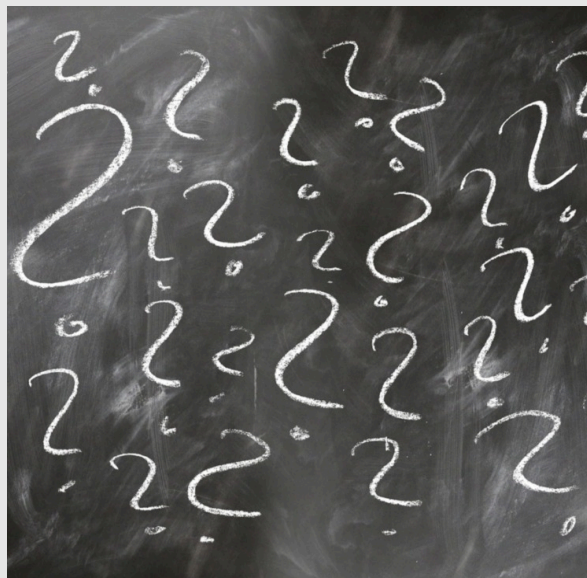
In test tube 1:

In test tube 2:

physical process

chemical reaction

✓ Check



Task 3

PHYWE
excellence in science

What properties can change in a chemical reaction?

Reactivity towards other substances

Color

Density

Fabric composition

✓ Check

Task 4

What properties can change in a physical process?

- Fabric composition
- Color
- Reactivity towards other substances
- Density

✓ Check



Slide	Score/Total
Slide 18: Test tube process	0/2
Slide 19: Changes in chemical reactions	0/2
Slide 20: Changes in physical processes	0/2

Total  0/6

 Solutions

 Repeat

 Export text