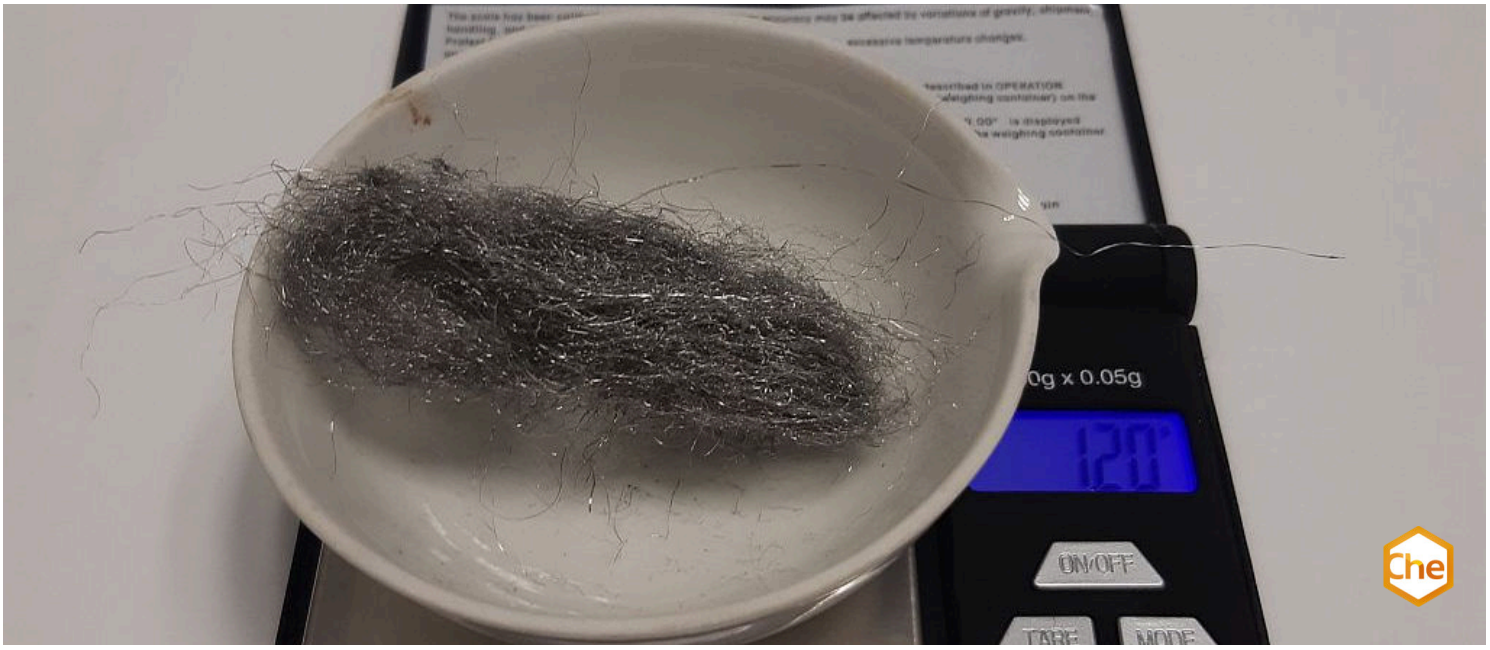
Quantitative analysis of oxides



In this student experiment, the "weight change" during oxidation is investigated. The increase in weight during the oxidation of metals is determined directly by weighing; this is checked using the combustion of steel wool.

Chemistry | Inorganic chemistry | Acids, bases, salts

Difficulty level	Group size	Preparation time	Execution time
easy	2	10 minutes	10 minutes

This content can also be found online at:

http://localhost:1337/c/6339c55f370105000319eeda

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Teacher information

Application

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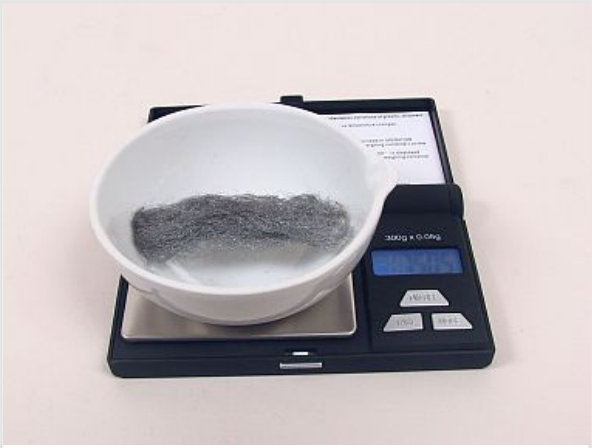

Mass determination of an oxide

The law of conservation of mass applies to all chemical reactions, i.e. the sum of the mass of the starting materials is equal to the sum of the mass of the products. This also applies to combustion reactions in air, so oxides as binary compounds have a higher mass than the element to be oxidised.

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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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Prior knowledge

Planning this experiment in class requires thinking in discontinuous terms, i.e. understanding the atomic structure of matter first, which can be deepened again here.

Principle

The heating or oxidation of the iron wool produces an iron oxide that has a higher mass than the iron wool that was previously oxidised.

Other teacher information (2/2)

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Learning objective

Oxides as binary compounds have a higher mass than the element to be oxidised. The increase in weight during the oxidation of metals can be determined directly by weighing. Oxidations in which gaseous oxides are formed must be followed by collecting and binding these oxides by weighing.

Tasks

- Checking the change in weight during oxidation.
- Why does the above not seem to apply when burning charcoal or a candle? How could one measure the change in weight of the oxides?

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Robert-Bosch-Breite 10
37079 Göttingen

Tel.: 0551 604 - 0
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info@phywe.de
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Safety instructions

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Particles may fly off from the glowing iron wool. Protect your hands and wear safety goggles!

The general instructions for safe experimentation in science lessons apply to this experiment. For H and P phrases, please consult the safety data sheet of the respective chemical.

Before starting the experiment, all potential sources of ignition must be removed ! Likewise, care must be taken when handling naked flames !

Disposal

Put oxidised iron wool in the collection container for 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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Rusted iron.

Oxidation plays a major role in industry, for example in the combustion of raw materials or the melting of iron. But also in our everyday life we can often notice the effects of oxidation, e.g. when a bridge rusts.

The resulting oxides show several differences compared to their respective elements to be oxidised, which are to be investigated in this student experiment.

Tasks

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- Check the change in weight during oxidation and write down your observations.
- Explain the observed facts and state them in a mnemonic sentence. Write a word equation for this.
- Justify why the facts just mentioned do not seem to apply when burning charcoal or a candle. How could one measure the change in weight of the oxides?

Oxidations and reductions.

Oxygen is absorbed during oxidation.

True

False

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Robert-Bosch-Breite 10
37079 Göttingen

Tel.: 0551 604 - 0
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Equipment

Position	Material	Item No.	Quantity
1	Porcelain dish, 75ml, d = 80 mm	32516-00	1
2	Wire gauze with ceramic, 160 x 160 mm	33287-01	1
3	Crucible tongs, 200 mm, stainless steel	33600-00	1
4	Test tube brush w. wool tip,d20mm	38762-00	1
5	Protecting glasses, clear glass	39316-00	1
6	Iron wool 200 g	31999-20	1
7	Butane burner with cartridge, 220 g	32180-00	1
8	Portable Balance, OHAUS YA302	49213-00	1

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Robert-Bosch-Breite 10
37079 Göttingen
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info@phywe.de
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Set-up (1/2)

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Get a suitable scale from your teacher.

Place the scale in the centre of the workstation (fig. top left).

Switch on the scale (Fig. bottom left).

Now carefully position the evaporating dish on the scale (fig. bottom right).

Set-up (2/2)

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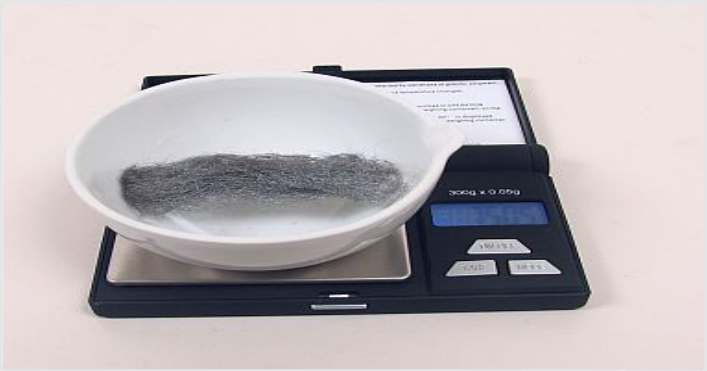
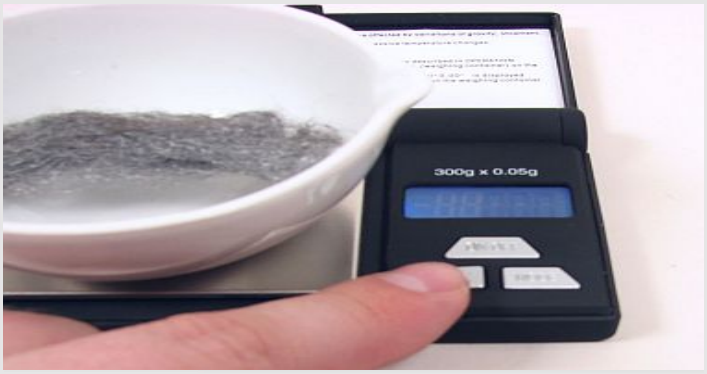
Place an approximately 1 cm thick and 5 cm long ball of iron wool in the evaporation tray (fig. left) and zero the balance (fig. right).





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Procedure

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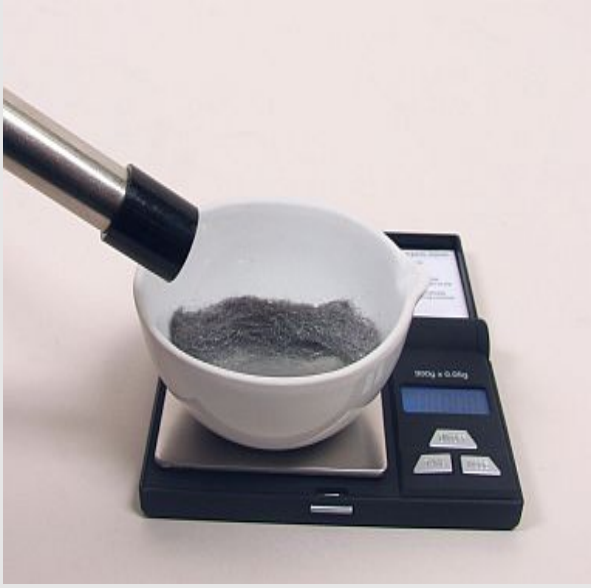

Ignite the iron wool with the burner.

Allow the iron wool to glow through, promote combustion by carefully fanning it with air if necessary. (Be careful not to get too close to the embers).

Watch the scale display.

Write down your observations.

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Report

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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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Write down your observations.

Task 2

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The connection that has been created is ...

... around iron oxide.

... still about iron wool.

Oxides and their properties

Oxides have _____ than _____. This is because in _____ and a new compound or _____ is formed. In the reverse reaction, _____, oxygen is _____.

Check

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Robert-Bosch-Breite 10
37079 Göttingen

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Fax: 0551 604 - 107

info@phywe.de
www.phywe.de

Slide	Score / Total
Slide 8: Iron oxidation	0/4
Slide 15: Multiple tasks	0/7

Total 0 / 11

Solutions | Repeat | Export text

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