# Rusting- "slow combustion"

In this student experiment, the example of "rusting iron wool" clearly shows that oxidation also takes place over longer periods of time and in an "unspectacular" way. The experiment shows that iron corrodes and rusts when it is exposed to humid air for a long time.

Chemistry > Inorganic chemistry > Acids, bases, salts

| 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/633b1a8dbdf6080003a941d0

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# Teacher information

## Application

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**Rusted iron chain**

Rust is formed from iron or steel by oxidation with oxygen in the presence of water.

Rust is a hydrous oxide of iron, a chemical compound that belongs to the oxides and also contains water and hydroxide ions. High temperatures are not required.

Rust is porous and does not protect against further decomposition, unlike the oxide layer of many metallic materials such as chrome, aluminium or zinc.

The weathering of ferrous materials in air and water to rust causes damage worldwide every year.



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# Other teacher information (1/2)

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## Prior knowledge

Based on their properties, metals are divided into two groups: Ferrous metals (rust) and non-ferrous metals (do not rust).

Rust is a corrosion product, whereby the metal is oxidised by the oxygen in the air.

## Principle

- In this student experiment, the example "Rusting of iron wool" clearly shows that oxidations also take place over longer periods of time and is"unspectacular".
- The experiment shows that iron corrodes and rusts when it is exposed to humid air for a long time.

# Other teacher information (2/2)

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## Learning objective

Iron corrodes and rusts when it is exposed to humid air for a long time.

Rusting is a "silent oxidation".

## Tasks

- In this experiment, the students investigate the rusting of iron wool.
- They note down the experimental observations in the report and answer the questions.



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## Safety instructions

- Use protective goggles!
- The general instructions for safe experimentation in science lessons apply to this experiment.

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# Motivation

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**Wire brushes can clean rusted iron parts**

Every iron or steel component is affected by rust in the long term. It is not possible to remove the rust, as it could be counterproductive in the long term. To restore affected iron parts to a good condition, you can remove the rust with a wire brush or sandpaper.

In industry, sandblasters are used to remove paint residues and rust. Usually a protective layer prevents direct contact with oxygen and water. This can consist of paint, grease, oil or another metal. For bicycle chains, lubricants are used to protect against corrosion and wear.

# Tasks

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- Investigate the rusting of iron wool.
- Note down your observations and answer the questions in the report.

**What processes take place during rusting?**

Ferrous metals rust.

- False
- True



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# Equipment

| Position | Material | Item No. | Quantity |
|---|---|---|---|
| 1 | Beaker, Borosilicate, tall form, 250 ml | 46027-00 | 1 |
| 2 | Test tube, 180x18 mm,100pcs | 37658-10 | 1 |
| 3 | Test tube brush w. wool tip,d20mm | 38762-00 | 1 |
| 4 | Protecting glasses, clear glass | 39316-00 | 1 |
| 5 | Glass rod, boro 3.3, l=200mm, d=5mm | 40485-03 | 1 |
| 6 | Iron wool 200 g | 31999-20 | 1 |
| 7 | Butane burner with cartridge, 220 g | 32180-00 | 1 |
| 8 | Wood splints, package of 100 | 39126-10 | 1 |



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## Procedure (1/2)

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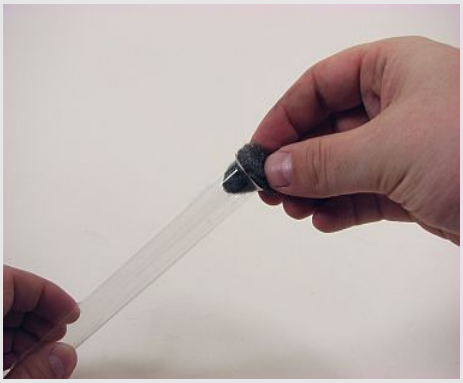
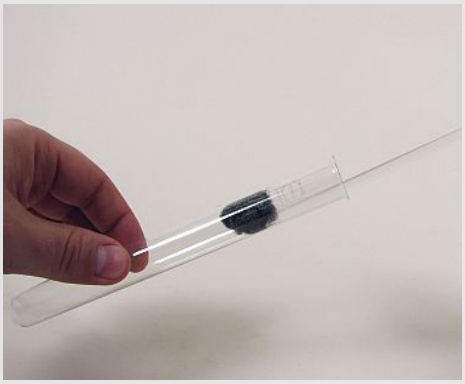
Loosely insert a suitable iron wool ball into the test tube and push it to the bottom with the glass rod without squeezing it.

Moisten the iron wool slightly and fill the beaker halfway with water.





## Procedure (2/2)

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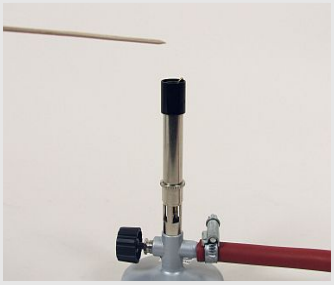
Put the test tube in with the opening facing down.

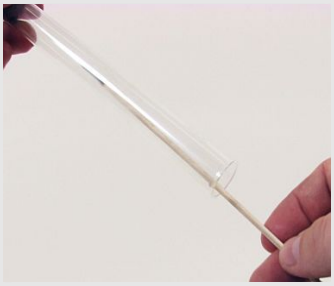
Place the beaker with contents in a storage place (cupboard) where it can remain for a week.

Place some iron wool next to the beaker for comparison.

In the next week, remove the test tube, closing the opening with your thumb.

Light a wood chip and hold it in the test tube.







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# Report

## Task 1

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**Write down your observations.**



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## Task 2

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In winter, the rusting of vehicles is accelerated by .....

- Road salt and water
- Sugar
- Nitrogen

## Task 3

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How can iron parts be protected against rusting?

[ ] is the most widely produced and used metal. When [ ] and oxygen attack together, it rusts. The surface must be thoroughly [ ] and the first [ ] must be applied immediately afterwards, otherwise the iron will [ ] again straight away. The paints contain pigment and fillers. The pigments [ ] the material and protect it from mechanical influences and [ ] new rust formation.

Iron | cleaned | water | rust | prevent | paint | colour

Check



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| Slide | Score / Total |
|---|---|
| Slide 8: Properties of metals | 0/2 |
| Slide 14: Grate | 0/4 |
| Slide 15: Corrosion protection | 0/7 |

**Total** 0 / 13

Solutions Repeat Export text



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