

Student experiment
(5th - 10th grade)

Rusting

🕒 **Time:**
max. 15-20 min.

Safety:

safety glasses



Instruments:

- 1 beaker
- 1 spatula
- 1 spoon
- 1 100ml graduated cylinder
- 1 scale
- 1 piece of sandpaper
- 1 glass rod
- 1 Petri dish
- Bunsen burner

Chemicals:

- iron nail
- solid potassium nitrate (H: 272; P: 220)
- agar agar
- potassium hexacyanoferrate (III) solution, 1% (EUH: 032)
- phenolphthalein, 1% (H: 350-341-361f; P: 201-281-308+313)
- water

Experiment:

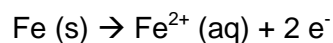
- Vigorously sand an iron nail with sandpaper and place the nail in a Petri dish.
- Put 100ml of water into a beaker. Add 2g of potassium nitrate and 2g some agar agar. Stir the mixture well using a glass rod and heat to boiling. Let cool for approximately 2 minutes when finished.
- Stir several drops of phenolphthalein and 3ml of potassium hexacyanoferrate (III) solution into the gel.
- Then pour the cooled-off mixture over the nail in the Petri dish. The nail should be fully covered with the gel.
- Do not touch or move the Petri dish for about 30 minutes.

Observations:

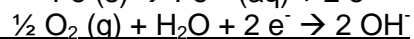
The solution around the nail turns pink and blue in various places.

Results:Reaction Equation:

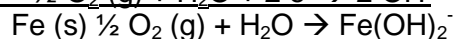
Anode (Oxidation):



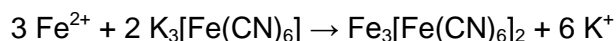
Cathode (Reduction):



overall reaction:

Detection of Fe²⁺ ions using potassiumhexacyanoferrate (III):

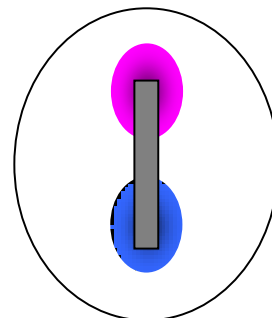
Fe²⁺ ions turn red in the presence of potassium hexacyanoferrate(III) (trivially named "red blood alkali salt" in German):



A blue precipitate results: Turnbull's blue (identical to Berliner blue).

Detection of OH⁻ with phenolphthalein:

Phenolphthalein is an indicator which is colorless at pH values of 0 - 8,2 and reddish-purple at pH values > 8,2.

**Disposal:**

The waste should be disposed of in the heavy metal container.