

Demonstration  
(5th - 10th grade)

## Chlorine synthesis

🕒 Time: 10-15 min.

### Safety:

safety glasses



Do not press the stopper too tightly into the test tube! Too much gas production can pop the stopper out and allow the gas to escape, but stoppers which are overly tight can cause the test tube to shatter under high pressure.

The needle tips should be trimmed off with pair wire cutters. Be careful not to crush the tube while doing this. Do not breathe the collected gas!

Be careful around concentrated acids! They can badly burn you if you don't handle them with care and respect.

### Instruments:

- 1 test tube (Duran 16/160)
- 1 soft rubber stopper
- 2 (pink) needles (1,2 / 40mm)
- 2 2ml syringes
- 2 20ml syringes
- 1 pair wire cutters
- funnel
- active charcoal

### Chemicals:

- hydrochloric acid, HCl, 37% ((H: 314-335; P: 260-301+330+331-303+361+353-305+351+338-405-501)
- potassium permanganate powder,  $\text{KMnO}_4$  (H: 272-302-410; P: 210-273)
- potassium iodide, 5%

### Preparation:

Remove the needle points with the pair wire cutters. Be careful not to crush the tube while doing this. The 20ml syringe should function smoothly and be lubricated using silicone oil. The second 20ml syringe should have the plunger removed and be packed with active charcoal. This will later be used as a charcoal filter.

**Experiment:**

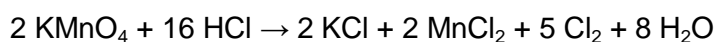
- Fill the test tube with potassium permanganate (KMnO<sub>4</sub>) to a depth of about 1 cm.
- Plug the test tube with a stopper which has been vertically pierced all the way through with two needles. **Do not press the stopper too firmly into the test tube!**
- Attach one empty 20ml syringe to one needle and a 2ml syringe full of hydrochloric acid (HCl) on the other.
- Drip HCl slowly onto the potassium permanganate. Catch the gas forming from this reaction using the 20ml syringe. **Make sure that the syringe plunger slides freely and easily.**
- When the syringe is full of gas, replace it with the homemade active charcoal filter.
- esting the captured gas: Carefully spray the captured gas through a moist piece of potassium iodide paper under an exhaust hood. **Avoid breathing in the gas!**

**Observations:**

After just a very short time, yellow chlorine gas is produced. The potassium iodide paper turns brown when the gas contacts it.

**Results:**

Reacting potassium permanganate and hydrochloric acid together produces yellow chlorine gas.



This gas reacts with potassium iodide to form brown-colored iodine.

**Disposal:**

Put the products in the test tube into the waste container for heavy metals.