

Some reactions of sulfur dioxide – teacher notes

Topic

Gases

Timing

20 minutes.

Apparatus

- Eye protection
- Student worksheet
- Clear plastic sheet (eg OHP sheet)
- Plastic Petri dish (base + lid), 9 cm
- Plastic pipette
- Scissors

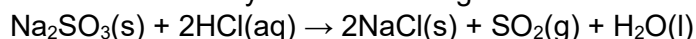
Chemicals

Solutions should be contained in plastic pipettes. See the accompanying guidance on apparatus and techniques for microscale chemistry, which includes instructions for preparing a variety of solutions here <https://rsc.li/3SG8VG3>

- Hydrochloric acid, 1 mol dm⁻³
- Potassium iodide, 0.2 mol dm⁻³
- Potassium iodate(V), 0.1 mol dm⁻³
- Potassium manganate(VII), 0.01 mol dm⁻³
- Full-range indicator solution diluted 1:1 with deionised water
- Sulfuric acid, 1 mol dm⁻³
- Sodium sulfite powder

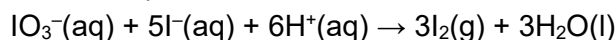
Method

Sodium sulfite + hydrochloric acid generates sulfur dioxide:



Results

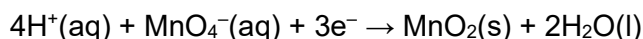
The iodide/iodate mixture turns black due to liberation of iodine:



If sufficient sulfur dioxide is produced and the solution contains excess acid, the potassium manganate(VII) solution is decolorised:



However, with less sulfur dioxide and therefore less acid, the brown manganese(IV) oxide is formed:



Full-range indicator turns from green to yellow, indicating that sulfur dioxide is an acidic gas.

Health, safety and technical notes

- Read our standard health and safety guidance here <https://rsc.li/3eeAKq4>
- Students must wear eye protection.
- Sulfur dioxide is toxic and is a particular problem for asthmatics. Only use a very small amount of sulfite and acid to keep the sulfur dioxide production to a minimum. A risk-assessment should include any individual sensitivities (see CLEAPSS Hazcard [HC097](#)).
- Hydrochloric acid 1 mol dm^{-3} , potassium iodide 0.2 mol dm^{-3} , potassium iodate(V) 0.1 mol dm^{-3} and potassium manganate(VII) 0.01 mol dm^{-3} are all of low hazard (see CLEAPSS Hazcards [HC047a](#), [HC047b](#), [HC080](#), [HC081](#)).
- Sulfuric acid 1 mol dm^{-3} is a skin/eye irritant (see CLEAPSS Hazcard [HC098a](#)).
- Sodium sulfite powder is a skin, eye and respiratory irritant. Depending on its formulation, full range indicator can still be flammable when diluted 1:1 with water. Keep away from sources of ignition (see CLEAPSS Hazcard [HC092](#)).