# Metal oxides: displacement and redox

Teacher / technician

YEAR 10 / LESSON 29 / CHEMISTRY + SCIENCE (DOUBLE AWARD)

Staff preparation and answer guidance. Keep separate from student sheets. Recorded evidence and paper modelling only. No live thermite, ignition instructions or metal-powder heating.

## Coverage and delivery

2.16, 2.17 and 2.20: displacement involving metal oxides; reactivity order; oxidation, reduction and agents by oxygen transfer and electron transfer.

Allow about 50 minutes. Follow the student sequence and use the answers to check reasoning.

## Requisition • class of 30, working in 15 pairs

| Item | Per pair / setup | Class total |
|---|---|---|
| Student booklet / writing tools | 1 per learner | 30 sets |
| Atom cards | 7 per pair | 105 cards |
| Recording / display | Teacher setup | 1 setup |

## Immediate safety

Desk activity. Keep small cards out of mouths. No chemicals or heating; do not attempt to reproduce the recorded reaction.

# Preparation and delivery

Read alongside the student method

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**1.** Preview the RSC recording and select the reaction segment. If unavailable, use the atom-model task and explicitly mark the observation row “recording unavailable”; do not invent observations.

**2.** Supply 15 sets of seven labelled atom cards. Learners must conserve the three oxygen atoms. No powders, igniters, burners or reaction vessels are requisitioned.

**3.** The inherited live instructions combine incompatible locations and equipment. Retain the original in backups only; this edition is recorded evidence, not an authorisation or method for a live thermite demonstration.

**4.** Allow 10 minutes viewing, 15 minutes atom modelling, 15 minutes redox explanations and 10 minutes corrections. Compare formal ion/electron bookkeeping with oxygen transfer.

**5.** No video can establish product identity from colour alone. Distinguish narration, visible evidence and model explanation.

## Close of lesson

- Return cards and retain observations; recycle waste paper.

## Check before teaching

Check the cards, reference data and quantities against this requisition. Keep the staff answer guide separate until the checking stage. Supplied numerical practice datasets are labelled examples; they are not class measurements.

# Answers and teaching notes

Expected explanations • do not give as experimental observations

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- $Fe_2O_3$ + 2Al → $Al_2O_3$ + 2Fe; two iron, two aluminium and three oxygen atoms on each side.
- Aluminium is oxidised by gaining oxygen; iron(III) oxide is reduced by losing oxygen.
- 2Al → $2Al^{3+}$ + $6e^-$; $2Fe^{3+}$ + $6e^-$ → 2Fe. These are electron bookkeeping, not free aqueous ions in the demonstration.
- Aluminium is the reducing agent and is itself oxidised. Iron(III) oxide is the oxidising agent and is itself reduced.
- Copper is less reactive than iron, so it does not displace iron from its oxide in this model.
- Accept actual recorded light/glow or product appearance as observations. “Iron was produced” requires supplied identification evidence; a bright glow alone does not identify iron.

## References and provenance

Pearson Chemistry specification

RSC recorded thermite demonstration

RSC displacement teaching guidance

Prepared 22 November 2026. Original wording, tables and questions. Sources inform the concepts and technique; the lesson scope and classroom quantities are explicitly described here. No laboratory trial or final school risk approval is claimed.