Ions

Teacher / technician

YEAR 10 / LESSON 15 / CHEMISTRY + SCIENCE (DOUBLE AWARD)

Staff preparation and answer guidance. Keep separate from student sheets. Desk model only. No electrolytes, electric field, ion migration or chemical observations are included.

Coverage and delivery

1.37–1.38: electron loss/gain, common main-group ion charges and the listed metal ions.

Allow about 45 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	1 per student	30
Periodic table	1 per pair	15
Pencil / ruler / correction pen	1 set per student	30 sets
Electron counters	20 per pair	300
Paper atom/ion mats	1 set per pair	15 sets

Immediate safety

Desk activity only. Use pre-cut cards or reusable counters; keep small pieces out of mouths and off the floor. No chemicals, flames, glassware or radiation sources are required.

Preparation and delivery

Read alongside the student method

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1. Supply twenty electron counters per pair: 300 for 15 pairs. Proton numbers are written on mats, so a second stock of proton counters is not required.

2. Allow 10 minutes for charge counting, 15 for constructing ions, 10 for named-ion recall and 10 for explanations and checking.

3. Keep ion formation distinct from nuclear changes. Show superscript charge clearly and avoid confusing the 2 in Mg^{2+} with the subscript in a molecular formula.

4. The previous practical-science scheme link to ion migration is replaced by this matching modelling activity; no wet investigation is needed for this lesson.

Close of lesson

• Count and return cards or counters. Keep your written work and corrections; recycle unwanted 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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- Na^+: 11 protons and 10 electrons, charge +1. Removing a negative electron leaves one excess positive charge.
- Rows electrons/charge/symbol: Na 10/+1/Na^+; Mg 10/+2/Mg^{2+}; Al 10/+3/Al^{3+}; N 10/−3/N^{3-}; O 10/−2/O^{2-}; Cl 18/−1/Cl^-.
- Chloride still has 17 protons, which defines chlorine. Its extra electron changes charge, not element identity.
- Groups 2 and 3: +2 and +3; Groups 5 and 6: −3 and −2 in the simple monatomic-ion pattern. Fe^{2+} has 24 electrons and Fe^{3+} has 23.
- Silver Ag^+; copper(II) Cu^{2+}; lead(II) Pb^{2+}; zinc Zn^{2+}. Distinguish iron(II) and iron(III) explicitly.
- Ordinary ion formation changes electrons, not the nucleus. A monatomic ion is one charged atom; a molecule contains bonded atoms. Polyatomic ions also exist but are not modelled in this task.

References and provenance

Pearson Chemistry specification

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.