# Ionic bonds

Teacher / technician

YEAR 10 / LESSON 16 / CHEMISTRY + SCIENCE (DOUBLE AWARD)

Staff preparation and answer guidance. Keep separate from student sheets. Desk models with optional recorded demonstration. No live burning method or measured mass claim. Prior wording “burning magnesium oxide” is corrected.

## Coverage and delivery

1.39–1.41: ionic formulae, outer-electron dot-and-cross diagrams and electrostatic attraction between oppositely charged 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 and writing tools | 1 set per pair | 15 sets |
| Counters (or pencil symbols) | 24 per pair | 360 optional |
| Blank model paper / ion cards | 1 set per pair | 15 sets |
| Display for optional recording | 1 teacher setup | 1 optional |

## Immediate safety

Desk activity only. No chemical samples or live reactions. Keep counters out of mouths and return loose pieces; use pencil symbols instead if preferred.

# Preparation and delivery

Read alongside the student method

YEAR 10 / LESSON 16 / CHEMISTRY + SCIENCE (DOUBLE AWARD)

**1.** Prepare 15 ion-card sets from the supplied charge reference. Use printed symbols or drawings instead of counters if preferred. No magnesium, burner, oxygen cylinder or eye-viewing filters are requisitioned for this recorded version.

**2.** Optional recording: RSC Conservation of Mass, magnesium segment beginning about 1:29 and ending before the calcium carbonate section around 4:31. Preview it first and check playback. The core modelling task works without a recording.

**3.** Allow 10 minutes for formula ratios, 15 for dot-and-cross models, 5 for the optional recording and 15 for explanation and corrections. Challenge misplaced brackets and unbalanced charges.

**4.** Teach formation of ions separately from ionic attraction. The metal oxide product is not the substance being burned. A live magnesium demonstration would require a separate approved procedure and school risk assessment; this booklet is not its method.

## Close of lesson

• Keep evidence and corrections together. Return shared cards/counters and equipment; close the recording or reference pages. No chemical waste is generated.

## 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

YEAR 10 / LESSON 16 / CHEMISTRY + SCIENCE (DOUBLE AWARD)

• Formula table: NaCl 1:1; MgO 1:1; $MgCl_2$ 1:2; $Al_2O_3$ 2:3; $Ca(NO_3)_2$ 1:2; $(NH_4)_2SO_4$ 2:1. All are electrically neutral ratios.

• Na loses one electron; Cl gains one. Mg loses two; O gains two. Bracket each ion and show charges. Chloride and oxide have eight outer electrons; transferred electrons use the donor symbol.

• $MgCl_2$ needs two $Cl^-$ ions for one $Mg^{2+}$. Each chloride receives one electron. $Al_2O_3$ balances +6 and −6; $Ca(NO_3)_2$ balances +2 and two −1 ions.

• $AgNO_3$; $ZnCO_3$; $Fe_2O_3$. Preserve a polyatomic group rather than changing its internal formula.

• Ionic bonding is electrostatic attraction between oppositely charged ions throughout the structure. Electron transfer explains ion formation, not a separate attraction mechanism.

• If shown, the video may show bright light and white solid; accept only observations actually visible. Magnesium reacts with oxygen: $2Mg + O_2 \rightarrow 2MgO$. The simple model omits the extended lattice and does not show electron motion to scale.

## References and provenance

Pearson Chemistry specification

RSC: Conservation of Mass video — magnesium segment

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.