Properties of the halogens

Teacher / technician

YEAR 10 / LESSON 20 / CHEMISTRY + SCIENCE (DOUBLE AWARD)

Staff preparation and answer guidance. Keep separate from student sheets. Reference-data activity only. Replaces the previous halogen-sample and chlorine-smelling instructions; no live demonstration is specified.

Coverage and delivery

2.5–2.6: colours, physical states and trends for chlorine, bromine and iodine; predictions about other halogens.

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
Computer, display and internet	1 teacher setup	1 setup

Immediate safety

Recorded/reference activity only. Do not obtain, handle, open, heat or smell the substances shown. No live reactions, gas tests or chemical waste are part of this lesson.

Preparation and delivery

Read alongside the student method

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1. Prepare one reference-data booklet per pupil and display the RSC chlorine, bromine and iodine pages. Internet images remain at the source; the booklet uses original text and a labelled schematic.

2. No chlorine, bromine, iodine, chlorine water, wet litmus or chemical waste containers are required. Remove the previous instruction to smell or waft chlorine; there is no smell test in either audience's method.

3. Allow 10 minutes for reading/reference provenance, 15 for state deductions, 10 for trends and 10 for evaluation. Ask learners to show inequalities, not just memorised states.

4. The listed phase-change values are reference values, not a heating experiment. Iodine can sublime but also has a liquid phase above its melting point under the stated pressure conditions.

5. Keep chemical reactivity and displacement for the relevant following lesson. Do not infer increasing reactivity from increasing boiling point.

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

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• At 20°C: chlorine gas (20 > −34.04); bromine liquid (−7.2 < 20 < 58.8); iodine solid (20 < 113.7).

• At 70°C: chlorine gas, bromine gas and iodine solid. At 120°C iodine is liquid because 113.7 < 120 < 184.4 at the stated pressure.

• Both melting and boiling points increase down Cl, Br, I. Fluorine is predicted to have a lower boiling point than chlorine; astatine a higher one than iodine. These are extrapolations.

• At room temperature iodine is grey-black solid. Violet describes its vapour; colours of solutions depend on the solvent and are not interchangeable with bulk-element descriptions.

• No smell test is needed to use published physical-property data. Halogens are hazardous; this desk activity requires none. Photographs and printing also affect colour appearance.

• The data support physical trends, not a chemical reactivity ranking. Accept consistent course colour words such as pale green, red-brown and grey-black.

References and provenance

Pearson Chemistry specification

RSC chlorine data

RSC bromine data

RSC iodine data

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.