

Exercise walk-through

Transition elements ■ 8.4

eXercise

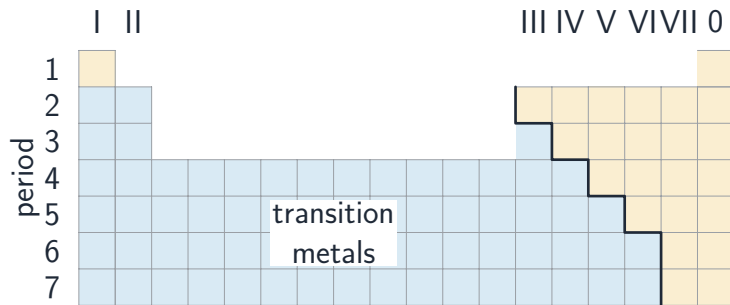
You must be able to

- state the properties of transition elements
- contrast them with Group I metals
- recognise variable oxidation states and coloured compounds

Method — Transition metal properties

- high density and high melting point.
- form **coloured** compounds; often act as catalysts.
- have **variable oxidation numbers** (e.g. iron(II) and iron(III)).

Method — Transition metal properties



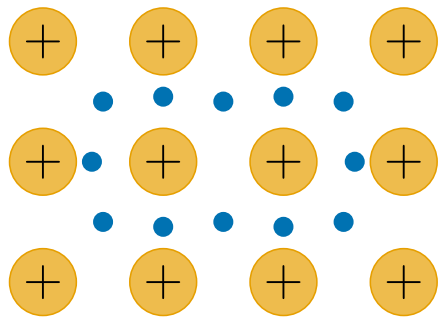
metal

non-metals

— metal / non-metal line

A schematic Periodic Table with the transition block in the middle

Method — Transition metal properties



'sea' of **delocalised electrons**, free to move and carry charge

positive metal ions in a fixed lattice

Transition elements are metals with a sea of electrons

Practice 2.1 ■ 1 mark

State one property of transition metals not shared by Group I metals.

Solution 2.1

Method: Transition metal properties

Worked steps

any of: high density; high melting point; coloured compounds; variable oxidation states; catalytic activity **B1**.

Practice 2.2 ■ 2 marks

Give the two common oxidation states of iron.

Solution 2.2

Method: Transition metal properties

Worked steps

iron(II) and iron(III) **B1** **B1**.

Exam-style 3.1 ■ 1 mark

A student compares element X from Group I with element Y from the transition elements. Which row could be correct?

X	Y
A forms a white compound, one oxidation state	forms a coloured compound, several oxidation states
B forms a coloured compound, several oxidation states	forms a white compound, one oxidation state
C high density, high melting point	low density, low melting point
D acts as a catalyst	never acts as a catalyst

Solution 3.1

Method: Transition metal properties

Worked steps

A. A Group I metal forms white compounds and has one oxidation state, while a transition element forms coloured compounds and has several. B swaps the two, C gives the densities and melting points the wrong way round, and D reverses the catalytic behaviour.

Exam-style 3.2 ■ 2 marks

Compare a transition metal with a Group I metal.

- (a) Give two differences in physical properties.
- (b) State one use of transition elements (or their compounds) linked to their special property.

Solution 3.2

Method: Transition metal properties

Worked steps

- (a) transition metals have higher density and higher melting points than Group I metals **B1** **B1**.
- (b) used as catalysts (e.g. iron in the Haber process) **B1**.

Exam-style 3.3 ■ 1 mark

Iron forms both iron(II) and iron(III) compounds. State what this shows about transition elements.

Solution 3.3

Method: Transition metal properties

Worked steps

they have variable oxidation numbers (states) **B1**.