

8.4 Transition elements

Name: _____ Class: _____ Date: _____

Total: 8 marks

KEY WORDS coloured 有色 • iron 铁 • compounds 化合物 • variable 可变
• transition elements 过渡元素

Objective

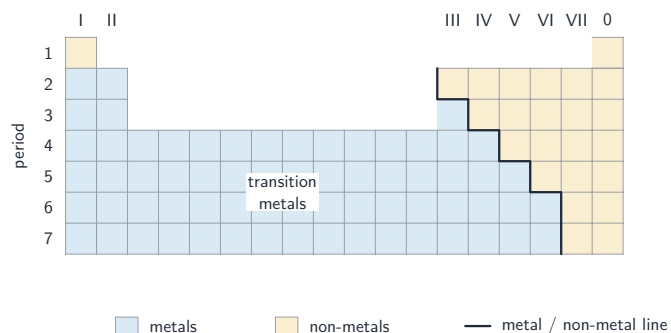
Build the skills to answer exam questions on the **transition elements** 过渡元素 — their properties compared with Group I metals.

You must be able to:

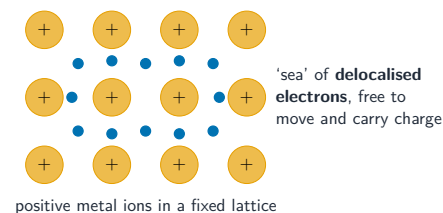
- state the properties of transition elements
- contrast them with Group I metals
- recognise variable oxidation states and coloured compounds

1 Worked examples

■ Transition metal properties



The transition elements are the block of metals in the middle of the table



Transition elements are metals with a sea of electrons

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

2 Practice

2.1 State one property of transition metals not shared by Group I metals. [1]

2.2 Give the two common oxidation states of iron. [2]

3 Exam-style questions

3.1 A student compares element X from Group I with element Y from the transition elements. Which row could be correct? [1]

	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

3.2 Compare a transition metal with a Group I metal.

(a) Give two differences in physical properties.

[2]

(b) State one use of transition elements (or their compounds) linked to their special property.

[1]

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

[1]

Solutions

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

2.2 iron(II) and iron(III).

3.1 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.

3.2 (a) transition metals have higher density and higher melting points than Group I metals.

(b) used as catalysts (e.g. iron in the Haber process).

3.3 they have variable oxidation numbers (states).