

9.3 Alloys and their properties

Name: _____ Class: _____ Date: _____

Total: 10 marks

KEY WORDS alloy 合金 • brass 黄铜 • carbon 碳 • mixture 混合物 • ore 矿石

Objective

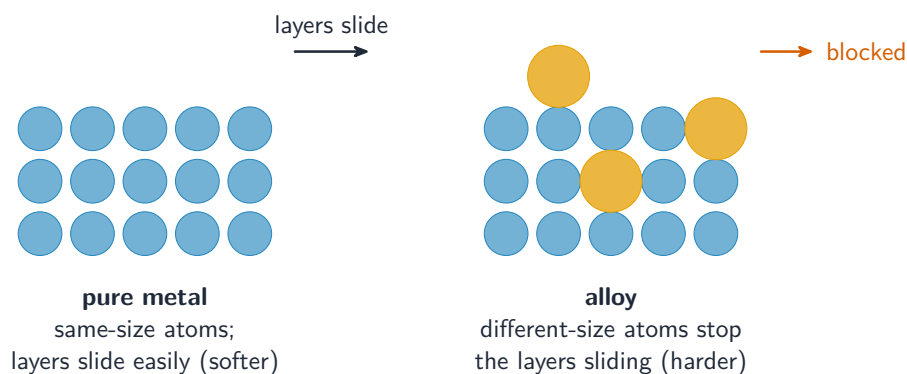
Build the skills to answer exam questions on **alloys** 合金 — what they are, examples, and why they are harder than pure metals.

You must be able to:

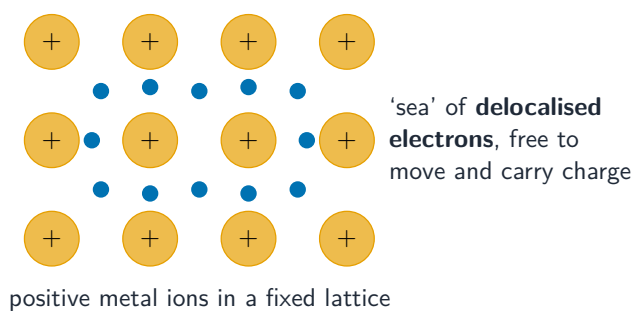
- define an alloy and give examples (brass, stainless steel)
- explain why alloys are harder than pure metals
- link the property to a use

1 Worked examples

■ Why alloys are harder



Different-sized atoms stop the layers sliding, so the alloy is harder than the pure metal



Alloying distorts the metallic lattice, changing properties

- **alloy:** a mixture of a metal with other element(s).
- **brass** = copper + zinc; **stainless steel** = iron + chromium/nickel/carbon.

2 Practice

2.1 Define an alloy.

[1]

2.2 Name the two metals in brass.

[2]

3 Exam-style questions

3.1 Alloys are usually harder than pure metals because the different-sized atoms: [1]

- **A** are more reactive
 - **B** stop the layers sliding over each other
 - **C** make the metal lighter
 - **D** conduct better
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3.2 Stainless steel is used for cutlery.

(a) Name two elements (other than iron) found in stainless steel. [2]

(b) State two properties that make it suitable for cutlery. [2]

3.3 Explain, using their structures, why an alloy is harder than the pure metal it is made from. [2]

Solutions

2.1 a mixture of a metal with one or more other elements.

2.2 copper; zinc.

3.1 B. Different-sized atoms stop the layers sliding.

3.2 (a) chromium and nickel (or carbon).

(b) it is hard and does not rust (resists corrosion).

3.3 in a pure metal the atoms are the same size, so layers slide easily; in an alloy different-sized atoms distort the layers and stop them sliding, making it harder.