

9.1 Properties of metals

Name: _____ Class: _____ Date: _____

Total: 22 marks**KEY WORDS** metals 金属 • oxygen 氧气 • copper 铜 • oxide 氧化物 • salt 盐

Objective

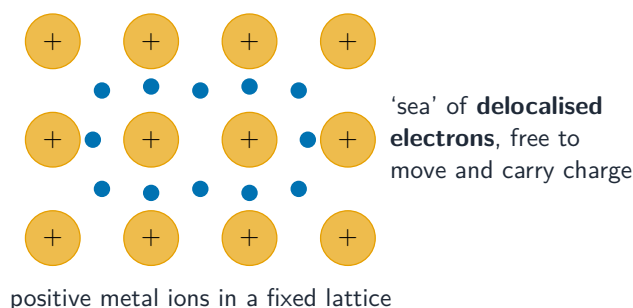
Build the skills to answer exam questions on the **properties of metals** 金属的性质 — physical properties vs non-metals, and the chemical reactions of metals.

You must be able to:

- contrast the physical properties of metals and non-metals
- give the products of metals with acids, water/steam and oxygen
- link properties to uses

1 Worked examples

■ Metal properties



Delocalised electrons make metals good conductors; sliding layers make them malleable

most reactive			
	K	potassium	
	Na	sodium	
	Ca	calcium	
	Mg	magnesium	above carbon: extract by electrolysis
	Al	aluminium	
	C	carbon (non-metal)	
	Zn	zinc	
	Fe	iron	
	H	hydrogen (non-metal)	below carbon: extract by reduction with carbon
	Cu	copper	
	Ag	silver	
	Au	gold	
least reactive			

Reactivity is a key chemical property of a metal

- **metals:** good conductors, malleable/ductile, high melting points.
- **reactions:** + acid → salt + hydrogen; + oxygen → metal oxide; + water/steam → hydroxide/oxide + hydrogen.

2 Practice

2.1 State two physical properties of metals. [2]

2.2 Give the products when a metal reacts with a dilute acid. [1]

3 Exam-style questions

3.1 Which property is typical of a non-metal? [1]

A	B
C	D

- A good electrical conductor
 B malleable
 C brittle
 D high density

3.2 Magnesium reacts with dilute hydrochloric acid.

(a) Name the two products. [2]

(b) Name the gas given off and a test for it. [2]

3.3 State why metals are good electrical conductors. [1]

3.4 Four metals — copper, magnesium, iron and zinc — are tested with cold water, steam and dilute hydrochloric acid.

(a) State **three** physical properties that most metals have and most non-metals do not.[3]

(b) Only magnesium reacts noticeably with cold water; copper reacts with neither steam nor acid. Place the four metals in order of reactivity, most reactive first, and explain how the tests justify your order. [4]

(c) Write the word equation and the balanced symbol equation for zinc reacting with dilute hydrochloric acid. [3]

(d) A piece of magnesium is placed in copper(II) sulfate solution. Predict what you would see, and write the ionic equation. [3]
