

2.2 Reactivity, rusting and metals

Name: _____ Class: _____ Date: _____

Total: 21 marks

Objective

Cover the reactivity series, rusting and metals (2.15–2.27C): ordering metals, displacement, redox terms, rusting prevention, (C) extraction by carbon or electrolysis, alloys. Original IGCSE-level practice.

1 Key knowledge and worked examples

■ The ladder

potassium	more reactive
sodium	
lithium	
calcium	
magnesium	
aluminium	
zinc	
iron	
copper	
silver	
gold	

carbon sits between aluminium and zinc; hydrogen between iron and copper

$K > Na > Li > Ca > Mg > Al > \text{(C)} > Zn > Fe > \text{(H)} > Cu > Ag > Au$. Metals above hydrogen – down to iron – fizz with dilute acids giving H_2 . A metal displaces a less reactive metal's ions from solution or its oxide.

■ Rusting and redox

Rusting needs **oxygen and water**. Barrier methods, galvanising (zinc coat) and sacrificial protection prevent it. **Oxidation = loss of electrons; reduction = gain**. In $Zn + CuSO_4 \rightarrow ZnSO_4 + Cu$, zinc is oxidised (the reducing agent) and Cu^{2+} is reduced (copper(II) sulfate is the oxidising agent).

■ (C) Extraction and alloys

Below carbon (iron): reduce the ore with carbon. Above (aluminium): electrolyse the molten ore. Alloys are harder than pure metals – different-sized atoms stop the layers sliding.

2 Practice

2.1 State the order of reactivity of potassium, zinc, copper and gold. [2]

2.2 Name the two substances iron needs to rust, and one barrier prevention. [3]

2.3 Zinc is added to copper(II) sulfate solution. Write the ionic equation and state which ion is reduced. [3]

2.4 (C) Why is sacrificial zinc bolted to a ship's steel hull? [2]

2.5 (C) State why stainless steel resists rusting, and one use. [2]

3 Exam-style questions

3.1 Explain, using the reactivity series, why magnesium reacts with dilute hydrochloric acid but copper does not, and name the gas formed. [3]

3.2 (C) Aluminium is above carbon in the reactivity series. Explain why this decides its extraction method, naming the process and the molten substance electrolysed. [3]

3.3 (C) Explain why a pure metal is soft and malleable but an alloy is harder, in terms of particle arrangement. [3]
