



METAL EXTRACTION 1

WHERE DO METALS COME FROM?

Only a few metals are found as elements on Earth – these are the least reactive metals (e.g. gold, platinum)

Most metals are produced by chemical reactions (“extracted”) from compounds found in rocks (e.g. aluminium is produced from aluminium oxide found in bauxite).

METAL ORES

if a metal can be extracted for profit from the compounds in a rock, then the rock is called on ore.

REDUCTION

Reduction = loss of oxygen and/or gain of electrons.

Most ores contain **METAL OXIDES**. To extract the metal from the metal oxide, the oxygen is removed. Reactions that remove oxygen are called **reduction reactions**.

e.g. $\text{Al}_2\text{O}_3 \rightarrow \text{Al}$

However, when all metals are extracted, metal ions in the compounds gain electrons to form metal atoms. This means that all extraction reactions involve **reduction**.

e.g. $\text{NaCl} \rightarrow \text{Na}$ ($\text{Na}^+ + \text{e}^- \rightarrow \text{Na}$)

Most reactive Least reactive	Potassium	Strong bonds in compounds 	Hard to extract 	ELECTROLYSIS (ELECTRICAL DECOMPOSITION) Pass an electric current through the molten compound	
	Sodium				
	Calcium				
	Magnesium				
	Aluminium				
	Carbon				
	Zinc	Weak bonds in compounds 	Easy to extract 	DISPLACEMENT USING CARBON Heat the compound with carbon, The carbon displaces the less reactive metal	
	Chromium				
	Iron				
	Nickel				
	Tin				
Lead					
Copper					
Mercury				THERMAL DECOMPOSITION Heat compound – it decomposes to form the metal	
Silver					
Gold				ALREADY ELEMENTS Found as elements – don't need to extract	
Platinum					

Questions

1) Most metals are extracted from ores.

a) Why does gold not need to be extracted from ores?

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b) Iron is extracted from an ore. What is an ore?

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2) Calcium is extracted from calcium chloride by electrolysis.

a) Explain why calcium cannot be extracted by heating calcium chloride with carbon.

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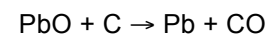
b) Explain why this extraction involves a reduction reaction.

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3) One method of extracting zinc involves the reaction of zinc oxide with carbon. Explain, both in terms of oxygen and electrons, why this extraction is involves reduction.

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4) Lead is extracted by the reduction of lead oxide by heating with carbon:



a) Explain why lead can be extracted by heating with carbon.

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b) Explain why this is a redox reaction.

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