

Metal reactivity and redox equations

NAME:

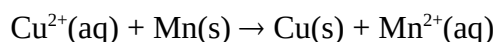
CLASS:

INTRODUCTION

Metals vary in their reactivity. More reactive metals (stronger reductants) lose their valence electrons more easily. An activity series of metals can be described, where metals further up the list are more reactive than those further down the list. Part of such an activity series is shown below.

Increasing reactivity ↑	Lithium (Li)
	Potassium (K)
	Barium (Ba)
	Sodium (Na)
	Calcium (Ca)
	Magnesium (Mg)
	Aluminium (Al)
	Manganese (Mn)
	Zinc (Zn)
	Iron (Fe)
	Nickel (Ni)
	Lead (Pb)
	Copper (Cu)
	Silver (Ag)

Metals further up the list (stronger reductants) will displace a metal further down the list from a solution of its ions. For example, when manganese is added to a solution of copper(II) sulfate, the following reaction occurs:



In this reaction, electrons are passed from the manganese atoms to the copper(II) ions.

No.	Question	Answer
1	Name two metals that are: a less reactive than aluminium b more reactive than calcium.	
2	Metal X is added to a solution of nickel nitrate and a coating of nickel metal appears on metal X. Name two metals that are less reactive than X.	
3	What would you expect to observe if a piece of manganese were to be placed in a solution of lead(II) nitrate?	

Worksheet 14.2

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4	What would you expect to observe if a piece of nickel were to be placed in a solution of zinc nitrate?	
5	<p>a Write the half equations for the reaction of solid magnesium with a solution of iron(II) sulfate.</p> <p>b Write the overall ionic equation for this reaction.</p>	
6	Explain, with the aid of an equation, how solid lead could be produced from a solution of lead nitrate.	
7	Explain, using an appropriate equation, why a nickel spatula should not be used to stir solutions of silver nitrate.	
8	A solution of zinc nitrate is to be stored, but only four different metal containers are available. They are made of copper, nickel, aluminium and silver. Which would be the best choice?	
9	Two colourless solutions are placed side by side. One is magnesium nitrate and the other is zinc nitrate. Describe a simple test you could conduct to determine which was which.	

A student conducted an experiment to determine the activity series for metals A, B, C and D. Solid samples of each metal, as well as 0.1 mol L^{-1} solutions of their nitrate salts were used. The different metals were placed in the different solutions, and the results shown below were obtained.

	Metal A	Metal B	Metal C	Metal D
$0.1 \text{ mol L}^{-1} \text{ ANO}_3$	No reaction	Reaction	Reaction	Reaction
$0.1 \text{ mol L}^{-1} \text{ B(NO}_3)_2$	No reaction	No reaction	Reaction	No reaction
$0.1 \text{ mol L}^{-1} \text{ CNO}_3$	No reaction	No reaction	No reaction	No reaction
$0.1 \text{ mol L}^{-1} \text{ D(NO}_3)_3$	No reaction	Reaction	Reaction	No reaction

Worksheet 14.2

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No.	Question	Answer
10	Four of these experiments were unnecessary. Which are they?	
11	Which of the metals forms ions with a charge of +3?	
12	Which of the metals could possibly belong to the same group in the periodic table as calcium?	
13	Which of the metals would form a compound with chlorine that has the general formula XCl ?	
14	Write balanced ionic equations for the reactions, in aqueous solution, occurring between: a metal B and $D(NO_3)_3$ b metal C and $B(NO_3)_2$ c metal D and ANO_3 .	
15	Based on the results shown, list the activity series for these four metals from most reactive to least reactive.	