Worksheet 1.6

Formulae and equations

1 The formulae of some positive and negative ions are shown in the tables below.

Name	Symbol	Charge
lithium	Li^+	1+
sodium	Na^+	1+
potassium	K^+	1+
magnesium	Mg^{2+}	2+
calcium	Ca^{2+}	2+
barium	Ba^{2+}	2+
aluminium	Al^{3+}	3+
hydrogen	H^+	1+
ammonium	NH_4^+	1+
copper	Cu^{2+}	2+
zinc	Zn^{2+}	2+
iron(II)	Fe^{2+}	2+
iron(III)	Fe^{3+}	3+

Name	Symbol	Charge
fluoride	F^-	1–
chloride	Cl^-	1–
bromide	Br^-	1–
iodide	I^-	1–
oxide	O^{2-}	2–
sulfide	S^{2-}	2–
hydroxide	OH^-	1–
silicate	SiO_3^{2-}	2–
carbonate	CO_3^{2-}	2–
hydrogencarbonate	HCO_3^-	1–
sulfate(VI)	SO_4^{2-}	2–
nitrate(V)	NO_3^-	1–
phosphate(V)	PO_4^{3-}	3–

What is the formula of each of the following compounds?

a sodium chloride

b lithium oxide

c zinc nitrate(V)

d ammonium carbonate

e potassium silicate

f potassium oxide

g aluminium oxide

h sodium phosphate(V)

i copper(II) fluoride

j copper(II) hydroxide

k iron(III) sulfate(VI)

l sodium bromide

m calcium carbonate

n ammonium phosphate

o calcium hydrogencarbonate [15]

2 Write balanced symbol equations for the following syntheses. The formulae of the covalent products (e.g. silicon dioxide) are given but you should be able to work out the formulae of the ionic products (e.g. sodium oxide).

a sodium + oxygen → sodium oxide [2]

b aluminium + oxygen → aluminium oxide [2]

c silicon + oxygen → silicon dioxide (SiO_2) [2]

d magnesium + chlorine → magnesium chloride [2]

e aluminium + chlorine → aluminium chloride (Al_2Cl_6) [2]

f silicon + chlorine → silicon tetrachloride ($SiCl_4$) [2]

g phosphorus (P_4) + chlorine → phosphorus pentachloride (PCl_5) [2]

h iron(II) bromide + sodium hydroxide → iron(II) hydroxide + sodium bromide [3]

i iron(III) sulfate(VI) + potassium hydroxide → iron(III) hydroxide + potassium sulfate(VI) [3]

3 Write an equation for each of the following decomposition reactions.

a calcium nitrate(V) decomposing to give calcium oxide, nitrogen dioxide and oxygen

b lithium nitrate(V) decomposing to give lithium oxide, nitrogen dioxide and oxygen

c magnesium carbonate decomposing to give magnesium oxide and carbon dioxide

d magnesium hydroxide decomposing to give magnesium oxide and water

e calcium hydrogencarbonate decomposing to give calcium carbonate, water and carbon dioxide [10]

