FORMULA LITERACY (GCSE) - INTRODUCTION

It is vital as a chemistry student that you know the formulas of common substances. Here is a list of substances whose formulas you should know at all times.

Elements				Compounds	
Al	aluminium	Mg	magnesium	NH_3	ammoni**a**
Ar	argon	Hg	mercury	$CaCO_3$	calcium carbonate
Br_2	bromine	Mg	magnesium	CO	carbon monoxide
Ca	calcium	Ne	neon	CO_2	carbon dioxide
C	carbon	Ni	nickel	$CuSO_4$	copper sulfate
Cl_2	chlorine	N_2	nitrogen	HCl	hydrochloric acid
Cr	chromium	O_2	oxygen	CH_4	methane
Co	cobalt	P_4	phosphorus	HNO_3	nitric acid
Cu	copper	Pt	platinum	NO	nitrogen monoxide
F_2	fluorine	K	potassium	NO_2	nitrogen dioxide
Au	gold	Si	silicon	NaCl	sodium chloride
He	helium	Ag	silver	NaOH	sodium hydroxide
H_2	hydrogen	Na	sodium	SO_2	sulfur dioxide
I_2	iodine	S_8	sulfur	H_2SO_4	sulfuric acid
Fe	iron	Sn	tin	H_2O	water
Pb	lead	Ti	titanium		
Li	lithium	Zn	zinc		

You also need to be able to work out the formula of ionic compounds. To do this you need to know the charges on ions. Many of these can be worked out from the position in the Periodic Table or from the number in roman numerals after a name (e.g. iron (III) sulfate contains Fe^{3+} ions; iron (II) sulfate contains Fe^{2+} ions).

+1	H^+ hydrogen ions NH_4^+ ammon**ium** ions Group 1 ions (e.g. Na^+ sodium ions)
+2	Group 2 ions (e.g. Ca^{2+} calcium ions)
+3	Group 3 ions (e.g. Al^{3+} aluminium ions)

–1	NO_3^- nitrate ions OH^- hydroxide ions Group 7 ions (e.g. Br^- bromide ions)
–2	CO_3^{2-} carbonate ions SO_4^{2-} sulfate ions
–3	PO_4^{3-} phosphate ions

The formula is then worked out by balancing the number of + and – charges. For example:

sodium oxide	contains Na^+ and O^{2-} ions	need ions in ratio: $2Na^+ : 1O^{2-}$	formula = Na_2O
aluminium bromide	contains Al^{3+} and Br^- ions	need ions in ratio: $1Al^{3+} : 3Br^-$	formula = $AlBr_3$
calcium hydroxide	contains Ca^{2+} and OH^- ions	need ions in ratio: $1Ca^{2+} : 2OH^-$	formula = $Ca(OH)_2$
magnesium nitrate	contains Mg^{2+} and NO_3^- ions	need ions in ratio: $1Mg^{2+} : 2NO_3^-$	formula = $Mg(NO_3)_2$
iron(III) sulfate	contains Fe^{3+} and SO_4^{2-} ions	need ions in ratio: $2Fe^{3+} : 3SO_4^{2-}$	formula = $Fe_2(SO_4)_3$