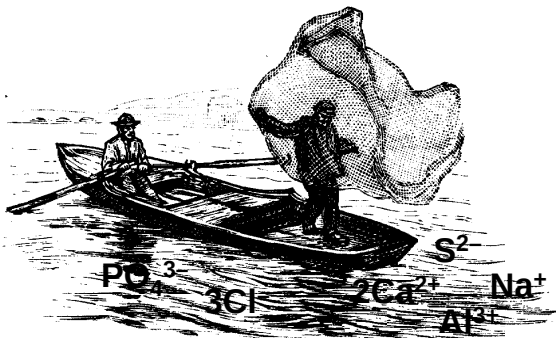

Net ionic equations

Review: forming ions

- Ionic (i.e. salt) refers to +ve ion plus -ve ion
- Usually this is a metal + non-metal or metal + polyatomic ion (e.g. NaCl, $NaClO_3$, Li_2CO_3)
- Polyatomic ions are listed on page 95
- (aq) means aqueous (dissolved in water)
- For salts (aq) means the salt exists as ions
- NaCl(aq) is the same as: $Na^+(aq) + Cl^-(aq)$
- Acids form ions: HCl(aq) is $H^+(aq) + Cl^-(aq)$, Bases form ions: NaOH(aq) is $Na^+ + OH^-$

Q - how is charge determined (+1, -1, +2, etc.)?

A –

- F, Cl _____ ___ electron, thus forming ___, ___
- Ca _____ _____ electrons, thus forming ____

Background: valences and formulas

- Charge can also be found via the compound
- E.g. in $NaNO_3(aq)$ if you know Na forms Na^+, then NO_3 must be NO_3^- ($NaNO_3$ is neutral)
- By knowing the valence of one element you can often determine the other valences

Q - Write the ions that form from $Al_2(SO_4)_3(aq)$?

Step 1 - look at the formula: $Al_2(SO_4)_3(aq)$

Step 2 - determine valences: $Al^3\ (SO_4)^2$

(Al is 3+ according to the periodic table)

Step 3 - write ions: $2Al^{3+}(aq) + 3SO_4^{2-}(aq)$

- Note that there are 2 aluminums because Al has a subscript of 2 in the original formula.

Practice with writing ions

Q - Write ions for $Na_2CO_3(aq)$

A -

- Notice that when ions form from molecules, charge can be separated, but the total charge (and number of each atom) stays constant.

Q - Write ions for $Ca_3(PO_4)_2(aq)$ & $Cd(NO_3)_2(aq)$

A -

A -

Q - Write ions for $Na_2S(aq)$ and $Mg_3(BO_3)_2(aq)$

A -

Types of chemical equations

Equations can be divided into 3 types (pg. 333)

1) Molecular, 2) Ionic, 3) Net ionic

- Here is a typical molecular equation:

$Cd(NO_3)_2(aq) + Na_2S(aq) \rightarrow CdS(s) + 2NaNO_3(aq)$

- We can write this as an ionic equation (all compounds that are (aq) are written as ions):

$Cd^{2+}(aq) + \cancel{2NO_3^-}(aq) + \cancel{2Na^+}(aq) + S^{2-}(aq)$
$\rightarrow CdS(s) + \cancel{2Na^+}(aq) + \cancel{2NO_3^-}(aq)$

- To get the NET ionic equation we cancel out all terms that appear on both sides:

Net: $Cd^{2+}(aq) + S^{2-}(aq) \rightarrow CdS(s)$

Equations must be balanced

- There are two conditions for molecular, ionic, and net ionic equations

Materials balance

Both sides of an equation should have the same number of each type of atom

Electrical balance

Both sides of a reaction should have the same net charge

Q- When NaOH(aq) and $MgCl_2(aq)$ are mixed, _____(s) and NaCl(aq) are produced. Write balanced molecular, ionic & net ionic equations

First write the skeleton equation

Ionic equation:

Net ionic equation:

Write balanced ionic and net ionic equations:

$CuSO_4(aq) + BaCl_2(aq) \rightarrow CuCl_2(aq) + BaSO_4(s)$

$Fe(NO_3)_3(aq) + LiOH(aq) \rightarrow$ _____(aq) $+ Fe(OH)_3(s)$

$Na_3PO_4(aq) + CaCl_2(aq) \rightarrow$ _____(s) $+ NaCl(aq)$

$Na_2S(aq) + AgC_2H_3O_2(aq) \rightarrow$ _____(aq) $+ Ag_2S(s)$