Combustion Analysis

Reacting a known mass of a compound with O_2 (g) to produce CO_2 (g), H_2O (g), NO_x and/or SO_x compounds that are collected and weighed.

Example- A 0.255 g sample of compound containing only the elements **C**, **H** and **O** was reacted with O_2 (g) completely to produce the following:

Compound
0.561 g CO_2 (g) (44.01 g/mol)
0.306 g H_2O (g) (18.01 g/mol)

Determine the formula of the compound.

Combustion Analysis

Compound	Moles	Mass (g)
0.561 g CO_2 (44.01 g/mol)	Moles C = 0.0128	Mass C = 0.153
0.306 g H_2O (18.01 g/mol)	Moles H = 0.034	Mass H = 0.0343
	Moles O = 0.0043	Mass O = 0.068

Mole Ratios C_3H_8O

Writing and Balancing Chemical Equations (by Inspection)

Identities of reactants (initial state) and products (final state)

Relative numbers of each

Physical states
- Solid (s)
- Liquid (ℓ)
- Gas (g)
- Dissolved in water (aqueous solution) ( ) (aq)

Balancing chemical equations (by inspection)
- Start with the most complicated species first.
- Balance H's and O's last.

Combustion Reactions

$CH_4(g) + 2O_2(g) \xrightarrow[\text{heat}]{\Delta} CO_2(g) + 2H_2O(g)$

$2C_8H_{18}(\ell) + 25O_2(g) \xrightarrow{\Delta} 16CO_2(g) + 18H_2O(g)$