WJEC (Wales) Chemistry A-level

Topic 1.1 - Formulae and Equations

Flashcards

What is an element?

What is an element?

An element is a substance made up of only one type of atom.

What is a compound?

What is a compound?

A compound is made up of at least two different elements chemically bonded together. This means compounds are made up of more than one type of atom.

What are the chemical formulas for nitrate and carbonate ions?

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Nitrate: NO_3^-

Carbonate: CO_3^{2-}

What are the chemical formulas for oxide and hydroxide ions?

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Oxide: O^{2-}

Hydroxide: OH^{-}

What are the chemical formulas for sulfate and ammonium ions?

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Ammonium: NH_4^+

Sulfate: SO_4^{2-}

What is an ionic compound?

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Ionic compounds are made up of positive and negative ions, held together by electrostatic attraction.

What is the chemical formula for the ionic compound sodium chloride?

What is the chemical formula for the ionic compound sodium chloride?

Sodium is in Group 1 so forms the ion Na^+.

Chlorine is in Group 7 so forms the ion Cl^-.

Sodium chloride has the formula NaCl as the charges on the ions must cancel to give a compound with no overall charge.

What is the chemical formula for the ionic compound aluminium oxide?

What is the chemical formula for the ionic compound aluminium oxide?

Aluminium forms the ion Al^{3+}. The oxide ion is O^{2-}.

For the ionic compound to have no overall charge, two aluminium ions must bond with three oxygen ions, giving the formula Al_2O_3.

What is the chemical formula for the ionic compound zinc nitrate?

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Zinc forms the ion Zn^{2+}. The nitrate ion is NO_3^-.

For the ionic compound to have no overall charge, two nitrate ions must bond with the zinc ion. This gives the formula $Zn(NO_3)_2$.

What is an oxidation number?

What is an oxidation number?

A number assigned to an atom or an ion which represents how many electrons have been lost or gained by the atom.

What is the oxidation number of an element?

What is the oxidation number of an element?

Zero.

What is the overall oxidation number of the ionic compound $CaCO_3$?

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Zero.

The oxidation numbers of a neutral compound add up to zero.

What is the overall oxidation number of HCO_3^-?

What is the overall oxidation number of HCO_3^-?

-1.

The overall oxidation number of a charged compound is simple as it is the charge shown on the molecule.

What are the oxidation states of hydrogen and oxygen ions?

What are the oxidation states of hydrogen and oxygen ions?

Hydrogen: +1 (except in metal hydrides where it is -1).

Oxygen: -2 (except in peroxides and F_2O where it is -1).

What are the common oxidation states of the halogens and Group one metals?

What are the common oxidation states of the halogens and Group one metals?

Halogens: -1

Group one metals: +1

What is the oxidation number of sulfur in Na_2SO_4?

What is the oxidation number of sulfur in Na_2SO_4?

Na → +1

O → -2

The overall charge on the compound is zero so sulfur must have an oxidation number of +6 to balance the charges.

What is the oxidation number of chromium in $K_2Cr_2O_7$?

What is the oxidation number of chromium in $K_2Cr_2O_7$?

$K \rightarrow +1$

$O \rightarrow -2$

The overall charge on the compound is zero so chromium must have an oxidation number of +6 to balance the charges.

What are the state symbols used in chemical equations?

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(g) - gas

(aq) - aqueous

(l) - liquid

(s) - solid

What is an ionic equation?

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Ionic equations only show the reacting ions and can be written for any reaction involving ions in solution.

Write an ionic equation for the reaction between nitric acid (HNO_3) and sodium hydroxide (NaOH). Include state symbols.

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Reaction equation: $HNO_3 + NaOH \rightarrow NaNO_3 + H_2O$

Rewrite the equation with the aqueous ions:

$H^+ + NO_3^- + Na^+ + OH^- \rightarrow Na^+ + NO_3^- + H_2O$

Cancel any ions appearing on both side to get the ionic equation and add in state symbols:

$H^+(aq) + OH^-(aq) \rightarrow H_2O(l)$

Write an ionic equation for the reaction between silver nitrate and sodium chloride. Include state symbols.

Write an ionic equation for the reaction between silver nitrate and sodium chloride. Include state symbols.

Reaction equation: $AgNO_3 + NaCl \rightarrow AgCl + NaNO_3$

Rewrite the equation with aqueous ions (note, AgCl is a solid):

$Ag^+ + NO_3^- + Na^+ + Cl^- \rightarrow AgCl + Na^+ + NO_3^-$

Cancel any ions appearing on both side to get the ionic equation:

$Ag^+(aq) + Cl^-(aq) \rightarrow AgCl(s)$