

Chemistry

Compulsory work

If you are intending to study chemistry next year you must complete all the exercises that are on the accompanying pdf file.

Optional work

You could also if you wish process the experimental results that you obtained on the second induction day. To do this you will need to convert your time to seconds and calculate $1/t$. Then you will need to plot $\text{Log}(1/t)$ vs $\text{Log } V$, where V is the volume of the potassium iodide. You should obtain a straight line. Work out the gradient of the line. The closer your answer is to 1.00 the better you did the experiment.

Writing and Balancing Equations

Writing Balanced Equations

To write a balanced symbol equation where reactants are given there are 5 simple steps:

1. Write out the word equation first.
2. Write the correct formula for each compound below its name (see page 26).
3. Go through each element in turn, making sure the number of atoms on each side of the equation balances.
4. If you changed any numbers, do step 3 again.
5. Keep doing this until all the elements balance.

Doing the third step:

If the atoms in the equation don't balance you can't change the molecular formulae — only the numbers in front of them.

For example:



There are two Cl on the right of the equation, so we need to have two HCl on the left-hand side. This also doubles the number of hydrogen atoms on the left-hand side, so that the hydrogens balance as well. This always works. If you can't get an equation to balance then it's wrong.

The examples below use the rules from the previous page to write out the word and symbol equations. Read through them and then try the questions on the next page.

Example 1: Write a balanced equation for the combustion of methane (CH_4) in oxygen.

Step 1:
(using rule 9)

Methane + oxygen \rightarrow carbon dioxide + water



Step 2:
(using rule 10)



Step 3:

(the Cs already balance,

put a 2 in front of H_2O to balance the Hs,

now put a 2 in front of O_2 to balance the Os. Check that all still balances.)

Example 2: Write a balanced equation for the reaction of magnesium with hydrochloric acid.

Step 1:
(using rules 2 and 4)

Magnesium + hydrochloric acid \rightarrow magnesium chloride + hydrogen



Step 2:
(using rule 10)



Step 3:

(the Mgs already balance,

put a 2 in front of HCl to balance the Hs and Cls. Check that all still balances.)

Writing and Balancing Equations

Combine what you've learnt on the previous three pages to answer the following:

Write balanced symbol equations for these reactions.

(The charges on the ions are given at the bottom of the question box.)

- 1) the complete combustion of propane (C_3H_8) in oxygen
- 2) the complete combustion of ethanol ($\text{C}_2\text{H}_5\text{OH}$) in oxygen
- 3) sodium hydroxide + nitric acid
- 4) potassium oxide + hydrochloric acid
- 5) sodium hydroxide + sulphuric acid
- 6) magnesium carbonate + nitric acid
- 7) sodium carbonate + sulphuric acid
- 8) potassium carbonate + nitric acid
- 9) the complete combustion of octane (C_8H_{18}) in oxygen
- 10) calcium hydroxide + hydrochloric acid

sodium: Na^+

carbonate: CO_3^{2-}

hydrogen: H^+

potassium: K^+

chloride: Cl^-

nitrate: NO_3^-

hydroxide: OH^-

calcium: Ca^{2+}

oxide: O^{2-}

magnesium: Mg^{+2}

sulphate: SO_4^{2-}