

Chemistry in Society

Worksheet 2

Calculate the atom economy for the following reactions where the desired product is in bold:

1. CaCO3 + 2HCl 🡪 **CaCl2** + CO2 + H2O

1. 4NH3 + 6NO 🡪 **5N2** + 6H2O

1. C2H4 + CH3CO2H + ½O2 🡪 **C2H3O2CCH3** + H2O
2. When ethene (C2H4) is hydrolysed with water it becomes ethanol (C2H6O). What is the percentage yield of ethanol if 42g were produced from hydrolysing 28g of ethane?
3. Propanol, C3H7OH, can be dehydrated to produce propene, C3H6, using excess sulfuric acid. Propoxypropane, C3H7OC3H7, and water are also produced.

4C3H7OH 🡪 2C3H6 + C3H7OC3H7 + 3H2O

21kg of propene were produced from a hydrolysis using 270 kg of propanol (C3H7OH), calculate the percentage yield of propene (C3H6).

1. Nitrogen monoxide gas, NO, combines with oxygen to form brown fumes of nitrogen dioxide according to the following equation.

 2NO + O2 🡪 2NO2
calculate the volume of oxygen needed to react completely with 60cm3 of nitrogen monoxide? (Take the molar volume of NO and oxygen to be 22.4 l mol-1)
2. How many moles of zinc will react with 50cm3 of 2 mol l-1 hydrochloric acid?

 Zn(s) + 2HCl(aq) ⭢ ZnCl2(aq) + H2(g)

1. The concentration of sulphuric acid was determined by titration with a 0.203 moldm-3 of sodium hydroxide solution. It required 26.8 cm3 of sodium hydroxide to neutralise 25.0 cm3 of the sulphuric acid solution. Calculate the concentration of the sulphuric acid.
2. For the combustion of sucrose:

C12H22O11 + 12O2 ---> 12CO2 + 11H2O

there are 10.0 g of sucrose and 10.0 g of oxygen reacting. Which is the limiting reagent?