**Energetics – calculating energy changes**

Some reactions give out energy to the surroundings making the surrounding temperature increase –

Some reactions take in energy from the surroundings making the surrounding temperature decrease –

We can measure the temperature change during a reaction to decide what type of reaction it is. These experiments are called calorimetry.

We use the results of these experiments to calculate Q, the **heat energy change** and ∆H, the **molar enthalpy change**

 **Q = mc∆T Q = m x c x ∆T**

Q

m

c

∆T

 **∆H = Q ÷ n**

n

Experiments

1. Combustion reactions
2. Metal displacement reactions
3. Neutralisation reactions
4. Salts dissolving
5. Combustion reactions

A spirit burner filled with propanol (C3H7OH) was used to heat 100cm3 water. The temperature rose from 21 to 65°C. Calculate ∆H for the reaction.

Results

|  |  |
| --- | --- |
| Mass of spirit burner at start (g) | 139.26 |
| Mass of spirit burner at end (g) | 138.71 |
| Mass of fuel burned (g) |  |
| Temperature change (°C) |  |

1. Metal displacement reactions

1.8g of zinc were added to 100cm3 CuSO4 of conc. 0.2 mol/dm3. The temperature rose from 21.2 to 40.9°C. Calculate ∆H for the reaction

Results

|  |  |
| --- | --- |
| Moles of CuSO4 |  |
| Moles of zinc |  |
| Temperature change (°C) |  |

1. Neutralisation reactions

25cm3 of NaOH was added to 25cm3 HCl. Both solutions had a concentration of 2.0 mol/dm3. The temperature rose from 21.0 to 33.6°C. Calculate ∆H for the reaction

Results

|  |  |
| --- | --- |
| Moles of NaOH solution (cm3) |  |
| Moles of HCl solution (cm3) |  |
| Temperature change (°C) |  |

1. Salts dissolving

10.0g of NH4Cl was added to 100cm3 water. The temperature fell from 21.0 to 15.1°C. Calculate ∆H for the reaction.

Results

|  |  |
| --- | --- |
| Moles of NH4Cl added |  |
| Temperature change (°C) |  |

