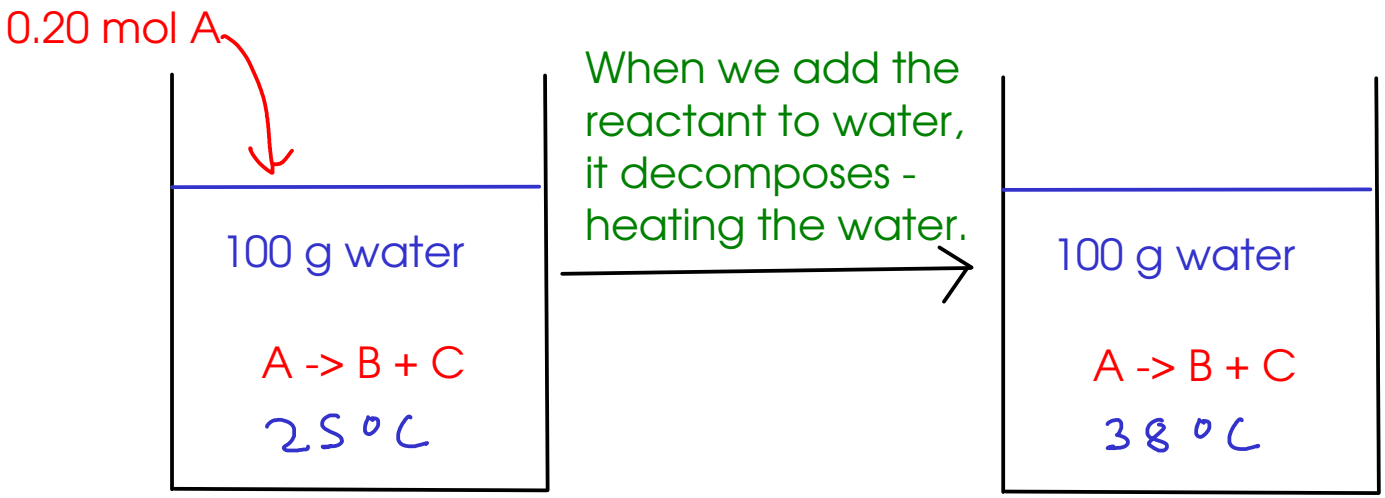
CALORIMETRY

- the measurement of heat. But how do we measure heat?



... what is Q for this reaction?

Assuming that no heat is lost from the water to the surrounding air,

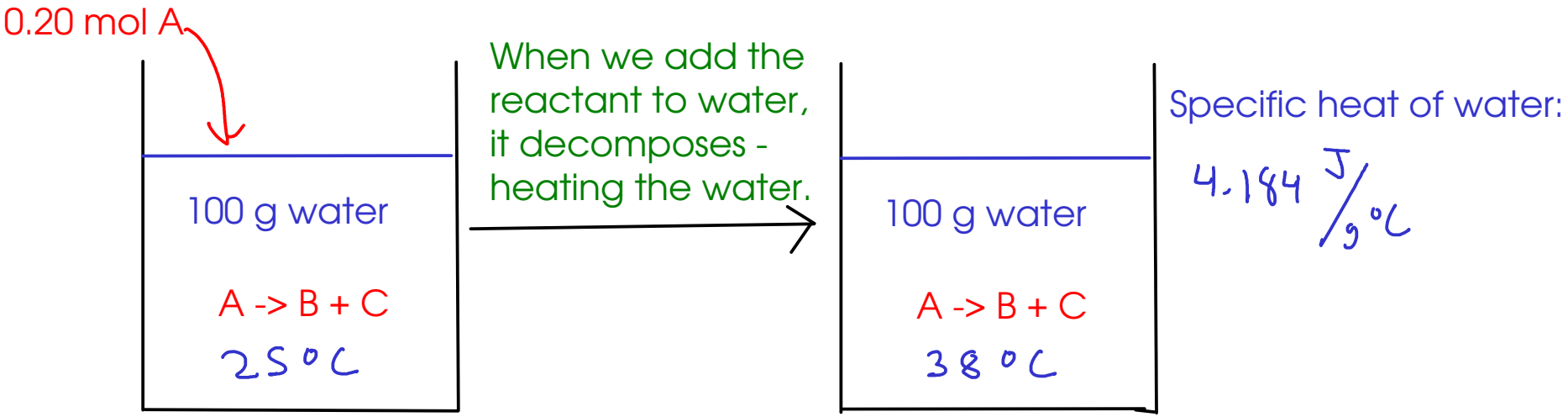
$$Q_r + Q_w = 0$$

Conservation of energy. The terms add to zero because they have opposite signs.

Q_r: reaction; Q_w: water

... if we knew something about the WATER, we could use that to find the heat of the REACTION!

We can look up the water's SPECIFIC HEAT and use it to relate the temperature change of the water to Q.



$$Q_r + Q_w = 0$$

$$Q_w = m_w \times S_w \times \Delta T_w$$

$$= (100\ g)(4.184\ J/g^{\circ}C)(38^{\circ}C - 25^{\circ}C)$$

$$= 5439.2\ J$$

$$Q_r + Q_w = 0;\ Q_r + 5439.2\ J = 0;\ Q_r = -5439.2\ J$$

Usually, reaction heats are reported on a per mole basis:

$$Q = \frac{Q_r}{\text{mol A}} = \frac{-5439.2\ J}{0.20\ \text{mol A}} = -27196\ \frac{J}{\text{mol A}} = \boxed{-27\ \frac{kJ}{\text{mol A}}}$$

We call these numbers (energy per mole for a reaction) "HEAT OF REACTION"