Exothermic: heat is produced

value of Q = + because it is released (product)

States are a must

$$C_4H_{10\,(g)} + \frac{13}{2}O_{2\,(g)} \longrightarrow 4CO_{2\,(g)} + 5H_2O_{(l)} \; + \; 2877.40 \text{ kJ}$$

↓ co-ef of 1

heat product

thermochemical equation

∴ exothermic, Q = 2877.40 kJ

thermodynamic equation

ΔH = -Q

$$C_4H_{10\,(g)} + \frac{13}{2}O_{2\,(g)} \longrightarrow 4CO_{2\,(g)} + 5H_2O_{(g)} \qquad \Delta H = -2877.40 \text{ kJ}$$

↑ change in chem. potential energy

-ve means exothermic!
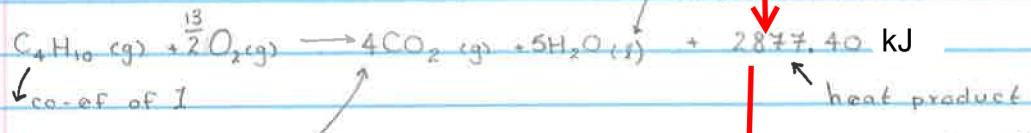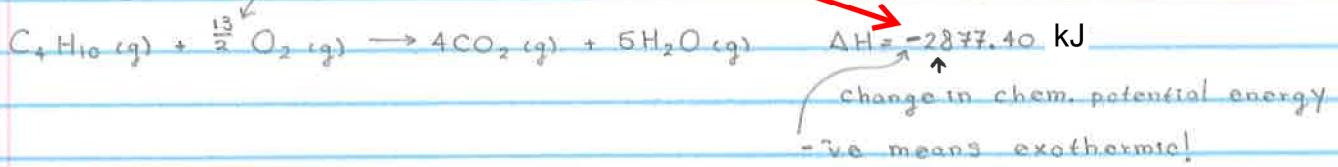
Endothermic: Heat is a "reactant", is absorbed. → required for reaction

$$H_2O_{(l)} + 44.0 \text{ kJ} \longrightarrow H_2O_{(g)}$$

ΔH = -Q

heat added ∴ endothermic

$$H_2O_{(l)} \longrightarrow H_2O_{(g)} \qquad \Delta H = +44.0 \text{ kJ}$$

+ve means endothermic
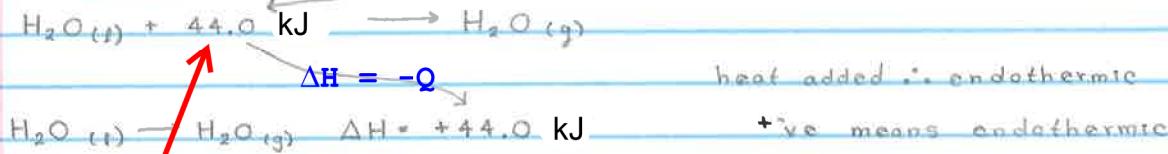
value of Q = - because it is absorbed (reactant)