Change in Enthalpy: ΔH

$$\Delta H \quad = \quad \Delta E_{system} \quad + \quad P\Delta V$$

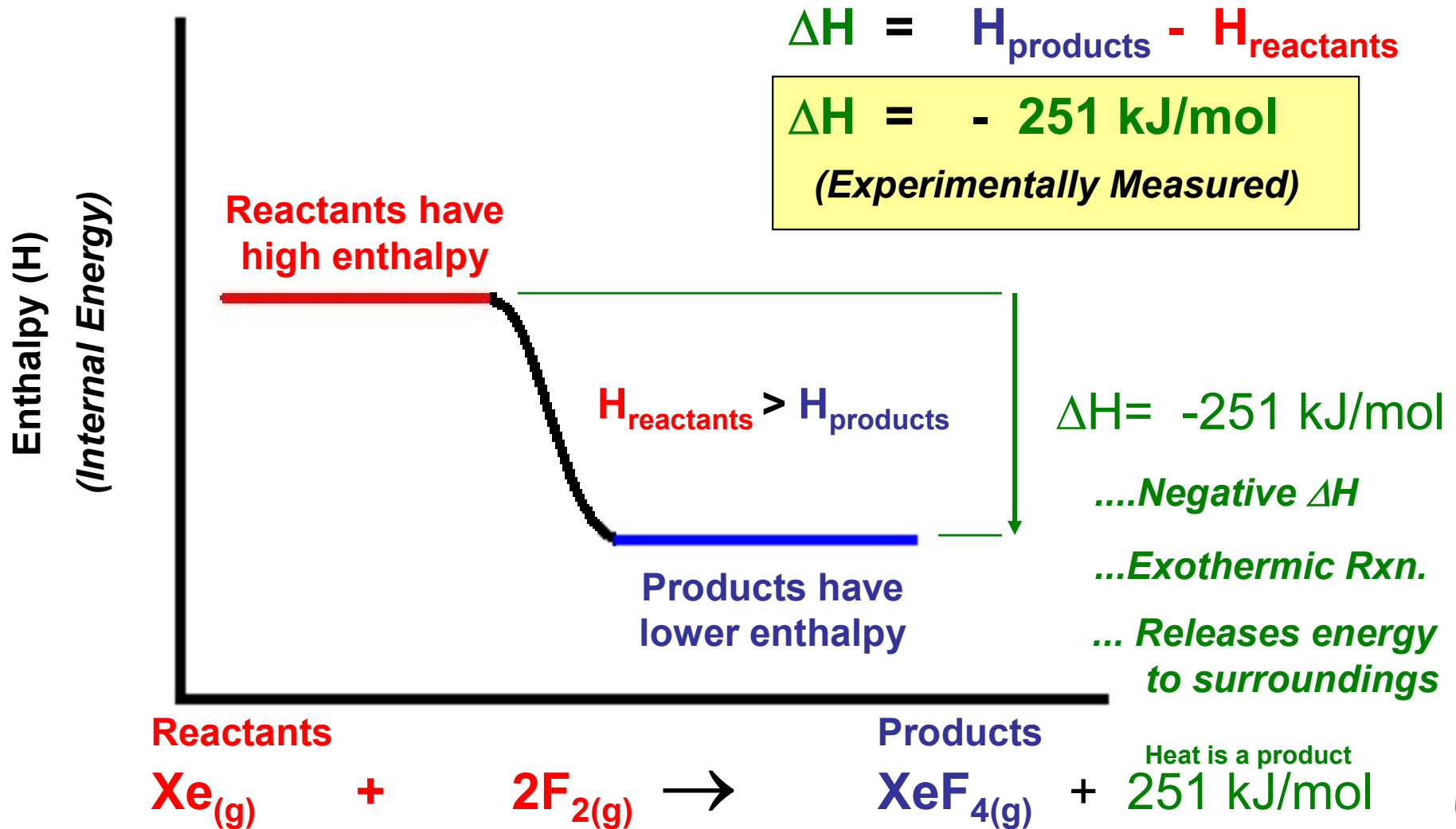$$\Delta H \quad = \quad \Delta E_{system \; + \; P\Delta V}$$

Change in Enthalpy $\approx$ **Change in system energy**

...if the volume change or work done by the system is nearly zero

In chemistry we measure ΔH for reactions knowing that in many cases it is the same as the change in internal energy when $\Delta V \approx 0$.

Changes in Chemical Enthalpy

$$\Delta H = H_{products} - H_{reactants}$$

$$\Delta H = -251 \text{ kJ/mol}$$

(Experimentally Measured)

Reactants have high enthalpy

$H_{reactants} > H_{products}$

$\Delta H = -251$ kJ/mol

....Negative ΔH

...Exothermic Rxn.

... Releases energy to surroundings

Products have lower enthalpy

Enthalpy (H) *(Internal Energy)*

Reactants

$Xe_{(g)}$ + $2F_{2(g)}$ →

Products

$XeF_{4(g)}$ + 251 kJ/mol

Heat is a product

Changes in Chemical Enthalpy

$$\Delta H = H_{products} - H_{reactants}$$

$$\Delta H = + 68 \text{ kJ/mol}$$
(Experimentally Measured)

Products have high enthalpy

$H_{reactants} < H_{products}$

$\Delta H = + 68 \text{ kJ/mol}$

....Positive ΔH

...Endothermic Rxn.

... Absorbs energy from surroundings.

Reactants have low enthalpy

Enthalpy (H)
(Internal Energy)

Reactants

Products

Heat is a reactant
$68 \text{ kJ/mol} + N_{2(g)} + 2O_{2(g)} \rightarrow 2NO_{2(g)}$