

Enthalpy (Heat) of Fusion [ΔH_{fus}] & of Vaporization [ΔH_{vap}] Worksheet

These Enthalpies (Heats) are the amount of energy required (or given off) BY ONE GRAM of the substance when it is changing from one phase to another. During this phase change the temperature *remains constant* so there's no temp change in the equation. 'Cp', our specific heat variable, is replaced with the symbols ΔH_{fus} & ΔH_{vap} depending on the phase change for which we are calculating.

Remember that **Enthalpy of Fusion** refers to changing between solid and liquid (melting or freezing) and **Enthalpy of Vaporization** refers to changing between liquid and gas (evaporation or condensation).

$$\begin{aligned}\text{In general: } q &= m\Delta H_{\text{fus}} \text{ for enthalpy of Fusion} \\ q &= m\Delta H_{\text{vap}} \text{ for enthalpy of Vaporization}\end{aligned}$$

1. How much heat is required to melt 360 g of solid water? Important constant: ΔH_{fus} of water is 334 J/g.
2. How much heat is required to vaporized 24 g of liquid water? ΔH_{vap} of water is 2257 J/g.
3. For a 500g block of lead (Pb) to melt, how much energy is needed? ΔH_{fus} of lead is 23 J/g.
4. Mercury is a metal that is a liquid at room temperature. In order to solidify 7.5g of it, how much energy needs to be removed? ΔH_{fus} of Hg is 11.3 J/g.
5. What is the heat of vaporization of ammonia (NH_3) if 0.15 g of it requires 206.5 J for evaporation?
6. Ethanol ($\text{C}_2\text{H}_5\text{OH}$) very easily changes from a liquid to a gas. If 29.34g of ethanol uses 32.23J of energy what would its ΔH_{vap} be?
7. Iron is the heaviest metal vaporized in the sun. Its ΔH_{vap} is 6071.43 J/g. How much heat is needed to turn (keep) .5 kilogram, 500 grams of iron into a gas?
8. In order for 5g liquid Hydrogen to become a solid, 12J of energy must be removed. What is the ΔH_{fus} for the element, Hydrogen?