

Friday worksheet 2 – [Latent heat](#)

$$q = n \times L$$

q = energy (kJ)

n = mol

L = latent heat (kJ/mol)

1. Consider the table on the right. it shows the latent heat of fusion and evaporation of a number of substances. According to the table the latent heat of fusion for water is 6.01 kJ/mol. That is, for every mol of ice 6.01 kJ is needed to disrupt the bonds between water molecules in the ice lattice to turn it into liquid water.

Substance	ΔH_{fus} (kJ/mol)	ΔH_{vap} (kJ/mol)
Ammonia (NH ₃)	5.65	23.4
Ethanol (C ₂ H ₅ OH)	4.60	43.5
Methanol (CH ₃ OH)	3.16	35.3
Oxygen (O ₂)	0.44	6.82
Water (H ₂ O)	6.01	40.7

- a. Ethanol has a boiling temperature of 78°C. Calculate the amount of energy, in kJ, required to completely evaporate 4.5 mol of liquid ethanol at 78°C.
- b. The melting point of ethanol is -114°C. Calculate the amount of energy, in kJ, required to completely melt 88.0 grams of ethanol.
- c. 63.0 grams of water at 100°C is supplied with just enough energy to completely evaporate. Calculate the amount of energy supplied in kJ.

2. Geothermal energy can be harnessed from hot springs.
- i. What is the relationship between the latent heat of evaporation and the latent heat of condensation?



- ii. Calculate the amount of energy released when 12.0 kg of steam at 100°C is captured and condensed back into water at 100°C.