## Friday worksheet 4 – Latent heat

- 1. The latent heat of vaporisation of acetone (molar mass 58.1g/mol) is 31.3 kJ/mol. Calculate the amount of energy, in kJ, required to evaporate 21.4 g of acetone at boiling point.
- 2. Refer to the information included in the table below.
  - a. Exactly 1 kg of ethanol is heated to its boiling temperature. Calculate the amount of energy, in kJ, that is required to vapourise the entire sample of ethanol?

| Substance                                  | $\Delta H_{c}$ (kl/mol) | $\Delta H$ (k.l/mol) |
|--|-------------------------|----------------------|
| oussiance                                  |                         | Lilvap (Kormon)      |
| Ammonia (NH <sub>3</sub> )                 | 5.65                    | 23.4                 |
| Ethanol (C <sub>2</sub> H <sub>5</sub> OH) | 4.60                    | 43.5                 |
| Methanol (CH <sub>3</sub> OH)              | 3.16                    | 35.3                 |
| Oxygen (O <sub>2</sub> )                   | 0.44                    | 6.82                 |
| Water (H <sub>2</sub> O)                   | 6.01                    | 40.7                 |
| mater (120)                                | 0.01                    | 40.7                 |

- b. How much energy is required, in kJ, to convert 23.4 kg of ammonia from a liquid to a gas at the same temperature?
- c. How much energy, in joules, is released when 10.0 g of steam at 100  $^\circ C$  condenses to water at 100  $^\circ C?$
- d. A furnace delivers an accurate amount of energy every minute. If it takes 30 seconds to convert 1.50 X 10<sup>3</sup> g of liquid water to 1.50 X 10<sup>3</sup> g of water vapour, how long would the same furnace take to convert 100 g of liquid aluminium at the boiling point of 2,470 °C to 100 g of aluminium gas also at 2,470 °C? Explain your reasoning with the use of a calculation.

(latent heat of vaporisation of aluminium 284kJ/mol )