# THERMODYNAMICS (F)

**1** Calculate the entropy change for the vaporisation of methanol ($CH_3OH$) given this data.

enthalpy of vaporisation of methanol = +35.2 kJ $mol^{-1}$
boiling point of methanol = +64.7 ºC

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**2** Tungsten can be extracted from tungsten oxide by reaction with hydrogen. The reaction is not feasible at room temperature. Calculate the temperature at which this reaction becomes feasible.

$$WO_3(s) + 3H_2(g) \rightarrow W(s) + 3H_2O(g)$$

| **substance** | **$WO_3(s)$** | **$H_2(g)$** | **W(s)** | **$H_2O(g)$** |
|---|---|---|---|---|
| $\Delta_f H^\ominus$ (kJ $mol^{-1}$) | –840 | | | –242 |
| $S^\ominus$ (J $mol^{-1}$ $K^{-1}$) | +83.3 | +131 | +33 | +189 |

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