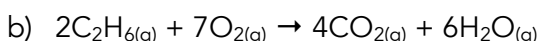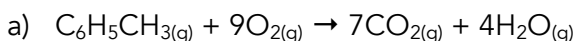# Energetics

Practice Problems

1. The Enthalpy of formation (ΔH^0) of the following compounds are given on Table 12 in your data booklet. Give the thermochemical equations which represent the ΔH^0 of them.

   a) Bromoethane

   b) Phenol

   c) Methylamine

2. Calculate the standard heat of formation for the following reactions:

   a) $C_6H_5CH_{3(g)} + 9O_{2(g)} \rightarrow 7CO_{2(g)} + 4H_2O_{(g)}$

   b) $2C_2H_{6(g)} + 7O_{2(g)} \rightarrow 4CO_{2(g)} + 6H_2O_{(g)}$

Additional data (ΔH^0_f):
- $CO_{2(g)}$ = -394 kJ mol^{-1}
- $H_2O_{(g)}$ = -242 kJ mol^{-1}

3. Born-Haber Cycle

   a) Write an equation to represent the lattice energy of cadmium fluoride, CdF_2.
   b) Write an equation to represent the second ionization energy of cadmium.
   c) Use the following data, and further information from sections 8 and 11 of the IB data booklet to construct a Born-Haber cycle for cadmium fluoride.
   d) Calculate the lattice energy of cadmium fluoride.

Additional data:
- enthalpy change of atomization for Cd(s) = +102 kJ mol^{-1}
- second ionization energy of cadmium = +1631 kJ mol^{-1}
- Enthalpy change of formation of CdF_2(s) = -694 kJ mol^{-1}