1) Find Δ_fH of butane given that the following data.

   Δ_cH: $C_4H_{10}(g) = -2877$, $C(s) = -394$, $H_2(g) = -286$ kJ mol^{-1}

2) Find ΔH for the following reaction using the data below.

$$C_3H_8(g) + 5 O_2(g) \rightarrow 3 CO_2(g) + 4 H_2O(l)$$
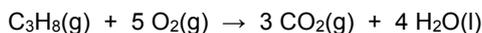
   Δ_fH: $C_3H_8(g) = -104$, $CO_2(g) = -394$, $H_2O(l) = -286$ kJ mol^{-1}

3) Find ΔH for the following reaction using the bond enthalpy data below.

$$C_2H_6(g) + 3\frac{1}{2} O_2(g) \rightarrow 2 CO_2(g) + 3 H_2O(g)$$

   C-C = 348, C-H = 412, O=O = 496, C=O = 743, O-H = 463 kJ mol^{-1}

4) Find Δ_cH of propan-2-ol given that the following data.

   Δ_fH: $CH_3CH(OH)CH_3(l) = -318$, Δ_cH: $C(s) = -394$, $H_2(g) = -286$ kJ mol^{-1}

5) Calculate Δ_fH of $CCl_4(l)$ given the following data.

   $CCl_4(l) \rightarrow CCl_4(g)$ = +31 kJ mol^{-1}
   $C(s) \rightarrow C(g)$ = +715 kJ mol^{-1}
   Bond enthalpy (Cl-Cl)   = +242 kJ mol^{-1}
   Bond enthalpy (C-Cl)   = +338 kJ mol^{-1}

6) Find ΔH for the hydrogenation of propene using the data below.

$$CH_3CH=CH_2(g) + H_2(g) \rightarrow CH_3CH_2CH_3(g)$$
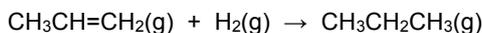
   Δ_cH: $CH_3CH=CH_2(g) = -2059$, $H_2(g) = -286$, $CH_3CH_2CH_3(g) = -2220$ kJ mol^{-1}

7) 0.550 g of propanone was burned in a calorimeter containing 80 g of water. The temperature rose by 47.3ºC. Calculate Δ_cH for propanone given the specific heat capacity of water is 4.18 J g^{-1} K^{-1}.

8) 25.0 cm^3 of 2.00 mol dm^{-3} nitric acid was reacted with 25.0 cm^3 of 2.00 mol dm^{-3} potassium hydroxide is an insulated cup. The temperature rose from 20.2ºC to 33.9ºC. Calculate ΔH for the reaction given the specific heat capacity of water is 4.18 J g^{-1} K^{-1}.