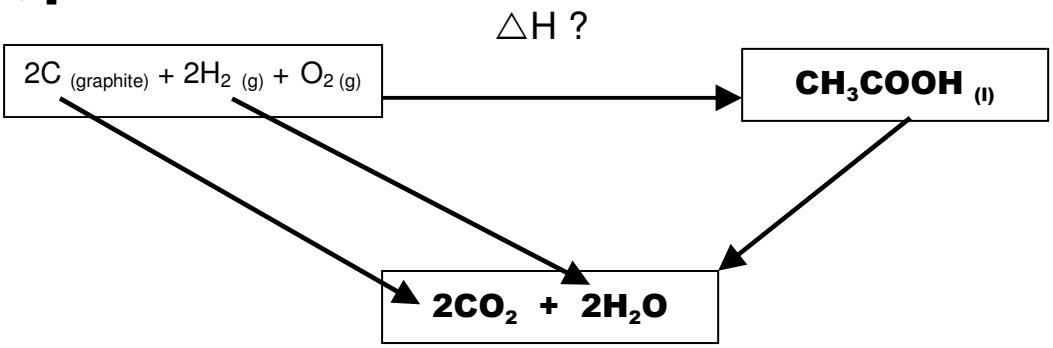
Hess cycle practice Qs

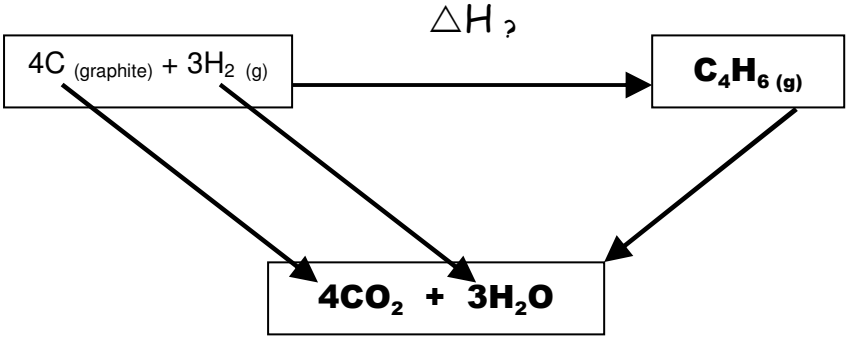
Given the following standard enthalpy changes of combustion at 298K in $kJmol^{-1}$, calculate the answers to Qs 1- 3

$C_{(graphite)}$	-394	$C_2H_{6\,(g)}$	-1561	$C_4H_{10\,(l)}$	-3510
$H_{2\,(g)}$	-286	$CH_2{=}CH_{2\,(g)}$	-1393	$CH_3OH_{\,(l)}$	-715
$CH_3COOH_{\,(l)}$	-876	$C_2H_5OH_{\,(l)}$	-1400		
$C_4H_{6\,(g)}$	-2542	$C_6H_{12\,(l)}$	-3924		
$CH_{4\,(g)}$	-891	$C_3H_{8\,(g)}$	-2220		

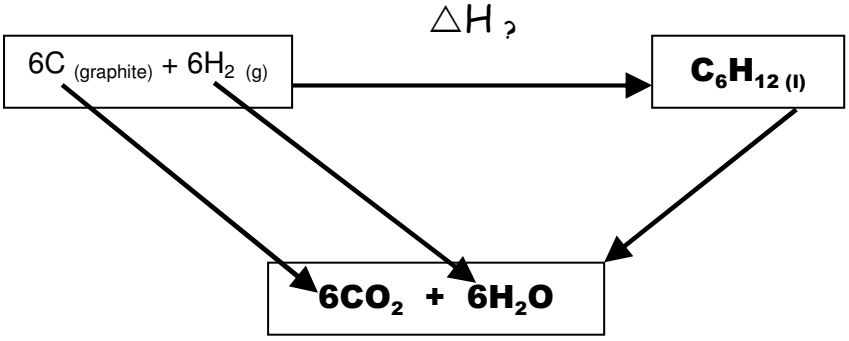
Q1]



Q2]



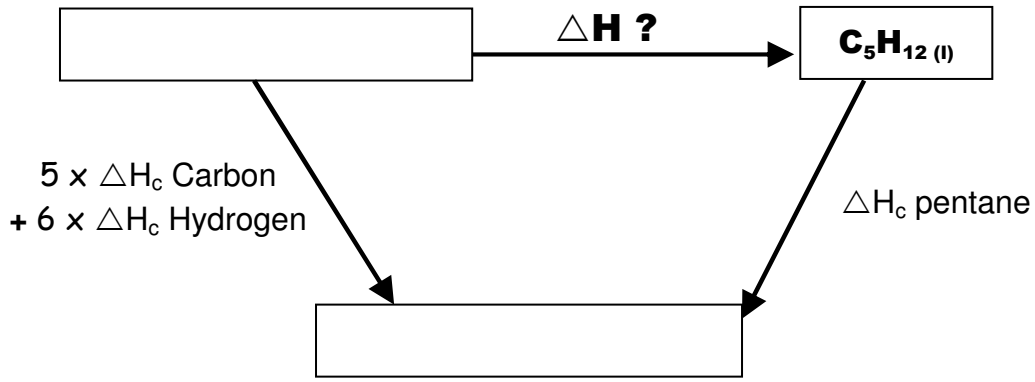
Q3]



Q4]

a) Write a balanced symbol equation for the enthalpy change of formation of pentane ?

b) Complete the Hess cycle below by filling in the two empty boxes.

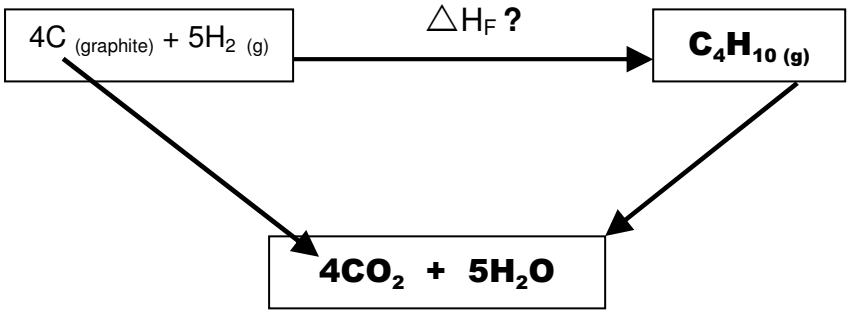


c) Given the following data, calculate the enthalpy change of formation of pentane:

△H_c Carbon = - 394 kJmol^{-1} △H_c Hydrogen = - 286 kJmol^{-1} △H_c Pentane = - 3,509 kJmol^{-1}

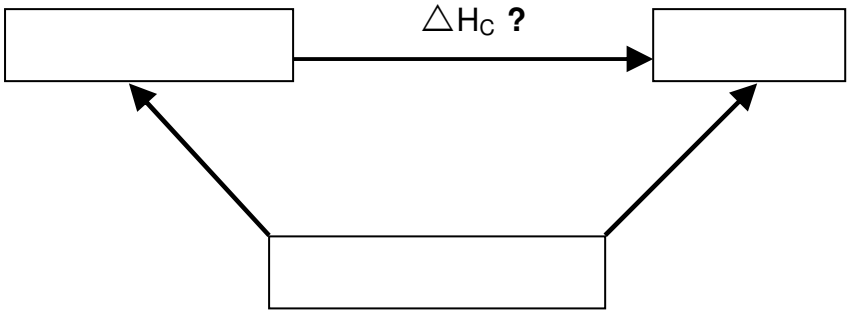
Q5] Calculate the enthalpy of formation of butane given the following

△H_c Carbon = - 394 kJmol^{-1} △H_c Hydrogen = - 286 kJmol^{-1} △H_c Butane = - 2,877kJmol^{-1}



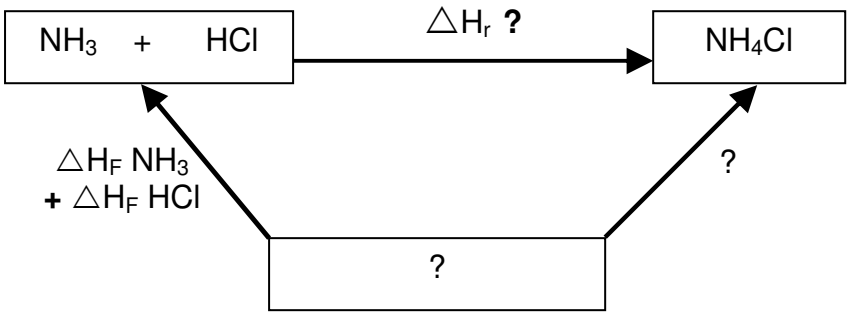
Q6] ***Complete the 3 boxes in the Hess cycle below and label the enthalpy change arrows, given the following information. This Hess cycle could be used to calculate the enthalpy change of combustion of hexane (C_6H_{14})*** :

△H_F $CO_{2\ (g)}$ = - 394 kJmol^{-1} △H_F H_2O = - 286 kJmol^{-1} △H_F Hexane = - 167.4 kJmol^{-1}



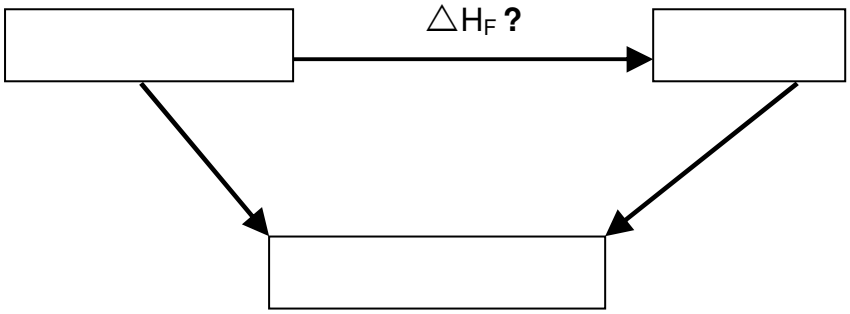
Q7] Complete the following Hess cycle and use it and the data below to calculate $\triangle H_r$ for the reaction ?

$\triangle H_F$ NH3 = - 46.1 kJmol^{-1} $\triangle H_F$ HCl = - 92.3 kJmol^{-1} $\triangle H_F$ NH_4Cl = - 314.4kJmol^{-1}



Q8] Calculate the enthalpy of formation of heptane, using the following data, by completing the Hess cycle and carrying out a calculation.

$\triangle H_c$ Carbon = - 394 kJmol^{-1} $\triangle H_c$ Hydrogen = - 286 kJmol^{-1} $\triangle H_c$ Heptane = - 4,465.8Jmol^{-1}



Q9] Calculate the enthalpy of formation of octane (C_8H_{18}) by constructing a Hess cycle and using the data below:

$\triangle H_c$ Carbon = - 394 kJmol^{-1} $\triangle H_c$ Hydrogen = - 286 kJmol^{-1} $\triangle H_c$ Octane = - 5,074.9Jmol^{-1}

Q10] Calculate the enthalpy of combustion of decane ($C_{10}H_{22}$), by constructing a Hess cycle and using the data below:

$\triangle H_F$ $CO_{2\ (g)}$ = - 394 kJmol^{-1} $\triangle H_F$ H_2O = - 286 kJmol^{-1} $\triangle H_F$ Decane = - 249.4 kJmol^{-1}