(All answers in 3 s.f.)
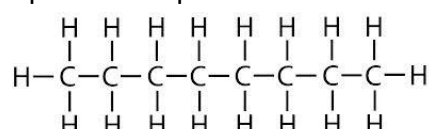
Question One- Complete the table, the specific heat energy is 4.18 $Jg^{-1o}C^{-1}$

Mass (g)	Change in temperature (^oC)	Energy released (J)
3.56	13.6	202
45.9	0.941	180.5
0.131	-25.6	-14.0
100	0.374	156.3
15.3	100	6400
0.399	-78	-130.2

Question Two-

Octane (C_8H_{18}) is one of the main components of petrol fuel. The structure of Octane is

Octane can be fully combust in excess oxygen (O_2) forming carbon dioxide (CO_2) and water (H_2O)

$$C_8H_{18} + 12½ O_2 \rightarrow 8 CO_2 + 9 H_2O$$
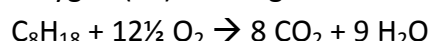
Using the bond energy provided below, calculate the enthalpy of the above reaction

C-C 346 $kJmol^{-1}$ O=O 494 $kJmol^{-1}$ C-H 414 $kJmol^{-1}$ O-H 464 $kJmol^{-1}$ C=O 724 $kJmol^{-1}$

Bond in reactant	Bond in product
7 × C-C + 18 × C-H + 12.5 × O=O	16 × C=O + 18 × O-H
7 × 346 + 18 × 414 + 12.5 × 494 = **16049 $kJmol^{-1}$**	16 × 724 + 18 × 464 = **19936 $kJmol^{-1}$**

$\Delta H = \Sigma BE_{reactant} - \Sigma BE_{product} = 16049 - 19936 = -3887$

From the calculation using the data give, the enthalpy is estimated to be **-3890 $kJmol^{-1}$**