Number of moles $\xrightarrow{\times M_r}$ mass; $\xleftarrow{\div \text{ molar mass}}$ $\qquad n = \frac{m}{M_r}$

|| Fuel value – Sample questions ||

ΔH_c – standard heat of combustion of 1mol of fuel.

Fuel value $= \frac{\Delta H_c}{M}$

so far octane $M = C_8H_{18} = 114$

ΔH_c for Octane $= 5460 \text{ kJ mol}^{-1}$

ΔH_c for glucose $= 2870 \text{ kJ mol}^{-1}$

$M = C_6H_{12}O_6 = 180.$

So fuel value for octane $\frac{\Delta H_c}{M} = \frac{5460}{114} = 47.89 \text{ kJ g}^{-1}$

glucose $= \frac{2870}{180}$ $\quad 15.94 \text{ kJ g}^{-1}$

Q Compare the energy from 100g of each.

$n(C_8H_{18}) = \frac{m}{M} = \frac{100g}{114} = 0.877$ moles

$\Delta H = \Delta H_c \times$ no. of moles $= 5460 \times 0.877$
$\quad \text{kJ mol}^{-1} \times \text{mol} \quad = 4788 \text{ kJ}.$

$n(C_6H_{12}O_6) = \frac{m}{M} = \frac{100g}{180} = 0.555$ moles

$\Delta H = \Delta H_c \times$ no. of moles $= 2870 \times 0.555$
$\quad \text{kJ mol}^{-1} \times \text{mol}. \quad = 1592 \text{ kJ}.$