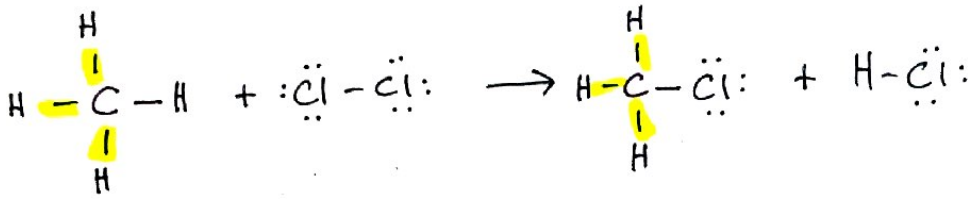
Unit 4 Test Review Kahoot, 2022

#3.) $CH_4 + Cl_2 \rightarrow CH_3Cl + HCl$ $\quad \Delta H_{rxn} = -110 \frac{kJ}{mol}$



$\Delta H_{rxn} = \Sigma BE\,(react) - \Sigma BE\,(prod)$

$= [4(C\text{-}H) + (Cl\text{-}Cl)] - [3(C\text{-}H) + (C\text{-}Cl) + (H\text{-}Cl)]$

OR

$= [(C\text{-}H) + (Cl\text{-}Cl)] - [(C\text{-}Cl) + (H\text{-}Cl)]$ } only includes bonds that change!

(H-Cl): unknown

$-110 = (400 + 250) - (350 + x)$

$x = 650 - 350 + 110 = \boxed{410\ kJ/mol}$

#5.) Goal rxn: $3H_2 + O_3 \rightarrow 3H_2O$ $\quad \Delta H_{rxn} = ?$

given: $\frac{3}{2} \times (2H_2 + O_2 \rightarrow 2H_2O)$ $\quad \Delta H = (-500) \times \frac{3}{2} = -750$

flip, $\frac{1}{2} \times$ $(3O_2 \rightarrow 2O_3)$ $\quad \Delta H = (+300) \times -\frac{1}{2} = -150$

$\Delta H_{rxn} = -750 - 150 = \boxed{-900\ kJ/mol}$

#7.) $\Delta H_{soln} = \frac{q_{soln}}{mol_{rxn}} = \frac{+12.8\ kJ}{3.2\ mol} = \boxed{+4.0 \frac{kJ}{mol}}$

#10.) $\underbrace{6B}_{3\text{ mol}} + \underbrace{2D}_{2\text{ mol}} \rightarrow 3A + 188\text{ kJ}$

$3\text{ mol B} \times \frac{1\text{ mol}_{rxn}}{6\text{ mol B}} = \underbrace{0.5\text{ mol}_{rxn}}_{\text{smaller!}}$

$2\text{ mol D} \times \frac{1\text{ mol}_{rxn}}{2\text{ mol D}} = 1\text{ mol}_{rxn}$

$\Rightarrow$ B limiting

$3\text{ mol B} \times \frac{-188\text{ kJ}}{6\text{ mol B}} = \boxed{-94\text{ kJ}}$

#12.) $\underbrace{2H_2O(\ell)}_{\Delta H_f = ?} \rightarrow 2H_2(g) + O_2(g) \quad \Delta H_{rxn} = +572\text{ kJ/mol}$

★ 2 ways to solve!

1st way: Big Mama's $\quad \Delta H_{rxn} = \Sigma \Delta H_f(pr) - \Sigma \Delta H_f(re)$

$572 = [2 \cdot H_2 + O_2] - [2 \cdot H_2O]$

both $= 0$ (std conditions)

$\Rightarrow \Delta H_f(H_2O) = \frac{572}{-2} = \boxed{-286\text{ kJ/mol}}$

2nd way: Hess's Law

want to find $\Delta H_f(H_2O) = \Delta H_{rxn}$ below:

$H_2(g) + \frac{1}{2}O_2(g) \rightarrow H_2O(\ell)$ ← goal rxn

original rxn: $\left(2H_2O(\ell) \rightarrow 2H_2(g) + O_2(g)\right)$ reverse, $\times \frac{1}{2} =$

$\Delta H_f(H_2O) = -\frac{1}{2}(\Delta H_{rxn}) = -\frac{1}{2}(572) = \boxed{-286\frac{kJ}{mol}}$