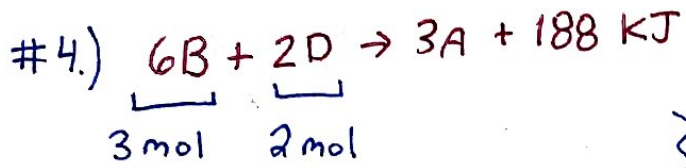


AP Unit 4 Test Review Key

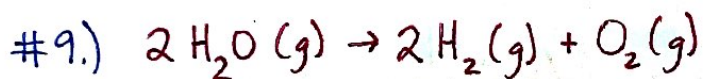


$$\frac{3 \text{ mol B}}{6} = 0.5 \leftarrow \text{smaller!} \Rightarrow \text{B limiting}$$

$$\frac{2 \text{ mol D}}{2} = 1$$

$$3 \text{ mol B} \times \frac{-188 \text{ kJ}}{6 \text{ mol B}} = \frac{-188}{2} = \boxed{-94 \text{ kJ}}$$

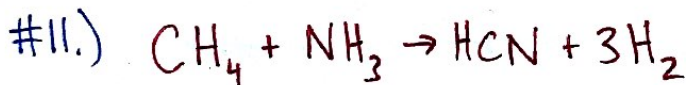
#7.) $q_r = n\Delta H \Rightarrow \Delta H = \frac{q_r}{\text{mol}} = \frac{12.8 \text{ kJ}}{3.2 \text{ mol}} \approx \frac{12}{3} = \boxed{+4 \frac{\text{kJ}}{\text{mol}}}$



$$\Delta S^\circ = \sum S^\circ(\text{prod}) - \sum S^\circ(\text{react.}) = [2 \cdot \text{H}_2 + \text{O}_2] - [2 \cdot \text{H}_2\text{O}]$$

$$= [2(131) + 205] - 2(189) \approx 2(130) + 200 - 2(200) = \boxed{+60 \text{ J/mol}\cdot\text{K}}$$

(+89)



Given:

flip $\times \frac{1}{2}$ ($\text{N}_2 + 3\text{H}_2 \rightarrow 2\text{NH}_3$) $\Delta H = -92 \times -\frac{1}{2} = +46$

flip ($\text{C} + 2\text{H}_2 \rightarrow \text{CH}_4$) $\Delta H = -75 \times -1 = +75$

$\times \frac{1}{2}$ ($\text{H}_2 + 2\text{C} + \text{N}_2 \rightarrow 2\text{HCN}$) $\Delta H = +270 \times \frac{1}{2} = +135 +$

$$\Delta H = \boxed{256 \text{ kJ/mol}}$$

#13.) $q_{\text{sol'n}} = -q_{\text{cal}} = -mCAT$

$$= - \underbrace{(300. \text{ g})}_{180 + 120} \underbrace{(4.2)}_{-6.2} (18.8 - 25.0)$$

$$\approx (300)(4)(6) = 7,200 \text{ J} = 7.2 \text{ kJ} \quad (7.8)$$

$$\text{mol}_{\text{rxn}} = \text{mol}_{\text{NaCl}}$$

$$= \frac{120. \text{ g}}{58 \text{ g/mol}} \approx \frac{120}{60} = 2 \text{ mol} \quad (2.05)$$

$$\Delta H_{\text{sol'n}} = \frac{7.2 \text{ kJ}}{2 \text{ mol}_{\text{rxn}}} = \boxed{3.6 \text{ kJ/mol}} \quad (3.9)$$

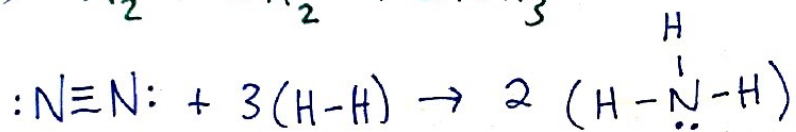
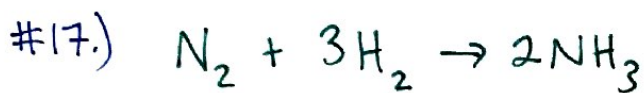
$$\#15.) \Delta G^\circ = \Delta H^\circ - T\Delta S^\circ = -93 \frac{\text{kJ}}{\text{mol}} - (298 \text{ K})(-0.198 \frac{\text{kJ}}{\text{mol}\cdot\text{K}})$$

↑ b/c 25°C = std. conditions

$$\approx -93 + (300)(0.2) = -93 + 60$$

$$= \boxed{-33 \text{ kJ/mol}}$$

(-34)



$$\Delta H_{\text{rxn}} = \sum \text{BE (broken)} - \sum \text{BE (formed)}$$

$$= [(\text{N}\equiv\text{N}) + 3(\text{H}-\text{H})] - [6(\text{N}-\text{H})]$$

$$-92.2 = [960 + 3(430)] - 6x$$

$$6x = 960 + 1290 + 92.2 \approx 2340$$

$$x \approx \frac{2400}{6} = 400 \text{ kJ/mol}$$

(390)



$$\uparrow \Delta H_f = 230 \frac{\text{kJ}}{\text{mol}}$$

$$\uparrow \Delta H_f = ?$$

$$\Delta H_{\text{rxn}} = \sum \Delta H_f (\text{prod}) - \sum \Delta H_f (\text{react})$$

$$= [\text{C}_6\text{H}_6] - [3(\text{C}_2\text{H}_2)]$$

$$-607 = x - 3(230)$$

$$x = 3(230) - 607 = 690 - 607 = \boxed{83 \frac{\text{kJ}}{\text{mol}}}$$