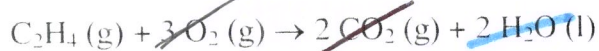
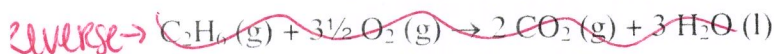


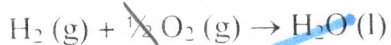
1. Calculate  $\Delta H$  for the reaction:  $C_2H_4(g) + H_2(g) \rightarrow C_2H_6(g)$ , from the following data.



$$\Delta H = -1411 \text{ kJ}$$



$$\Delta H = -1560 \text{ kJ}$$



$$\Delta H = -285.8 \text{ kJ}$$

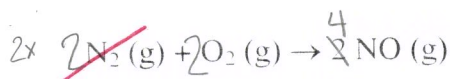


$$\Delta H = 1560 \text{ kJ}$$

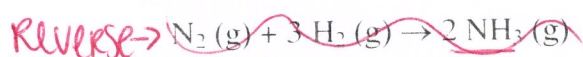


$$\Delta H = -1411 + -285.8 + 1560 = \boxed{-136.8 \text{ kJ}}$$

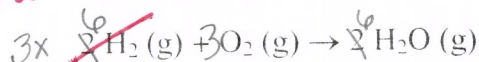
2. Calculate  $\Delta H$  for the reaction  $4NH_3(g) + 5O_2(g) \rightarrow 4NO(g) + 6H_2O(g)$ , from the following data.



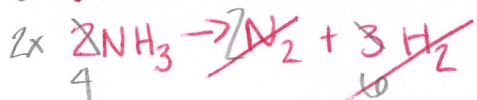
$$\Delta H = -180.5 \text{ kJ} \times 2 = -361$$



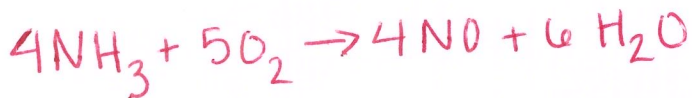
$$\Delta H = -91.8 \text{ kJ}$$



$$\Delta H = -483.6 \text{ kJ} \times 3 = -1450.8$$

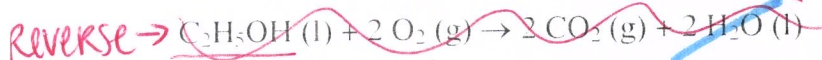


$$\Delta H = 91.8 \text{ kJ} \times 2 = 183.6$$

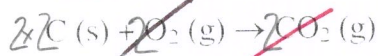


$$\Delta H = -361 + -1450.8 + 183.6 = \boxed{-1628.2 \text{ kJ}}$$

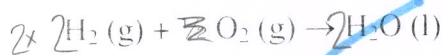
3. Find  $\Delta H^\circ$  for the reaction  $2H_2(g) + 2C(s) + O_2(g) \rightarrow C_2H_5OH(l)$ , using the following thermochemical data.



$$\Delta H = -875 \text{ kJ}$$



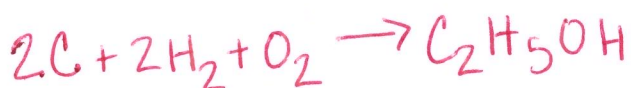
$$\Delta H = -394.51 \text{ kJ} \times 2 = -789.02$$



$$\Delta H = -285.8 \text{ kJ} \times 2 = -571.6$$

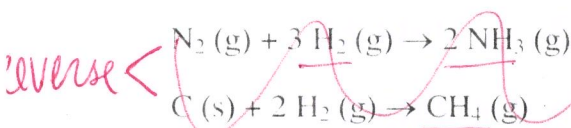


$$\Delta H = 875$$

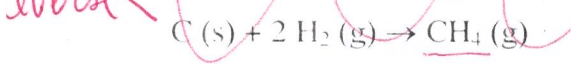


$$\Delta H = -789.02 + -571.6 + 875 = \boxed{-485.6}$$

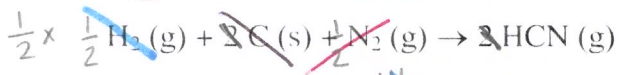
4. Calculate  $\Delta H$  for the reaction  $\text{CH}_4(\text{g}) + \text{NH}_3(\text{g}) \rightarrow \text{HCN}(\text{g}) + \text{H}_2(\text{g})$ , given:



~~$\Delta H = -91.8 \text{ kJ}$~~



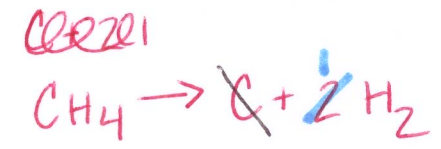
~~$\Delta H = -74.9 \text{ kJ}$~~



$\Delta H = +270.3 \text{ kJ}$



$\Delta H = 91.8 \text{ kJ}$

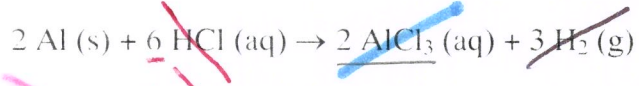


$\Delta H = 74.9 \text{ kJ}$

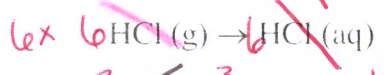


$\Delta H = 270.3 + 91.8 + 74.9 = \boxed{437 \text{ kJ}}$

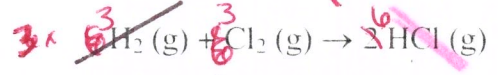
5. Calculate  $\Delta H$  for the reaction  $2\text{Al}(\text{s}) + 3\text{Cl}_2(\text{g}) \rightarrow 2\text{AlCl}_3(\text{s})$  from the data.



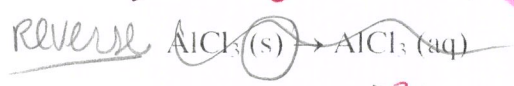
$\Delta H = -1049 \text{ kJ}$



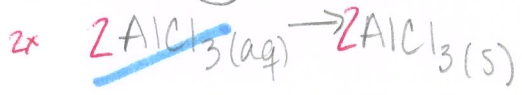
$\Delta H = -74.8 \text{ kJ} \times 6 = -448.8$



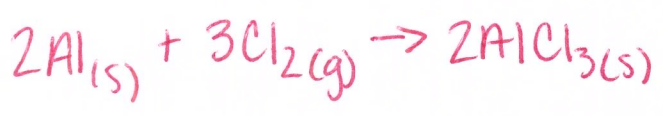
$\Delta H = -1845 \text{ kJ} \times 3 = -5535$



~~$\Delta H = -323 \text{ kJ}$~~



$\Delta H = 323 \times 2 = 646$



$\Delta H = -1049 + -448.8 + -5535 + 646 = \boxed{-6386.8 \text{ kJ}}$