

$$2. n = \frac{1.519}{122.0/\text{mol}} = 0.0124 \text{ mol}$$

$$\textcircled{a} 0.0124 \times 3.23 \times 10^6 = (2.6 \times 4.2 \times 10^3 + C) \times (21.84 - 19.23)$$

$$C = 4447 \text{ J} \cdot \text{C}^{-1}$$

$$3. \textcircled{a} Q_V = -41.4 \times \frac{3^2}{2} = -662.4 \text{ kJ} \cdot \text{mol}^{-1}$$

$$Q_P = Q_V + \Delta n_g R T$$

$$= -662.4 \times 10^3 + (-1) \times 8.314 \times 298 = -664.877 \text{ kJ} \cdot \text{mol}^{-1}$$

$$Q_P = -664.9 \text{ kJ} \cdot \text{mol}^{-1}$$

5. (1).

$$\Delta_r H^\theta = 4 \times \Delta_f H^\theta_m(\text{CO}_2(\text{g})) + 2 \times \Delta_f H^\theta_m(\text{H}_2\text{O}(\text{l})) - 2 \Delta_f H^\theta_m(\text{C}_2\text{H}_2(\text{g}))$$

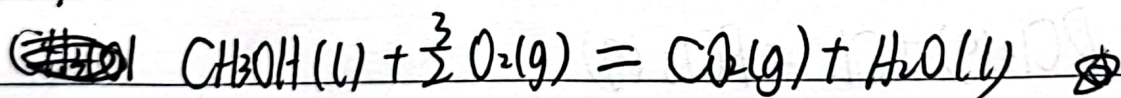
$$= -2598.86 \text{ kJ} \cdot \text{mol}^{-1}$$

(2)

$$\Delta_r H^\theta = 3 \Delta_f H^\theta_m(\text{CO}_2(\text{g})) - 2 \Delta_f H^\theta_m(\text{Fe}_2\text{O}_3(\text{s}))$$

$$= 469.08 \text{ kJ} \cdot \text{mol}^{-1}$$

⑦.7.



$$\Delta_r H^\theta = \Delta_c H^\theta_m(\text{CH}_3\text{OH}(\text{l}))$$

$$= -726.51 \text{ kJ} \cdot \text{mol}^{-1}$$

$$\Delta_f H_m^\theta(\text{H}_2\text{O}(\text{l})) = -285.83 \text{ kJ} \cdot \text{mol}^{-1}$$

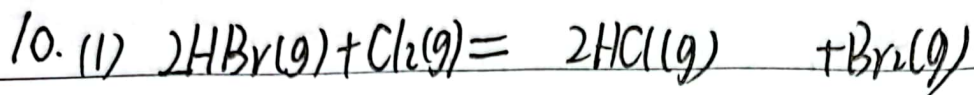
$$\Delta_f H_m^\theta(\text{CO}_2(\text{g})) = -393.14 \text{ kJ} \cdot \text{mol}^{-1}$$

$$\Delta_r H^\theta = \Delta_f H_m^\theta(\text{H}_2\text{O}(\text{l})) + \Delta_f H_m^\theta(\text{CO}_2(\text{g})) - \Delta_f H_m^\theta(\text{CH}_3\text{OH}(\text{l}))$$

$$\Delta_f H_m^\theta(\text{CH}_3\text{OH}(\text{l})) = \Delta_f H_m^\theta(\text{H}_2\text{O}(\text{l})) + \Delta_f H_m^\theta(\text{CO}_2(\text{g})) - \Delta_r H^\theta$$

$$= 47.54 \text{ kJ} \cdot \text{mol}^{-1}$$





S_m^θ ($\text{J}\cdot\text{mol}^{-1}\cdot\text{K}^{-1}$)

198.59 223.1 186.8 245.35

$$\Delta_r S_m^\theta = -1.33 \text{ J}\cdot\text{mol}^{-1}\cdot\text{K}^{-1}$$



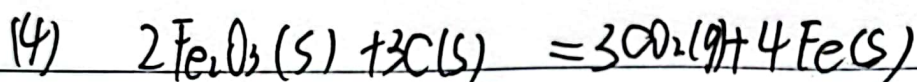
94.6 192.34 186.80

$$\Delta_r S_m^\theta = 284.54 \text{ J}\cdot\text{mol}^{-1}\cdot\text{K}^{-1}$$



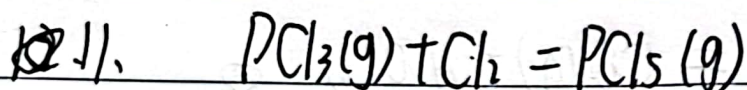
94.6 113.39 56.73

$$\Delta_r S_m^\theta = 75.52 \text{ J}\cdot\text{mol}^{-1}\cdot\text{K}^{-1}$$



87.40 ~~5.740~~ 213.64 27.28

$$\Delta_r S_m^\theta = 558.02 \text{ J}\cdot\text{mol}^{-1}\cdot\text{K}^{-1}$$



$\Delta_f H_m^\theta$ -287.0 0 -374.9

$\text{KJ}\cdot\text{mol}^{-1}$

$\Delta_f G_m^\theta$ -267.8 0 -305.0

$\text{KJ}\cdot\text{mol}^{-1}$

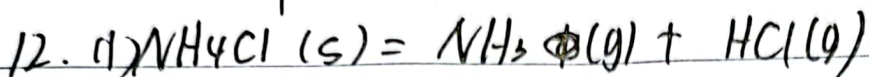
$$\Delta_r H^\theta = -87.9 \text{ KJ}\cdot\text{mol}^{-1}$$

$$\Delta_r G^\theta = -37.2 \text{ KJ}\cdot\text{mol}^{-1}$$

$$\Delta_r G^\theta = \Delta_r H^\theta - T \Delta_r S^\theta$$

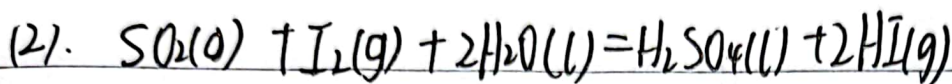


$$\Delta_r S^\ominus = \frac{\Delta_r H^\ominus - \Delta_r G^\ominus}{T} = -0.17 \text{ kJ} \cdot \text{mol}^{-1} \cdot \text{K}^{-1}$$



$$\Delta_f G_m^\ominus: \begin{array}{ccc} -203.0 & -16.48 & -95.30 \\ \text{kJ} \cdot \text{mol}^{-1} & & \end{array}$$

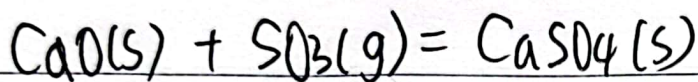
$$\Delta_r G_m^\ominus = 91.22 \text{ kJ} \cdot \text{mol}^{-1}$$



$$\Delta_f G_m^\ominus: \begin{array}{cccccc} -300.19 & 19.359 & -237.18 & -690.06 & 1.70 \\ \text{kJ} \cdot \text{mol}^{-1} & & & & \end{array}$$

$$\Delta_r G_m^\ominus = 68.531 \text{ kJ} \cdot \text{mol}^{-1}$$

14.



$$\Delta_f G_m^\ominus: \begin{array}{ccc} -604.0 & -371.08 & -1326.88 \\ \text{J} \cdot \text{mol}^{-1} & & \end{array}$$

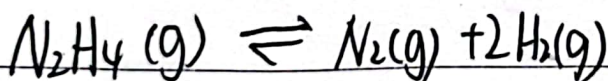
$$\Delta_r G_m^\ominus = -351.8 \text{ kJ} \cdot \text{mol}^{-1} < 0 \quad \text{能自发进行}$$

$$(8) (1) \Delta_f G_m^\ominus [\text{H}_2\text{O}(l)] = -285.830 \text{ kJ} \cdot \text{mol}^{-1}$$

$$2: \Delta_f G_m^\ominus [\text{H}_2\text{O}(l)] - \Delta_f G_m^\ominus [\text{N}_2\text{H}_4(l)] = \Delta_r G_m^\ominus$$

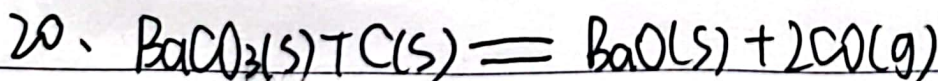
$$\Delta_f G_m^\ominus [\text{N}_2\text{H}_4(l)] = 2\Delta_f G_m^\ominus [\text{H}_2\text{O}(l)] - \Delta_r G_m^\ominus$$

$$(2). \quad = 51.54 \text{ kJ} \cdot \text{mol}^{-1}$$



$$\Delta_r G_m^\ominus = -\Delta_f G_m^\ominus [\text{N}_2\text{H}_4(l)] = -51.54 \text{ kJ} \cdot \text{mol}^{-1} < 0$$

\therefore 能分解.



$$\Delta_f H_m^\ominus: \begin{array}{cccc} -1216.3 & 0 & -553.5 & -110.5 \\ \text{kJ} \cdot \text{mol}^{-1} & & & \end{array}$$

$$\Delta_f S_m^\ominus: \begin{array}{cccc} 112.1 & 5.740 & 70.42 & 197.56 \\ \text{J} \cdot \text{mol}^{-1} \cdot \text{K}^{-1} & & & \end{array}$$



$$\Delta_r H_m^\ominus = 441.76 \text{ kJ} \cdot \text{mol}^{-1}$$

$$\Delta_r S_m^\ominus = 347.7 \text{ J} \cdot \text{mol}^{-1} \cdot \text{K}^{-1}$$

$$T_{\text{转}} = \frac{\Delta_r H_m^\ominus}{\Delta_r S_m^\ominus} = \frac{441.76 \times 10^3}{347.7} = 1270 \text{ K}$$

\therefore 最低为 1270 K.

