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$$2. \quad Q_{\text{水}} = 2600 \times 4.184 \times \Delta T \text{ (J)}$$

$$Q_{\text{冰}} = \frac{1.51}{122} \times 3.23 \times 10^3 \times 10^3 \text{ (J)}$$

$$C \cdot \Delta T = Q_{\text{冰}} - Q_{\text{水}}$$

$$\therefore C = 4447 \text{ (J/}^\circ\text{C)}$$

$$3. \quad Q_v = \Delta U = -41.4 \text{ kJ} \times \frac{32}{2}$$

$$= -662.4 \text{ (kJ/mol)}$$

$$pV = nRT$$

$$p\Delta V = RT\Delta n$$

$$Q_p = Q_v + 8.314 \times 298 \times (-1)$$

$$= -664.877 \text{ (kJ/mol)}$$

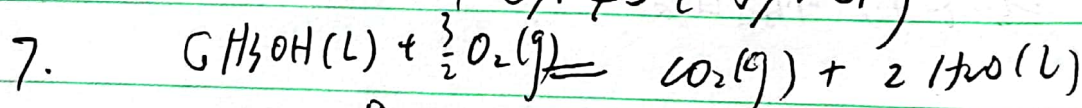
$$5. (1) \Delta_r H_m^\ominus = 4 \times (-393.14) + 2 \times (-285.83)$$

$$- (2 \times 227.32 + 5 \times 0)$$

$$= -2598.86 \text{ (kJ/mol)}$$

$$(2) \Delta_r H_m^\ominus = -393.14 \times 3 - 2 \times (-824.425)$$

$$= 469.43 \text{ (kJ/mol)}$$



$$\Delta_c H_m^\ominus(\text{C} \text{H}_3\text{OH}) = -726.5 \text{ kJ/mol} = 2 \times (-285.83) + (-393.14)$$

$$- \frac{3}{2} \times 0 - \Delta_f H_m^\ominus(\text{C} \text{H}_3\text{OH})$$

$$\therefore \Delta_f H_m^\ominus(\text{C} \text{H}_3\text{OH}) = -238.29 \text{ (kJ/mol)}$$



$$10. (1) \Delta_r S_m^\ominus = 245.32 + 2 \times 186.80 - 2 \times 148.59 - 22.1 \\ = -1.33 (\text{J}/(\text{mol} \cdot \text{K}))$$

$$(2) \Delta_r S_m^\ominus = 186.80 + 192.34 - 94.6 = 284.54 \text{ J}/(\text{mol} \cdot \text{K})$$

$$11. \Delta_r H_m^\ominus = -374.9 - (-287.0) = -87.9 \text{ kJ/mol}$$

$$\Delta_r G_m^\ominus = -305.0 - (-267.8) = -37.2 \text{ kJ/mol}$$

$$\Delta_r S_m^\ominus = \frac{\Delta_r H_m^\ominus - \Delta_r G_m^\ominus}{T}$$

$$= -170 \text{ J}/(\text{mol} \cdot \text{K})$$

$$12. (1) \Delta_r G_m^\ominus = -95.30 + (-16.48) - (-203.0) \\ = 91.22 (\text{kJ/mol}) \text{ 不能自发 (298 K T)}$$

$$(2) \Delta_r G_m^\ominus = 2 \times 1.70 + (-690.06) \\ - 19.359 - 2(-237.18) - 300.19 \\ = -68.531 (\text{kJ/mol})$$

298 K T, 不能自发.



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$$14. \Delta_r G_m^\ominus = \Delta_r H_m^\ominus - T \cdot \Delta_r S_m^\ominus$$

$$\Delta_r H_m^\ominus = -1434.11 - (-395.72) - (-635.1)$$

$$= -403.29 \text{ kJ/mol}$$

$$\Delta_r S_m^\ominus = 106.69 - 38.1 - 256.65$$

$$= -188.06 \text{ J/(mol}\cdot\text{K)}$$

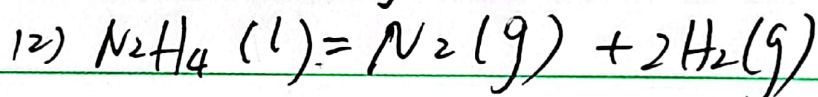
$$\Delta_r G_m^\ominus = -403.29 - 298 \times (-188.06) \times 10^{-3}$$

$$= -347.24812 \text{ (kJ/mol)}$$

298 K下能自发进行

$$18. (1) -237.18 \times 2 \quad \Delta_f G_m^\ominus (\text{N}_2\text{H}_4) = -623.21 \text{ kJ/mol}$$

$$\therefore \Delta_f G_m^\ominus (\text{N}_2\text{H}_4) = 148.84 \text{ kJ/mol}$$



$$\Delta_r G_m^\ominus = -148.84 \text{ (kJ/mol)}$$

会分解.



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$$\Delta_r H_m^\ominus = 2 \times (-110.52) + (-553.5) - (-1216.3)$$
$$= 441.76 \text{ kJ/mol}$$

$$\Delta_r S_m^\ominus = 2 \times 197.56 + 70.42 - 5.740 - 112.1$$
$$= 347.7 \text{ J/(mol} \cdot \text{K)}$$

$$\Delta_r G_m^\ominus = \Delta_r H_m^\ominus - \Delta_r S_m^\ominus \times T < 0$$

$$\therefore T > \frac{\Delta_r H_m^\ominus}{\Delta_r S_m^\ominus} = 1270 \text{ K}$$

