

中国科学技术大学

2014 年硕士学位研究生入学考试试题参考答案

(物理化学 B)

一、选择题 (每题 2 分, 共 60 分)

1. B 2. 3. 4. B 5. 6. 7. C 8. 9. 10. 11. C 12. 13. 14. 15. 16. 17. 18. 19. 20. 21. A 22. 23. 24. 25. 26. 27. 28. 29. 30.

二、计算证明题 (共 9 题, 共 90 分)

1. (12 分)

解:

$$\text{第①步中: } \Delta U_1 = 0, \quad \Delta H_1 = 0 \quad (1 \text{ 分})$$

$$W_1 = RT \ln \frac{p_2}{p_1} = 8.314 \times (273.15 + 80.1) \times \ln \frac{101.325}{40.53} = 2691.07 \text{ J} \quad (1 \text{ 分})$$

$$Q_1 = -W_1 = -2691.07 \text{ J}$$

$$\Delta S_1 = \frac{Q_1}{T} = \frac{-2691.07}{273.15 + 80.1} = -7.618 \text{ J} \cdot \text{K}^{-1} \quad (1 \text{ 分})$$

$$\text{第②步中: } \Delta H_2 = -30.878 \text{ kJ}, \quad Q_2 = \Delta H_2 = -30.878 \text{ kJ} \quad (1 \text{ 分})$$

$$W_2 = -p \Delta V = -p(V_{m,l} - V_{m,g}) \approx p V_{m,g} \\ = nRT = 1 \times 8.314 \times (273.15 + 80.1) = 2936.92 \text{ J} \quad (1 \text{ 分})$$

$$\Delta U_2 = \Delta H_2 - \Delta(pV) = \Delta H_2 - p \Delta V = -30.878 \text{ kJ} + 2936.92 \text{ J} = -27.941 \text{ kJ} \quad (1 \text{ 分})$$

$$\Delta S_2 = \frac{Q_2}{T} = \frac{-30.878 \text{ kJ}}{273.15 + 80.1} = -87.41 \text{ J} \cdot \text{K}^{-1} \quad (1 \text{ 分})$$