

第一章作业参考答案

9. 设原来体积为 V ，膨胀后为 $4V$ 。因

$$\frac{p_{\text{前}} \cdot V_{\text{前}}}{T_{\text{前}}} = \frac{p_{\text{后}} \cdot V_{\text{后}}}{T_{\text{后}}}$$

$$T_{\text{后}} = \frac{p_{\text{后}} V_{\text{后}} T_{\text{前}}}{p_{\text{前}} V_{\text{前}}} = \frac{101 \times 4V \times (273 + 27)}{202 \times V} = 600(\text{K})$$

$$x_M = \frac{m_{H_2}}{m_{H_2} + m_{Ne}} = \frac{n_{H_2} M_{H_2}}{n_{H_2} M_{H_2} + n_{Ne} M_{Ne}} = \frac{2n_{H_2}}{2n_{H_2} + 20.2n_{Ne}} = 25\%$$

$$\therefore n_{Ne} = 0.297n_{H_2}$$

$$x_{H_2} = \frac{n_{H_2}}{n_{H_2} + 0.297n_{H_2}} = 77.1\%$$

$$\therefore p_{H_2} = x_{H_2} p = 0.771 \times 202 = 156 \text{ (kPa)}$$

12. 由 $pV=nRT$ 得:

$$n_{\text{空气}} = pV/RT = 101 \times 10.0 / (8.314 \times 293) = 0.415(\text{mol})$$

$$n_{\text{溴苯}} = 0.475 / 157 = 0.003025(\text{mol})$$

$$x_{\text{溴苯}} = n_{\text{溴苯}} / (n_{\text{空气}} + n_{\text{溴苯}}) = 0.003025 / (0.415 + 0.003025) = 0.724\%$$

假设总压不变, 则:

$$p_{\text{溴苯}} = x_{\text{溴苯}} p = 0.724\% \times 101 = 0.731(\text{kPa})$$

假设总体积不变, 则:

$$p_{\text{溴苯}} = \frac{nRT}{V} = \frac{0.003025 \times 8314 \times (20 + 273)}{10.0} = 736.9(\text{Pa})$$

13. $p_{H_2} = p - p_{H_2O} = 101.3 - 2.33 = 98.97(\text{kPa})$

由 $p_{H_2} V = p V_{H_2}$ 得

$$V_{H_2} = p_{H_2} V / p = 98.97 \times 2.0 / 101.3 = 1.95(\text{L})$$

$$n_{H_2} = \frac{p_{H_2} \cdot V}{RT} = \frac{98.97 \times 2.0}{8.314 \times (20 + 273)} = 0.0813(\text{mol})$$

根据反应, 产生 0.0813mol 的 H_2 , 需消耗 $0.0813 \times 65.4 = 5.32$ 克的 Zn , 而加入了 10 克锌, 说明锌是过量的。