19장 온도

10. (a) $\rho_o = \frac{m}{V_o}$ 에서, $\triangle T = T - T_o$, $V = V_o(1+\beta \triangle T)$를 이용하여,

$$\therefore \rho = \frac{m}{V_o(1+\beta \triangle T)} = \frac{\rho_o}{1+\beta \triangle T}$$

(b) 온도를 $\triangle T$ 증가 시켜도 물질의 질량은 변화가 없다.

11.

$\frac{P_f V_f}{P_i V_i} = \frac{n_f R T_f}{n_i R T_i}$에서 부피와 온도가 일정하므로,

$$n_f = \left(\frac{P_f}{P_i}\right) n_i = \left(\frac{5.00\,\text{atm}}{25.0\,\text{atm}}\right)(1.50\,\text{mol}) = 0.300\,\text{mol}$$

$$\therefore \triangle n = n_i - n_f = 1.50\,\text{mol} - 0.300\,\text{mol} = 1.20\,\text{mol}$$

17.

(1) $P_i V_i = n_i R T_i \rightarrow (1.00\,\text{atm})\, V_i = n_i R[(10.0\,^\circ C + 273.15)\,\text{K}] \quad \cdots (1)$

$P_f V_f = n_f R T_f \rightarrow P_f(0.280\, V_i) = n_i R[(40.0\,^\circ C + 273.15)\,\text{K}] \quad \cdots (2)$

(2)÷(1) 정리하면,

$$\frac{0.280\, P_f}{1.00\,\text{atm}} = \frac{313.15\,\text{K}}{283.15\,\text{K}} \quad , \quad \therefore P_f = 3.95\,\text{atm} = 4.00 \times 10^5\,\text{Pa}$$

(2) $P_d(1.02)(0.280\, V_i) = n_i R(85.0\,^\circ\text{C} + 273.15\,)\text{K} \quad \cdots (3)$

(1)과 (3)을 이용하여,

$$\frac{(1.02)(0.280) P_d}{1.00\,\text{atm}} = \frac{358.15\,\text{K}}{283.15\,\text{K}}$$

$$\therefore P_d = 4.43\,\text{atm} = 4.49 \times 10^5\,\text{Pa}$$