

附录:

1、物理常量值:

玻尔兹曼常量 $k = 1.38 \times 10^{-23} \text{ J/K}$

阿伏伽德罗常量 $N_A = 6.02 \times 10^{23} \text{ mol}^{-1}$

普适气体常量 $R = 8.31 \text{ J/(mol} \cdot \text{K)}$

2、常用不定积分公式:

$$\int x^\alpha dx = \frac{1}{\alpha+1} x^{\alpha+1} \quad \int \frac{1}{x} dx = \ln|x| + C \quad \int \frac{1}{\sqrt{1-x^2}} dx = \arcsin x + C$$

$$\int x e^{ax} dx = \frac{1}{a^2} (ax-1)e^{ax} + C \quad \int \sin x dx = -\cos x + C \quad \int \cos x dx = \sin x + C$$

$$\int \tan x dx = -\ln|\cos x| + C \quad \int \cot x dx = \ln|\sin x| + C$$

$$\int \frac{dx}{x^2+a^2} = \frac{1}{a} \arctan \frac{x}{a} + C \quad \int \frac{dx}{x^2-a^2} = \frac{1}{2a} \ln \left| \frac{x-a}{x+a} \right| + C$$

$$\int \frac{x}{\sqrt{x^2+a^2}} dx = \sqrt{x^2+a^2} + C$$

$$\int \frac{dx}{\sqrt{x^2-a^2}} = \frac{x}{|x|} \operatorname{arch} \frac{|x|}{a} + C_1 = \ln \left| x + \sqrt{x^2-a^2} \right| + C$$

3、高斯积分公式:

$$g_0 = \int_0^\infty e^{-\alpha x^2} dx = \frac{\sqrt{\pi}}{2\sqrt{\alpha}}, \quad g_1 = \int_0^\infty x e^{-\alpha x^2} dx = \frac{1}{2\alpha}, \quad g_2 = \int_0^\infty x^2 e^{-\alpha x^2} dx = \frac{\sqrt{\pi}}{4(\alpha)^{3/2}},$$

$$g_3 = \int_0^\infty x^3 e^{-\alpha x^2} dx = \frac{1}{2\alpha^2}, \quad g_4 = \int_0^\infty x^4 e^{-\alpha x^2} dx = \frac{3\sqrt{\pi}}{8(\alpha)^{5/2}},$$

4、麦克斯韦速率分布函数:

$$f(v) = 4\pi \left(\frac{m_0}{2\pi kT} \right)^{\frac{3}{2}} e^{-\frac{m_0 v^2}{2kT}} v^2$$

5、三个输运系数的公式:

$$\kappa = \frac{1}{3} \rho \bar{v} \bar{\lambda} \frac{C_{v,m}}{M} \quad \eta = \frac{1}{3} \rho \bar{v} \bar{\lambda} \quad D = \frac{1}{3} \bar{v} \bar{\lambda}$$