Some equations and formulae that might or might not be useful:

$\Delta E = h\nu$; $\nu = \dfrac{c}{\lambda}$; $\lambda = \dfrac{h}{p}$

$h = 6.62 \times 10^{-34}$ J s; $\hbar = h/(2\pi)$
$c = 3 \times 10^{8}$ m/s; $k_B = 1.38 \times 10^{-23}$ J K^{-1}

$E_{kinet} = \dfrac{p^2}{2m}$; $\hat{p}_x = -i\hbar \dfrac{\partial}{\partial x}$;

$\Delta p_x \cdot \Delta x \geq \dfrac{\hbar}{2}$;

$E_n = \dfrac{h^2 n^2}{8ma^2}$; $\Psi_n(x) = \sqrt{\dfrac{2}{a}} \sin\left(\dfrac{\pi n}{a} x\right)$

$m_e = 9.1 \times 10^{-31}$ kg; $m_p = 1.67 \times 10^{-27}$ kg
$N_A = 6.02 \times 10^{23}$ mol^{-1} ; $k_B = 1.38 \times 10^{-23}$ J K^{-1};
$R = N_A \times k_B = 8.31$ J mol^{-1} K^{-1}

$E_n = \left(n + \frac{1}{2}\right) h\nu$;

$H_0(\xi) = 1$; $H_1(\xi) = 2\xi$; $H_2(\xi) = 4\xi^2 - 2$;

$\Psi_n(x) = A_n H_n\left(\sqrt{\alpha}\, x\right) e^{-\alpha x^2/2}$;

$H_3(\xi) = 8\xi^3 - 12\xi$; here $\xi = \sqrt{\alpha}\, x$ $\quad A_n = \dfrac{1}{\sqrt{2^n n!}} \left(\dfrac{\alpha}{\pi}\right)^{1/4}$;

$\nu = \dfrac{1}{2\pi} \sqrt{\dfrac{k}{\mu}}$; $\alpha = \sqrt{k\mu} / \hbar$;

$E_{m_l} = \dfrac{\hbar^2}{2I} m_l^{\,2}$; $\Psi_{m_l}(\phi) = \dfrac{1}{\sqrt{2\pi}} e^{i m_l \phi}$;

$\hat{l}_z = -i\hbar \dfrac{\partial}{\partial \phi}$; $l_z = m_l \hbar$; $I = \mu r^2$;

$E_l = \dfrac{l(l+1)\hbar^2}{2I}$; $\Psi_{l.m_l} = Y_{l,m_l}(\theta, \phi)$;

$\left|\vec{l}\right|^2 = l(l+1)\hbar^2$; $l_z = m_l \hbar$

$E_J = \dfrac{J(J+1)\hbar^2}{2I} = hcBJ(J+1)$

$Y_{0,0}(\theta,\phi) = 1/\sqrt{4\pi}$; $Y_{1,0}(\theta,\phi) = (3/4\pi)^{1/2} \cos\theta$;
$Y_{1,\pm 1}(\theta,\phi) = \mp (3/8\pi)^{1/2} \sin\theta\, e^{\pm i\phi}$;
$Y_{2,0}(\theta,\phi) = (5/16\pi)^{1/2} \left(3\cos^2\theta - 1\right)$;
$Y_{2,\pm 1}(\theta,\phi) = \mp (15/8\pi)^{1/2} \cos\theta \sin\theta\, e^{\pm i\phi}$;
$Y_{2,\pm 2}(\theta,\phi) = (15/32\pi)^{1/2} \sin^2\theta\, e^{\pm 2i\phi}$

$E_n = -\dfrac{m_e e^4}{8\varepsilon_o^2 h^2 n^2} = -\dfrac{\hbar^2}{2m_e a_o^2 n^2}$;

$R_{1,0} = 2(1/a_o)^{3/2} e^{-r/a_o}$; $R_{2,0} = \dfrac{1}{\sqrt{8}} (1/a_o)^{3/2} \left(2 - \dfrac{r}{a_o}\right) e^{-r/2a_o}$

$a_o = \dfrac{4\pi\varepsilon_o \hbar^2}{m_e e^2}$; $\Psi_{n,l.m_l} = R_{n,l}(r) Y_{l,m_l}(\theta,\phi)$

$R_{2,1} = \dfrac{1}{2\sqrt{6}} (1/a_o)^{3/2} \dfrac{r}{a_o} e^{-r/2a_o}$

$\hat{I}_z \alpha = \dfrac{\hbar}{2}\alpha$; $\hat{I}_z \beta = -\dfrac{\hbar}{2}\beta$; $\left[\hat{I}_x, \hat{I}_y\right] = i\hbar \hat{I}_z$;

$\hat{I}_x \alpha = \dfrac{\hbar}{2}\beta$; $\hat{I}_x \beta = \dfrac{\hbar}{2}\alpha$; $\hat{I}_y \alpha = i\dfrac{\hbar}{2}\beta$; $\hat{I}_y \beta = -i\dfrac{\hbar}{2}\alpha$;

$\int \alpha^* \alpha \, d\sigma = 1$; $\int \beta^* \beta \, d\sigma = 1$

$\int \beta^* \alpha \, d\sigma = 0$; $\int \alpha^* \beta \, d\sigma = 0$

$p_i = \dfrac{a_i}{N} = \dfrac{g_i e^{-\varepsilon_i \beta}}{q}$; $q = \sum_i g_i e^{-\varepsilon_i \beta}$;

$\beta = \dfrac{1}{k_B T}$; $W = \dfrac{N!}{a_0! a_1! a_2! \ldots}$; $\ln N! \approx N \ln N - N$;

$q_{transl} = \dfrac{V}{\Lambda^3}$; $\Lambda = h\left(\dfrac{\beta}{2\pi m}\right)^{1/2}$;

$q_{rot} = \dfrac{1}{hcB\beta}$; $q_{vibr} = \dfrac{1}{1 - e^{-h\nu\beta}}$

$E = -N \dfrac{\partial}{\partial \beta} \ln q = N k_B T^2 \dfrac{\partial}{\partial T} \ln q$;

$U - U(0) = -\left(\dfrac{\partial}{\partial \beta} \ln Q\right)_V = k_B T^2 \left(\dfrac{\partial}{\partial T} \ln Q\right)_V$

$Q = q^N$ or $q^N/N!$

$S = k_B \ln W$; $S = \frac{U - U(0)}{T} + k_B \ln Q$;

$e^{i\alpha} = \cos\alpha + i\sin\alpha$; $\cos\alpha = (e^{i\alpha} + e^{-i\alpha})/2$; $\sin\alpha = (e^{i\alpha} - e^{-i\alpha})/2i$

$\sin 2\alpha = 2\sin\alpha\cos\alpha$; $\cos 2\alpha = \cos^2\alpha - \sin^2\alpha$; $2\sin^2\alpha = 1 - \cos 2\alpha$; $2\cos^2\alpha = 1 + \cos 2\alpha$

$\int_{-\infty}^{\infty} e^{-ax^2} x^{2n}\, dx = \sqrt{\frac{\pi}{a}} \frac{1 \cdot 3 \cdot 5 \cdot \ldots \cdot (2n-1)}{2^n a^n}$; (for $n \geq 0$)

$\int_0^{\infty} e^{-ax^2} dx = \frac{1}{2}\sqrt{\frac{\pi}{a}}$; $\int_0^{\infty} e^{-ax^2} x^2\, dx = \frac{1}{4a}\sqrt{\frac{\pi}{a}}$

$\int_0^{a} \sin^2(\frac{\pi n}{a} x) dx = \frac{a}{2}$;

$\int_0^{\infty} x^n e^{-ax} dx = \frac{n!}{a^{n+1}}$