Formulae for Final

$$k = 1.381 \cdot 10^{-23}\ \mathrm{J/K} = 8.617 \cdot 10^{-5}\ \mathrm{eV/K}$$
$$h = 6.626 \cdot 10^{-34}\ \mathrm{Js} = 4.136 \cdot 10^{-15}\ \mathrm{eVs}$$
$$c = 2.998 \cdot 10^{8}\ \mathrm{m/s}$$
$$N_\mathrm{A} = 6.022 \cdot 10^{23}$$
$$\Delta U = Q + W_\mathrm{on} \qquad \text{where } W_\mathrm{on} = -\int p\mathrm{d}V$$
$$C = \frac{Q}{\Delta T} \qquad C_V = T\left(\frac{\partial S}{\partial T}\right)_V = \left(\frac{\partial U}{\partial T}\right)_{V,N} \qquad C_p = T\left(\frac{\partial S}{\partial T}\right)_p$$
$$pV = NkT \qquad pV^\gamma = \text{const., where } \gamma = (f+2)/f$$
$$U = \frac{f}{2}NkT$$
$$p = \frac{NkT}{(V-bN)} - a\frac{N^2}{V^2}$$
$$\epsilon = \frac{W_\mathrm{by}}{Q_\mathrm{h}} \qquad \mathrm{COP} = \frac{Q_\mathrm{c}}{W_\mathrm{on}}$$
$$G = \mu N$$
$$\frac{\mathrm{d}p}{\mathrm{d}T} = \frac{\Delta S}{\Delta V} = \frac{L}{T\Delta V}$$
$$H = U + pV \qquad F = U - TS \qquad G = U - TS + pV$$
$$\mathrm{d}U = T\ \mathrm{d}S - p\mathrm{d}V + \mu\ \mathrm{d}N$$
$$\Omega = \begin{pmatrix} q+N-1 \\ q \end{pmatrix} \qquad \Omega = \begin{pmatrix} N \\ n \end{pmatrix} = \frac{N!}{n!(N-n)!}$$
$$\ln N! \approx N\ln N - N \qquad \ln(1+x) \approx x$$
$$S = k\ln\Omega \qquad \frac{1}{T} = \left(\frac{\partial S}{\partial U}\right)_{N,V}$$
$$P(s) = \frac{\mathrm{e}^{-E(s)/(kT)}}{Z} \qquad P(s) = \frac{\mathrm{e}^{-(E(s)-\mu N(s))/(kT)}}{\mathcal{Z}}$$
$$\overline{n}_\mathrm{FD} = \frac{1}{\mathrm{e}^{(\epsilon-\mu)/(kT)}+1} \qquad \overline{n}_\mathrm{BE} = \frac{1}{\mathrm{e}^{(\epsilon-\mu)/(kT)}-1} \qquad \overline{n}_\mathrm{Pl} = \frac{1}{\mathrm{e}^{(hf/(kT)}-1}$$
$$D(v) = \left(\frac{m}{2\pi kT}\right)^{3/2} 4\pi v^2 \mathrm{e}^{-mv^2/(2kT)}$$
$$F = -kT\ \ln Z$$
$$Z_\mathrm{idealgas} = \frac{1}{N!}\left(\frac{VZ_\mathrm{int}}{v_\mathrm{Q}}\right)^N \text{ where } v_\mathrm{Q} = \left(\frac{h}{\sqrt{2\pi mkT}}\right)^3$$
$$\int_{-\infty}^{\infty} \mathrm{e}^{-ax^2}\mathrm{d}x = \sqrt{\frac{\pi}{a}} \qquad \int_{-\infty}^{\infty} x^2\mathrm{e}^{-ax^2}\mathrm{d}x = \frac{\sqrt{\pi}}{2}a^{-3/2} \qquad \int_{-\infty}^{\infty} x^4\mathrm{e}^{-ax^2}\mathrm{d}x = \frac{3}{4}\sqrt{\frac{\pi}{a^5}}$$
$$\sum_{n=0}^{\infty} x^n = \frac{1}{1-x}$$
$$\cosh(x) = \frac{\mathrm{e}^x+\mathrm{e}^{-x}}{2} \qquad \sinh(x) = \frac{\mathrm{e}^x-\mathrm{e}^{-x}}{2} \qquad \tanh(x) = \frac{\sinh(x)}{\cosh(x)}$$