Вычисление средней энергии идеального газа

$$\langle \varepsilon \rangle = \frac{m}{2}\langle v^2 \rangle = \frac{m v_в^2}{2}\langle u^2 \rangle = \frac{4}{\sqrt{\pi}}\frac{m v_в^2}{2}\int_0^\infty u^4 e^{-u^2} du =$$

$$= \frac{2 m v_в^2}{\sqrt{\pi}}\frac{1}{2}\int_0^\infty u^3 e^{-u^2} du^2 = \left| u^2 = x \right| = \frac{m v_в^2}{\sqrt{\pi}}\int_0^\infty x^{3/2} e^{-x} dx =$$

$$= \frac{m v_в^2}{\sqrt{\pi}}\Gamma\left(\frac{3}{2}+1\right) = \frac{m v_в^2}{\sqrt{\pi}}\left(\frac{3}{2}\frac{1}{2}\sqrt{\pi}\right) = \frac{3 m v_в^2}{4} =$$

$$= \frac{3m}{4}\frac{2RT}{\mu} = \left| R = kN_A \right| = \frac{3}{2}kT\frac{m}{\mu}N_A = \frac{3}{2}kTN_0$$