Домашняя работа №7

№ 6.234

Дано: T, $\ln\sigma$

Найти: E_g - ? E_0 - ?

Решение:

$$\sigma = \sigma_0 e^{-\left(\frac{E_g}{2kT}\right)} \Rightarrow \ln\sigma = \ln\sigma_0 - \frac{E_g}{2kT}$$

$$\boxed{E_g = \frac{-2k\cdot\Delta\ln\sigma_0}{\Delta(1/T)} \approx 1{,}21\ \text{эВ}}$$

$$\sigma' = \sigma_0' e^{-\left(\frac{E_0}{2kT}\right)} \Rightarrow E_0 = -2kT\cdot\frac{\Delta\ln\sigma'}{\Delta(1/T)}$$

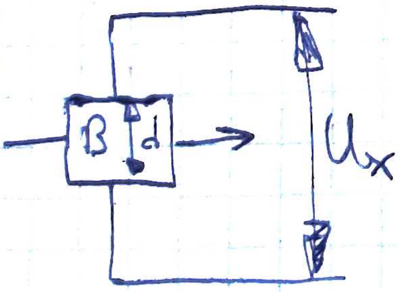
$$\boxed{E_0 \approx 0{,}057\ \text{эВ}}$$

№ 6.237

Дано: $B = 5\,\text{кГс}$, $\eta = 13$

Найти: $(\mu_n - \mu_p)$ - ?

Решение:



$$E_{\perp} = \frac{U_x}{d};\quad E_{\parallel} = \frac{j}{\sigma}$$

$$U_x = \frac{Bjd}{qn};\quad \frac{E_{\parallel}}{E_{\perp}} = \frac{j\,qn}{Bj\sigma} = \eta;$$

$$qn = \frac{qn(\mu_n-\mu_p)}{(\mu_n-\mu_p)\,qn(\mu_n+\mu_p)B} = \frac{1}{(\mu_n-\mu_p)B}$$

$$U_x = R_x B j d;$$

$$R_x = \frac{n(\mu_n^2-\mu_p^2)}{qn(\mu_n+\mu_p)} = \frac{\mu_n-\mu_p}{qn(\mu_n+\mu_p)};\quad U_y = \frac{\mu_n-\mu_p}{qn(\mu_n+\mu_p)}\cdot Bjd$$

$$\frac{E_1}{E_1} = \frac{jd}{\sigma U_x} = \frac{jd\,qn(\mu_n+\mu_p)}{qn(\mu_n+\mu_p)(\mu_n-\mu_p)\,B\,j\,d} = \eta$$

$$\mu_n - \mu_p = \frac{1}{B\eta} = \ldots \approx 0{,}2\,\frac{M^2}{B\cdot c}$$