

Exercise 2.3.5-1

Show the equivalence of the two equations for the minority carrier density

The [two equations](#) for the minority carrier concentration (here the electrons at the p-side) at the edge of a junction were

$$n_{e^p}(U) \Big|_{\text{edge}}^{\text{SCR}} = n_{e^n}(U) \Big|_{\text{edge}}^{\text{SCR}} \cdot \exp - \frac{V^n + U}{kT}$$
$$n_{e^p}(U=0) = \frac{n_i^2}{n_{h^p}(U=0)}$$

The first equation came from simply relating one kind of carriers on both sides of the junction including non-equilibrium (i.e. voltage U not zero), the second one is simple the mass action law valid for equilibrium (i.e. $U=0$).

- Show that the two equations are equivalent.
- *Hint:* Express n_{e^n} in terms of n_{h^p} . Write down the equation for n_{h^p} and reshuffle the energies in the exponent so that n_{e^n} and n_i can be extracted.



Link to the [solution](#)