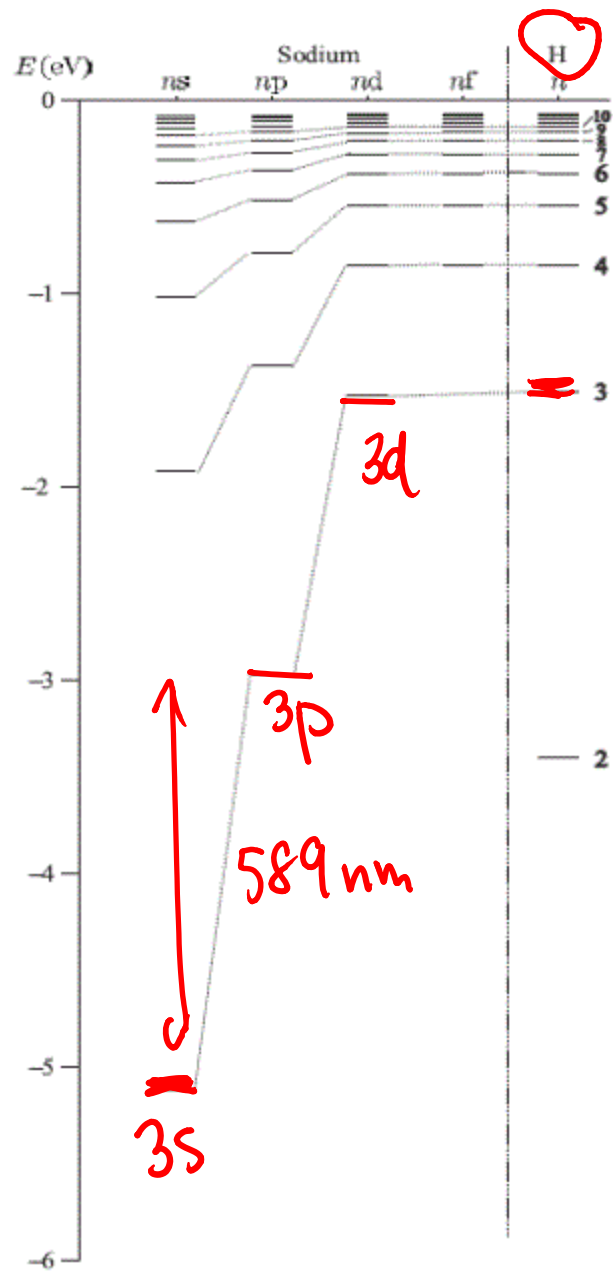




Quantum defects

$$E_{nl} = \frac{-13.6 \text{ eV}}{(n - \delta_e)^2} = \frac{-13.6 \text{ eV}}{(n^*)^2}$$

↑
quantum defect

Table 9.2 Parameters of the energy levels of the alkalis.

(a) quantum defects $\alpha(l)$

Atom	$l =$	0	1	2	3
Li		0.40	0.04	0.00	0.00
Na		1.35	0.85	0.01	0.00
K		2.19	1.71	0.25	0.00
Rb		3.13	2.66	1.34	0.01
Cs		4.06	3.59	2.46	0.02

(b) Effective principal quantum numbers n^* for the (n_0s) and (n_0p) levels

Level	Li ($n_0 = 2$)	Na ($n_0 = 3$)	K ($n_0 = 4$)	Rb ($n_0 = 5$)	Cs ($n_0 = 6$)
$(n_0s)^2S_{1/2}$	1.588	1.626	1.771	1.805	1.869
$(n_0p)^2P_{1/2}$	1.966	2.116	2.232	2.280	2.392
$(n_0p)^2P_{3/2}$	1.966	2.117	2.235	2.293	2.362

(c) Ionisation potentials of the alkalis

	Li	Na	K	Rb	Cs
I_p (eV)	5.39	5.14	4.34	4.18	3.89

Atom	Li	Na	K	Rb	Cs
n_0	2	3	4	5	6
ΔE	0.337	17.2	57.7	238	554 cm ⁻¹
	0.42	21	72	295	687 × 10 ⁻⁴ eV

$nP_{3/2}$ —————
 $nP_{1/2}$ ————— $\updownarrow \Delta E_{FS}$

