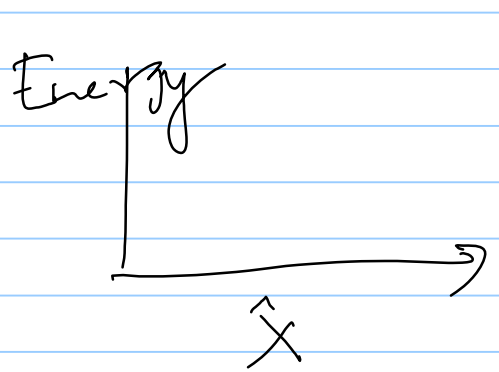
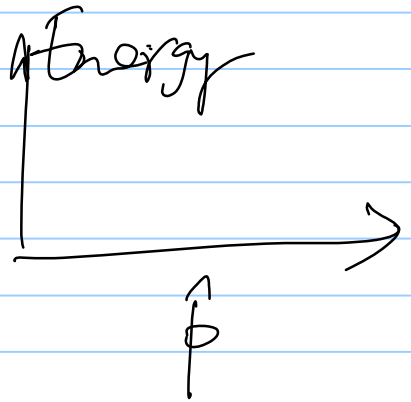
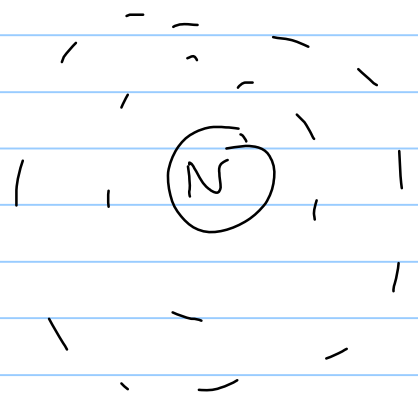
Band Model Bond Model







shells

$2n^2$

shell	Electron
1 →	2 (2)
2 →	8 (8)
3 →	4 (18)

$Si \rightarrow 14$

$1s^2\ 2s^2\ 2p^6\ 3s^2\ 3p^2$

r_1 — radius of the outermost shell

$$E_\infty = -\int_{r_1}^{\infty} F \cdot dr$$

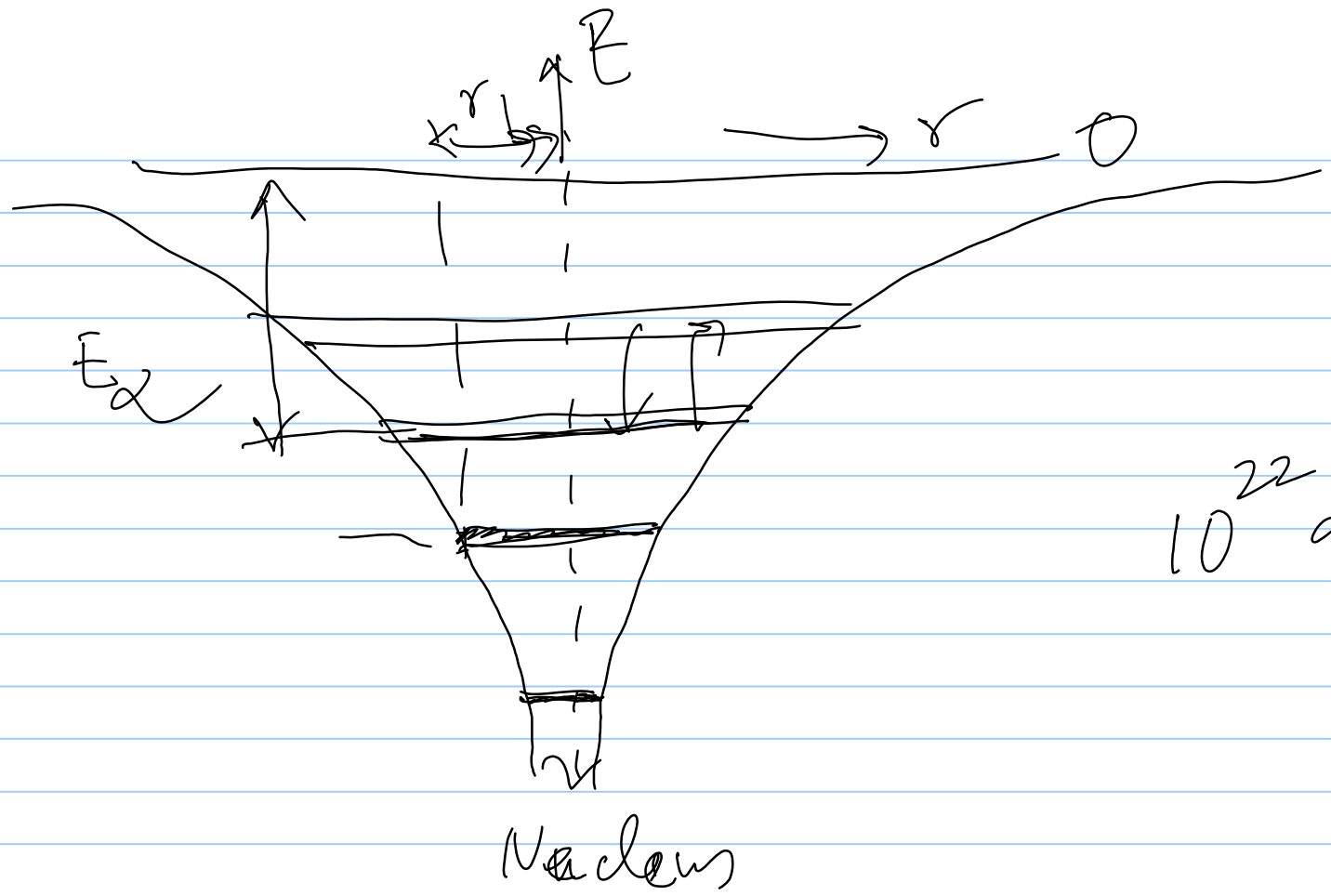
$$= -\int_{r_1}^{\infty} \frac{q^2}{r^2} \times 9\times10^9 \, dr = \frac{q^2 \times 10^9 \times 9}{r_1} J$$

$$= \frac{q}{r_1} \times 9\times10^9 \text{ eV}$$

$$\simeq 10 \text{ eV}$$

$r_1 \to 10^{-10}$ m

$q = 1.6\times10^{-19}$ C



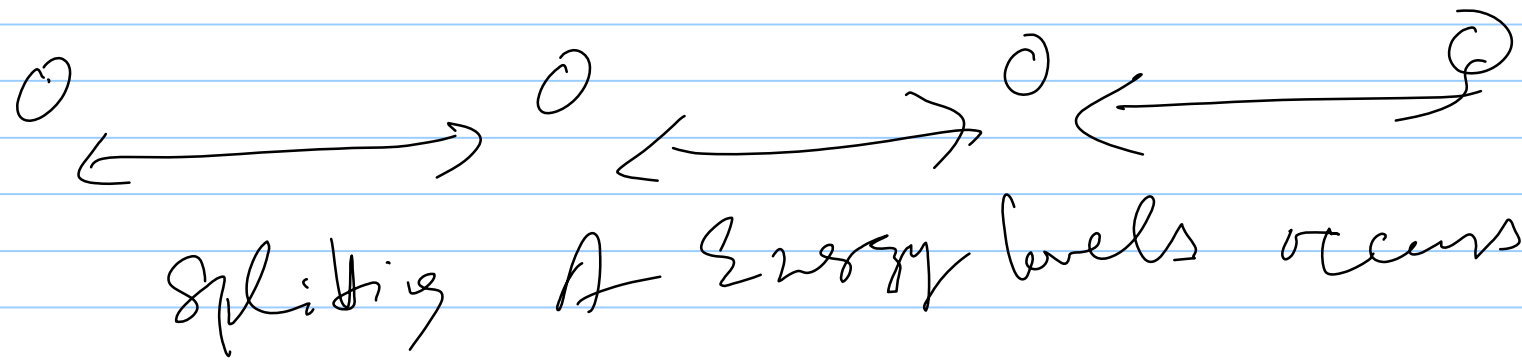
10^{22} atoms/ cm^3

Pauli's Exclusion Principle

Every energy level with maximally contain '2' electrons

$\downarrow$

$2n^2$

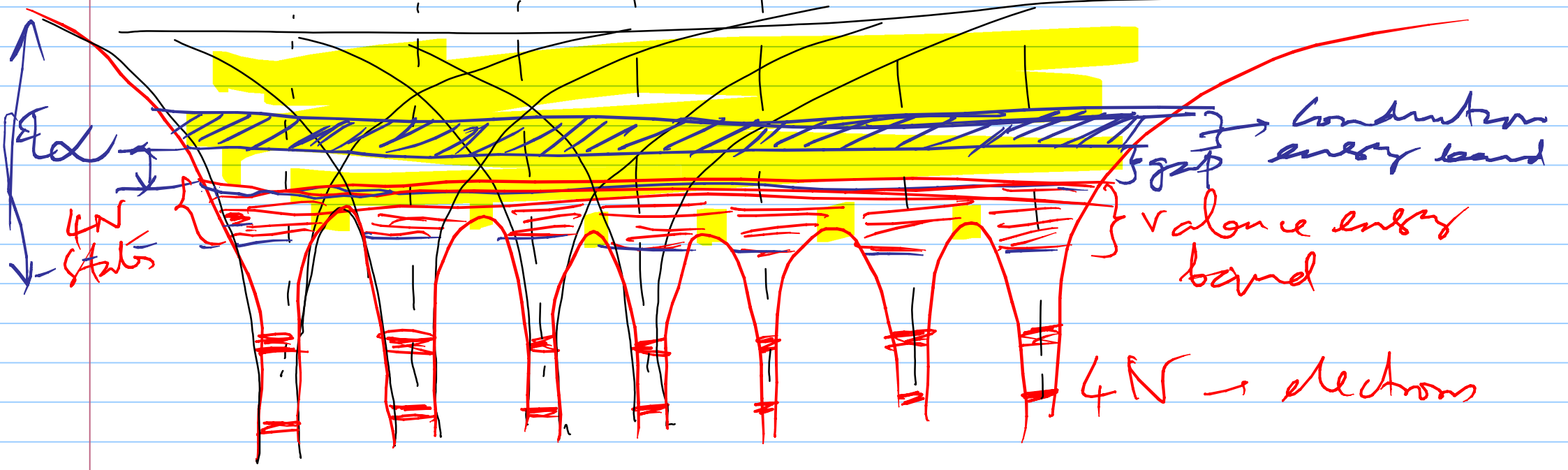


Splitting $\Rightarrow$ Energy levels occurs

Amount of energy splitting

↓

Amount of interaction



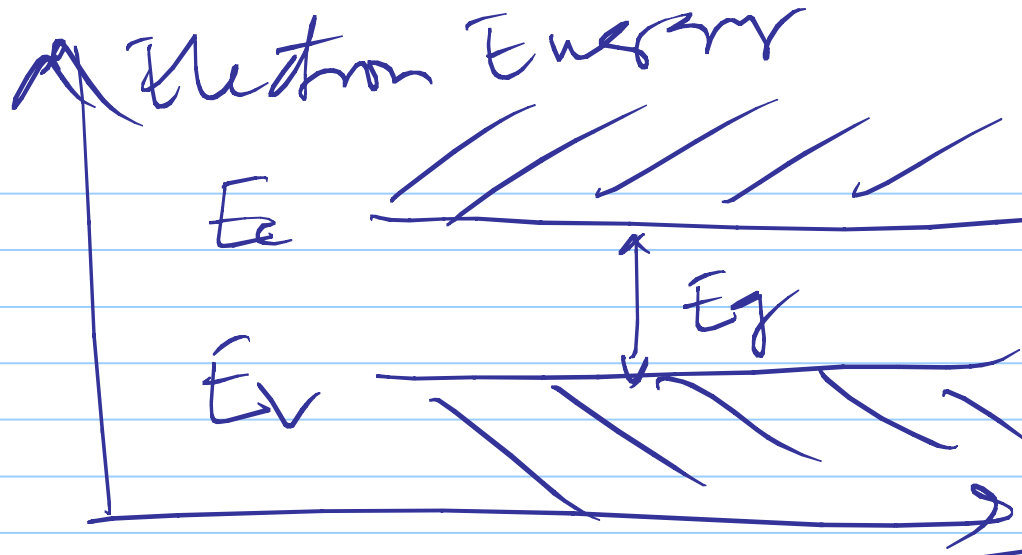
6s outer shell

18 states

9 energy levels } 4 electrons
2 energy levels occupied

Valence Energy band
Conduction Energy band
↕ Energy gap (Band gap or forbidden gap)

from Valence energy levels or outer most energy shell



At $T = 0K$

Completely filled or completely empty band cannot conduct current

→ Partially filled band conductor current

→ Insulator → E_g is very high

→ Conductor → E_g is zero

↳ bands are partially filled