(PHYSICAL CHEMISTRY)

SOLID STATE

EXERCISE (JEE-MAIN)

1.	(3)	**2.**	(85)	**3.**	(D)	**4.**	(C)	**5.**	(B)	**6.**	(C)	**7.**	(D)
8.	(C)	**9.**	(C)	**10.**	(143)	**11.**	(A)	**12.**	(C)	**13.**	(A)	**14.**	(A)
15.	(C)	**16.**	(D)	**17.**	(B)	**18.**	(B)	**19.**	(A)	**20.**	(C)	**21.**	(A)
22.	(D)	**23.**	(B)	**24.**	(B)	**25.**	(A)	**26.**	(B)	**27.**	(B)	**28.**	(C)
29.	(C)	**30.**	(B)	**31.**	(A)	**32.**	(C)	**33.**	(C)	**34.**	(A)	**35.**	(A)
36.	(C)	**37.**	(A)	**38.**	(A)	**39.**	(C)	**40.**	(C)	**41.**	(D)	**42.**	(B)
43.	(C)	**44.**	(B)										

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(11) (A) F

(13) (D) F

(14) (D)

$\underline{Na^+}$ Ce^- $9/2$ 6

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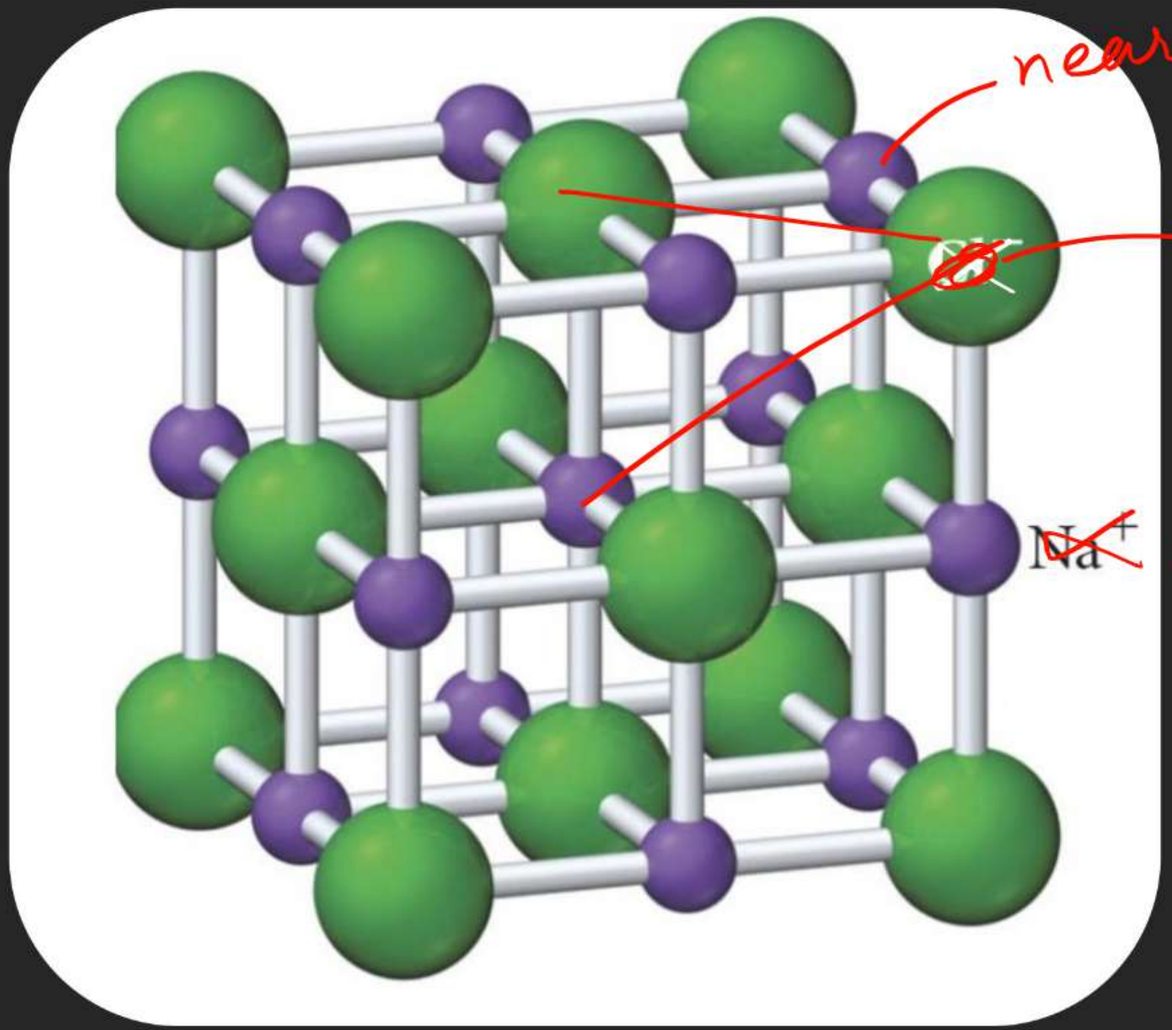
2nd nearest Na^+

$a/\sqrt{2}$, 12



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Na^+

Nearest —— e^- $\quad a/2 \quad 6$

2^{nd} nearest → Na^+ $\quad a/\sqrt{2} \quad 12$

3^{rd} nearest → e^- $\quad \sqrt{3}a/2 \quad 8$

BCC 32% void

$\sqrt{3}\,a = 4r$

$1.732\,a = 4 \times 17.32$ (10)

$a = 40$ cm

Volume $= (40)^3$

Void $= (40)^3 \times \frac{32}{100}$ ml = Vol of Oxygen

$PV = nRT$

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15, 16 — Para

17 – 20 —

21 – 22 —

23 — 24

25 – 26

1—10

⑨ $d = \frac{Z \times M/N_A}{a^3}$

$M = 50$

⑤

	A	M
	6	$\frac{2}{3} \times 12$
	6	8
CCP	3	4
HCP		$M_4 A_3$

(37) $a = 508$

$r_+ = 110$

$r_- = ?$

If O.V is occupied

$$a/2 = r_+ + r_-$$

If T.V is occupied

$$\frac{\sqrt{3}a}{4} = r_+ + r_-$$

BCC

(33) $\frac{\sqrt{3}a}{2} = r_+ + r_-$

(8)

(34) $NH_4^+Cl^-$ (BCC type)

CsCl

$\frac{\sqrt{3}a}{2} = r_+ + r_-$

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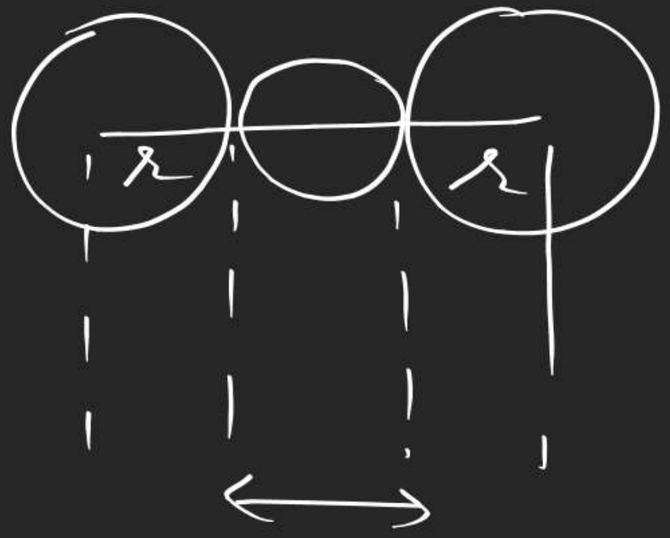
11 – 20

(12)



$\sqrt{3}a = 4r$

(2, 26)

$a - 2r = 2r'$

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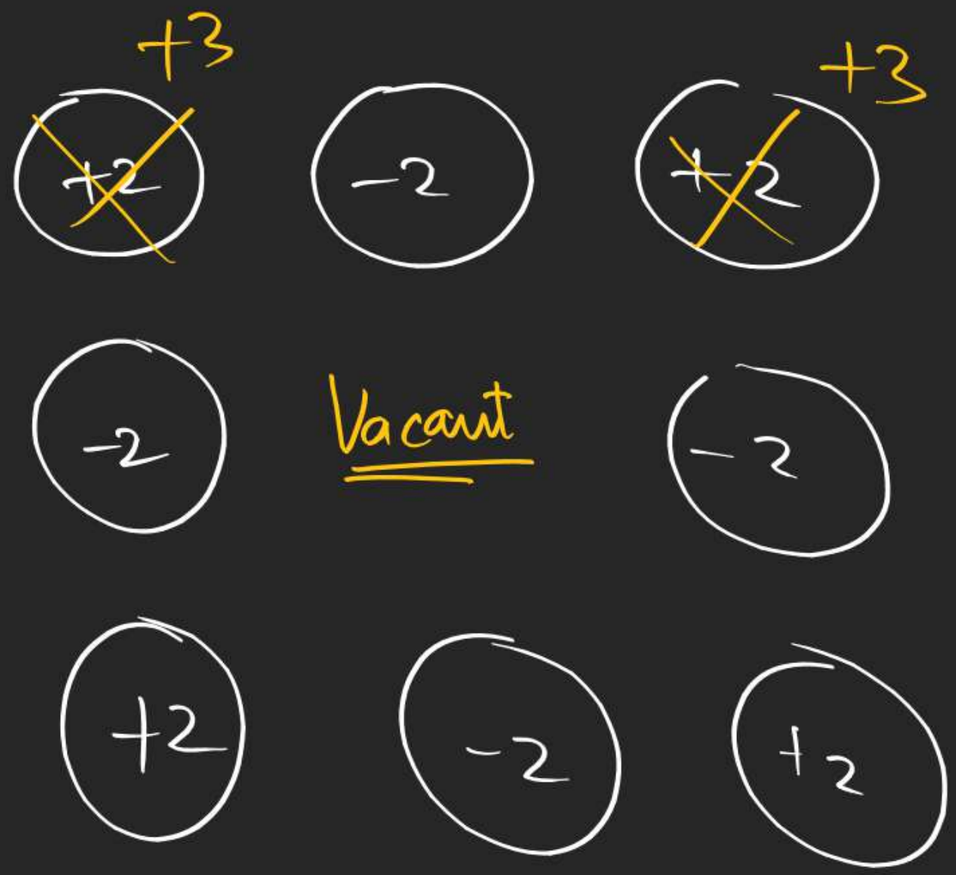

no. of Fe^{3+} ion = 2 × no. of Vacancies

$Fe_{0.95}O$

$Fe_{95}O_{100}$

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$Fe_{95}O_{100}$

$Fe^{2+}(x)$ ——— 85⁻

$Fe^{3+}(95-x) \longrightarrow 10$

$2x + 3(95-x) = 100 \times 2$

$3 \times 95 - 2\omega = x$

$85 = x$

Fe_3O_4

$Fe_{95}O_{100}$

Vacancy = 5

$Fe^{3+} = 10$

$Fe^{2+} = 85$

$Fe_{0.75}O$

$Fe_{75}O_{100}$

$Fe^{3+} = 50$

$Fe^{2+} = 25$

$Fe_{0.9}O$

$Fe_{90}O_{100}$

$Fe^{2+} — 70$

$Fe^{3+} \longrightarrow 20$

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SnO

$Sn_{0.9}O$

$Sn_{90}O_{100}$

Vacancies = 10

$\rightarrow Sn^{4+} = 10 \Rightarrow \frac{10}{90} \times 100$

$Sn^{2+} = 80$

$Sn^{2+} \Rightarrow$

$Sn^{4+} \Rightarrow$

✓ Metal deficiency defect due to missing cation

(3) Impurity defect

NaCl → K^+, Li^+

Substitutional defect

NaCl + $SrCl_2$

Na^+ ✗ , Sr^{2+}

density ↑

density ↓

no. of Sr^{+2} = no. of vacancies

2 × (" Al^{3+}) = no. of vacancies

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Conductor / Semiconductor

Conductor	semiconductor	Insulator
Conductivity = $10^{4} - 10^{7}$	$10^{-6} - 10^{4}$	$10^{-10} - 10^{-20}$ Sm^{-1}

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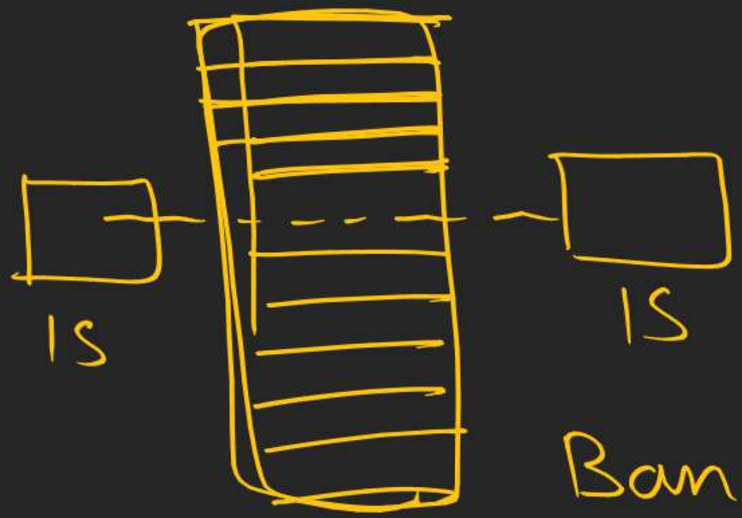


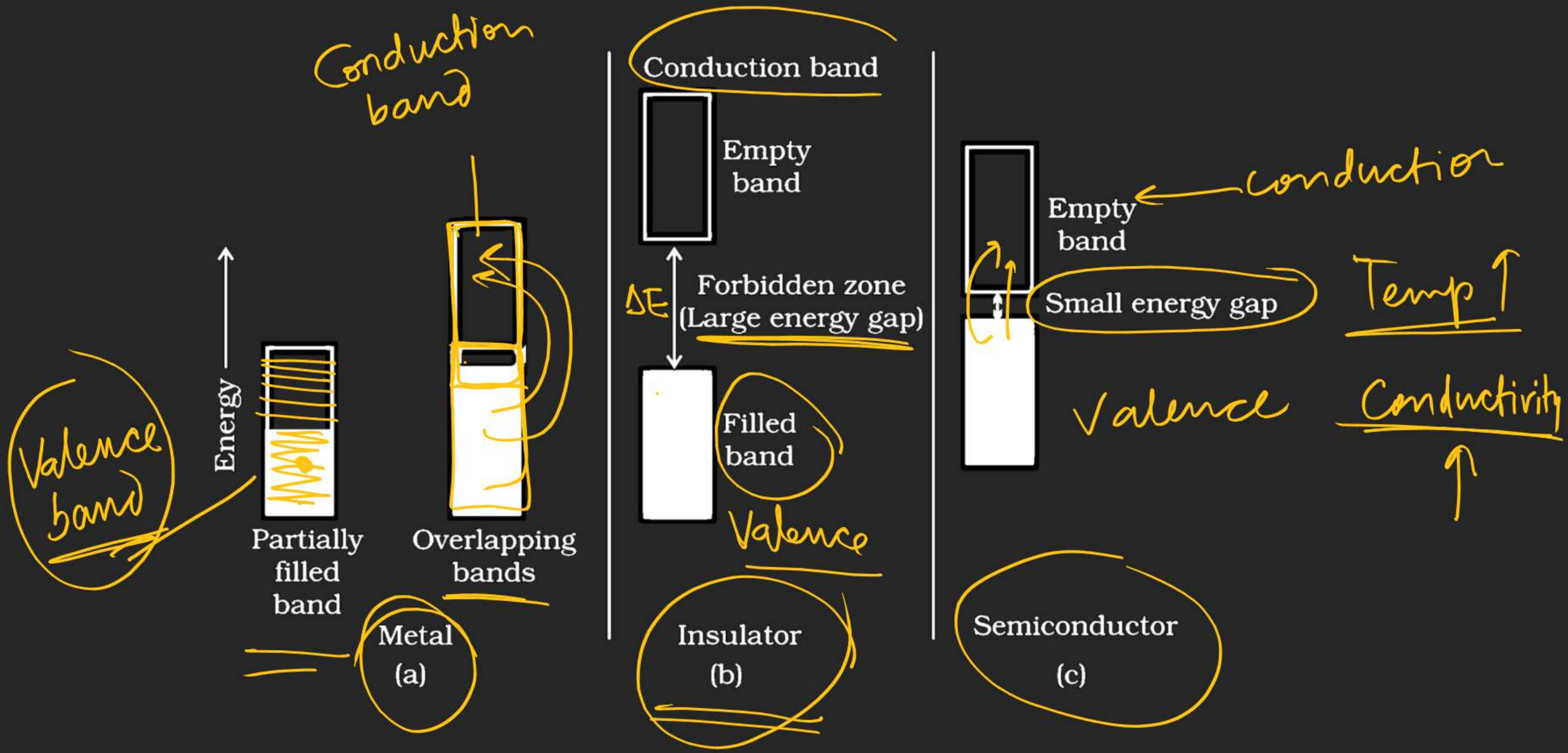
N_2

O_2

H_2

Band

group of Molecular orbitals having similar energy



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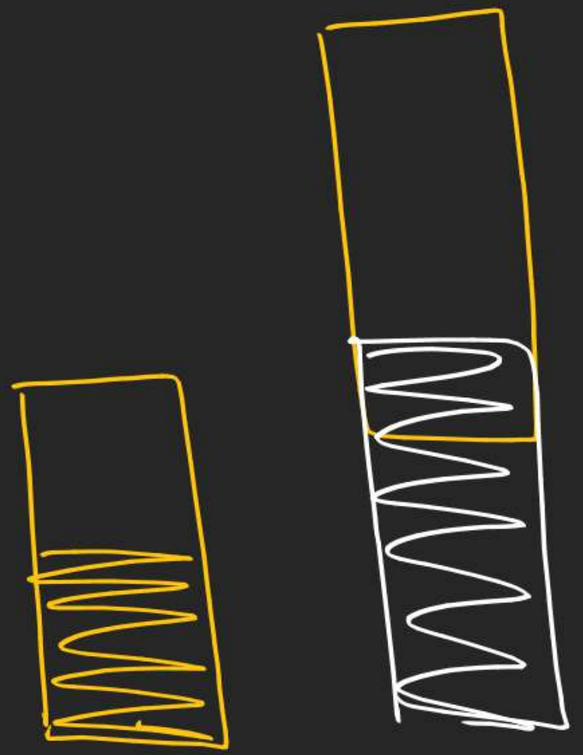
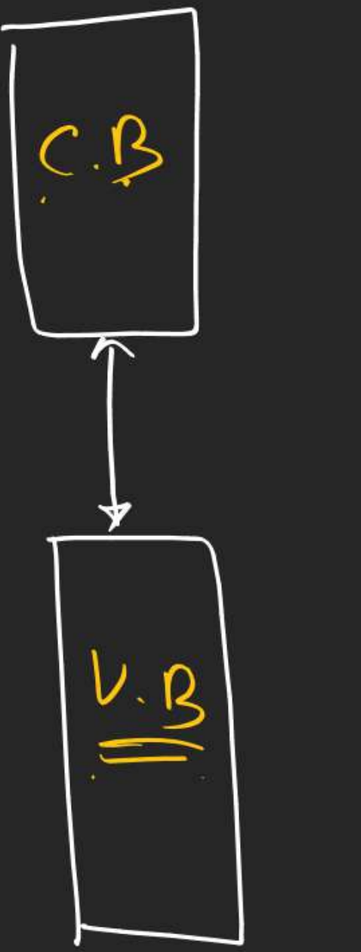
In case of Metals

T ↑

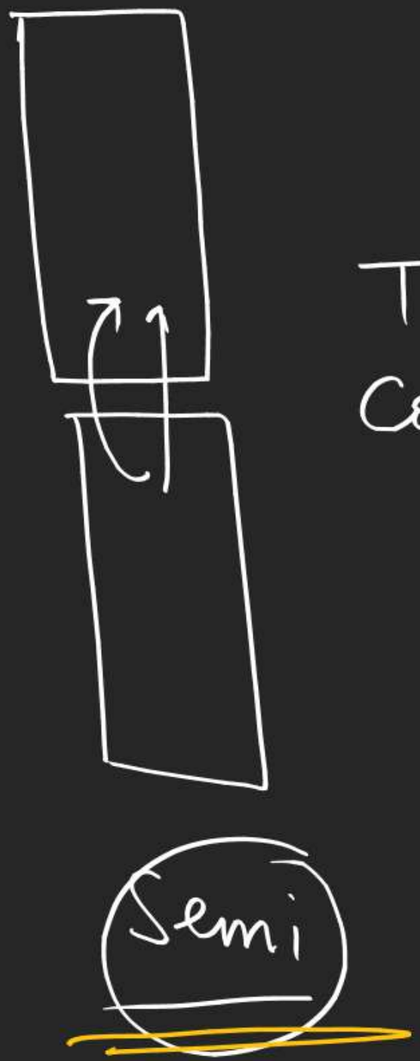
Conductivity ↓



Conductors



insulator



T ↑

Conductivity ↑

Semi

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J-M

O-I

S-I

O-II

NCERT

S-II

J-Adv

Semiconductors

Intrinsic

Pure Si
Ge

Extrinsic (doping)

- e^- rich (n-type)
- e^- deficient (P-type)

Intrinsic Si

Extrinsic