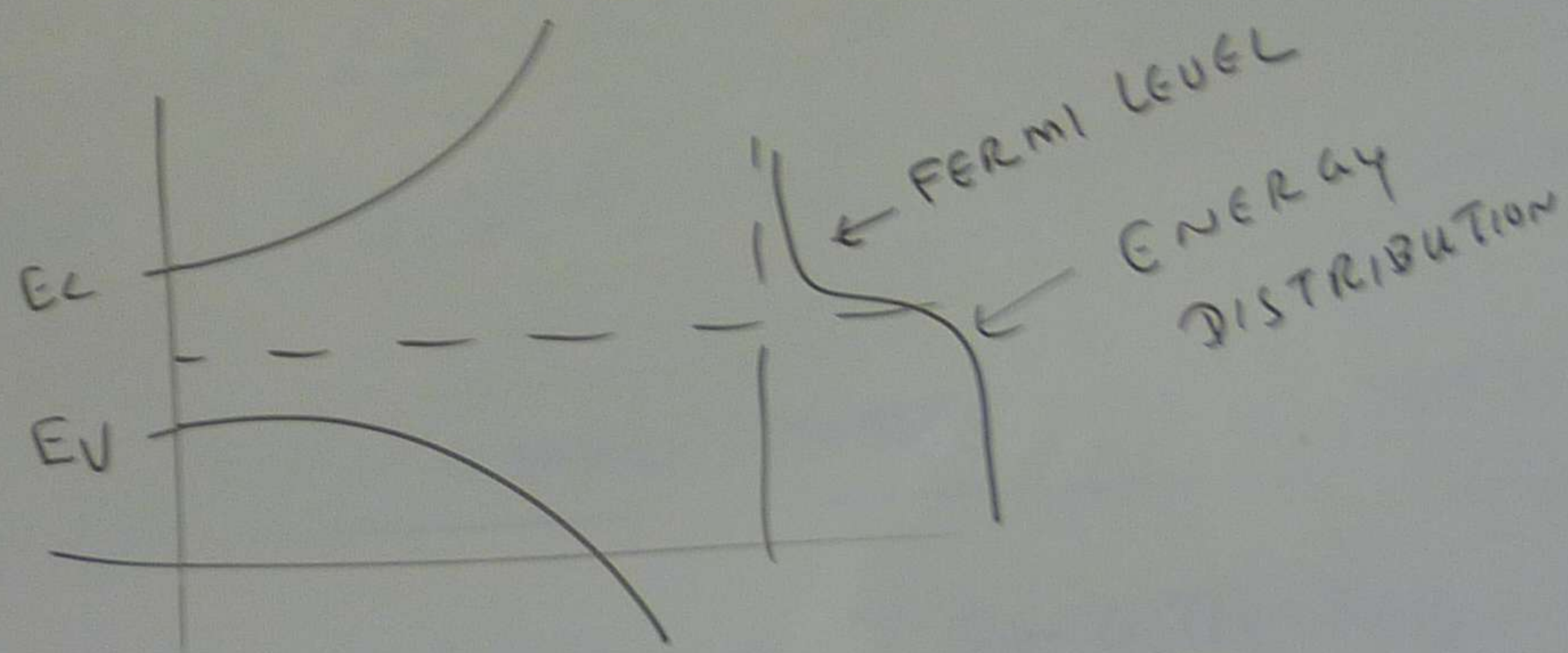


E_v = ENERGY BAND LEVEL
 E_c = CONDUCTION LEVEL ENERGY



E_c , E_v curve DEPENDS ON KIND OF MATERIALS.

FERMAL LEVEL - TH
 BLE

E_1 = ENERGY STA

E_2 = ENERGY S

E_F = FERMI
 ENER

$P(E) = P -$

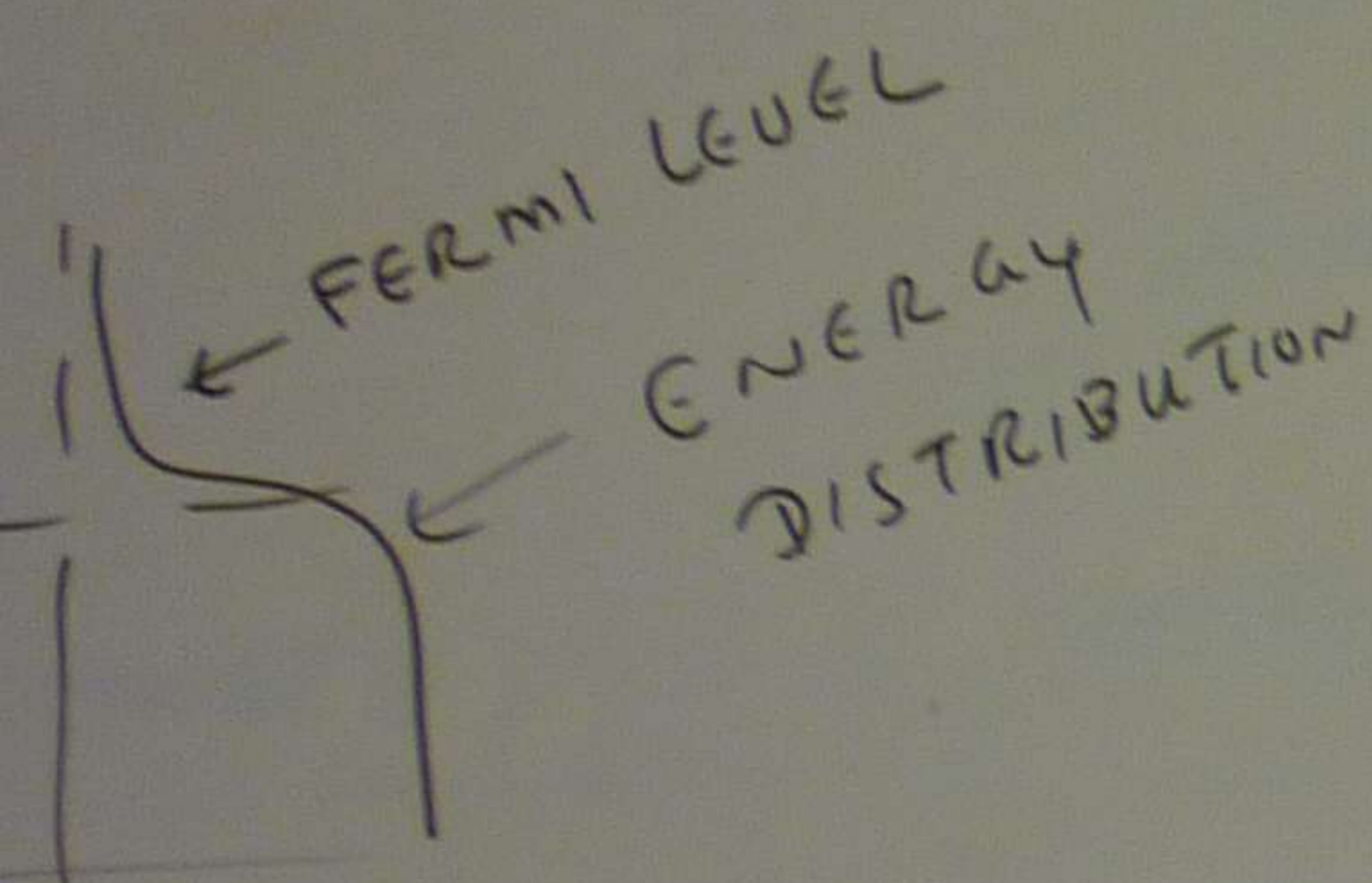
$N(E) = N -$

INSULATORS

CONDUCTORS

SEMI CONDUCT

ANCE LEVEL
EL ENERGY



DEPENDS ON KIND OF

FERMAL LEVEL — THE LEVEL OF ENERGY EXERTED ON ELECTRON FOR MOVEMENT.

$E_1 = \text{ENERGY STATE 1}$

$E_2 = \text{ENERGY STATE 2}$

$$E_F = \text{FERMI LEVEL} = \frac{E_1 + E_2}{2}$$

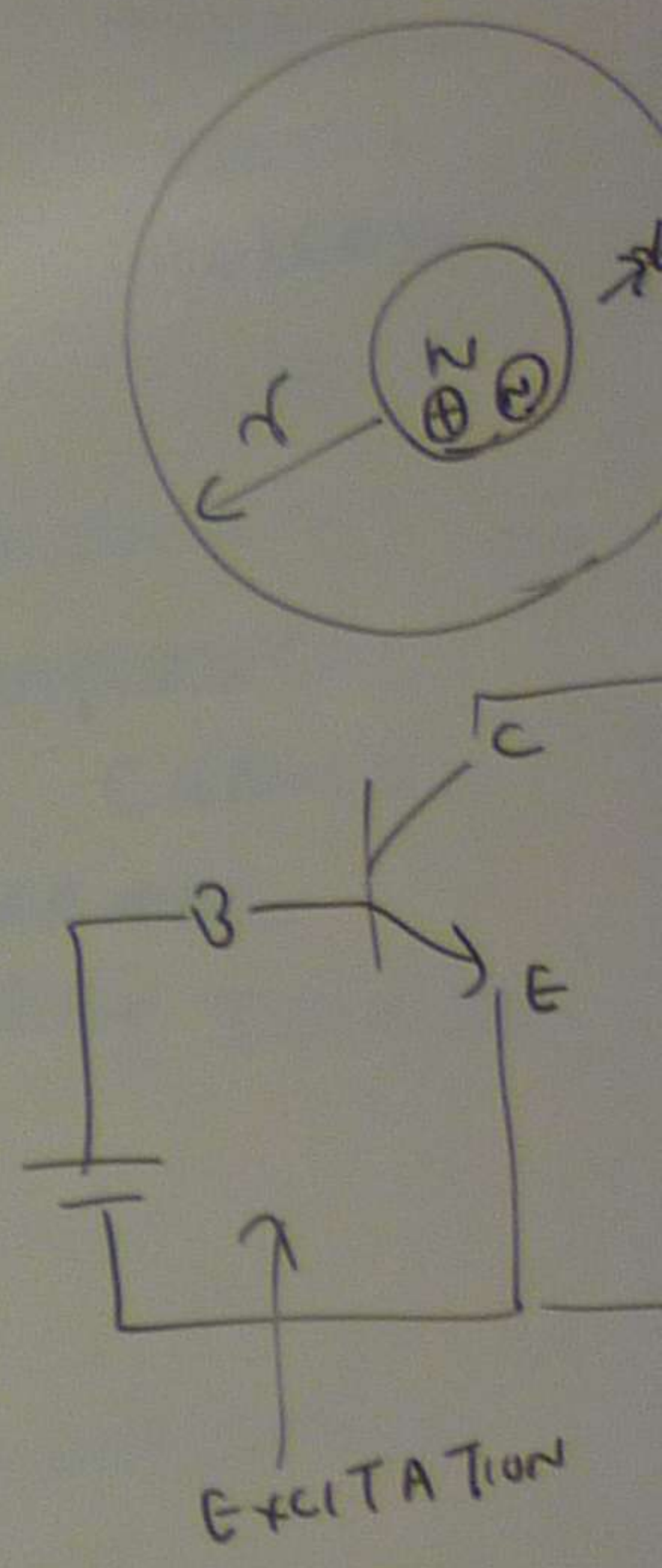
$P(E) = \text{P-TYPE SEMI CONDUCTOR MATERIAL ENERGY}$

$N(E) = \text{N-TYPE SEMI CONDUCTOR MATERIAL ENERGY}$

INSULATORS — RESISTIVITY MORE THAN $10^8 \Omega\text{-cm}$
GLASS, MICA

CONDUCTORS — RESISTIVITY LESS THAN $10^{-3} \Omega\text{-cm}$

SEMI CONDUCTOR — Ge / Si



TRANSISTOR IS
PASSAGE OF E
IS DETERMINING
WHICH ACTS
AND POSITIVE

- THE LEVEL OF ENERGY EXERTED ON ELECTRON FOR MOVEMENT.

STATE 1

STATE 2

$$\text{FERMI LEVEL ENERGY} = \frac{E_1 + E_2}{2}$$

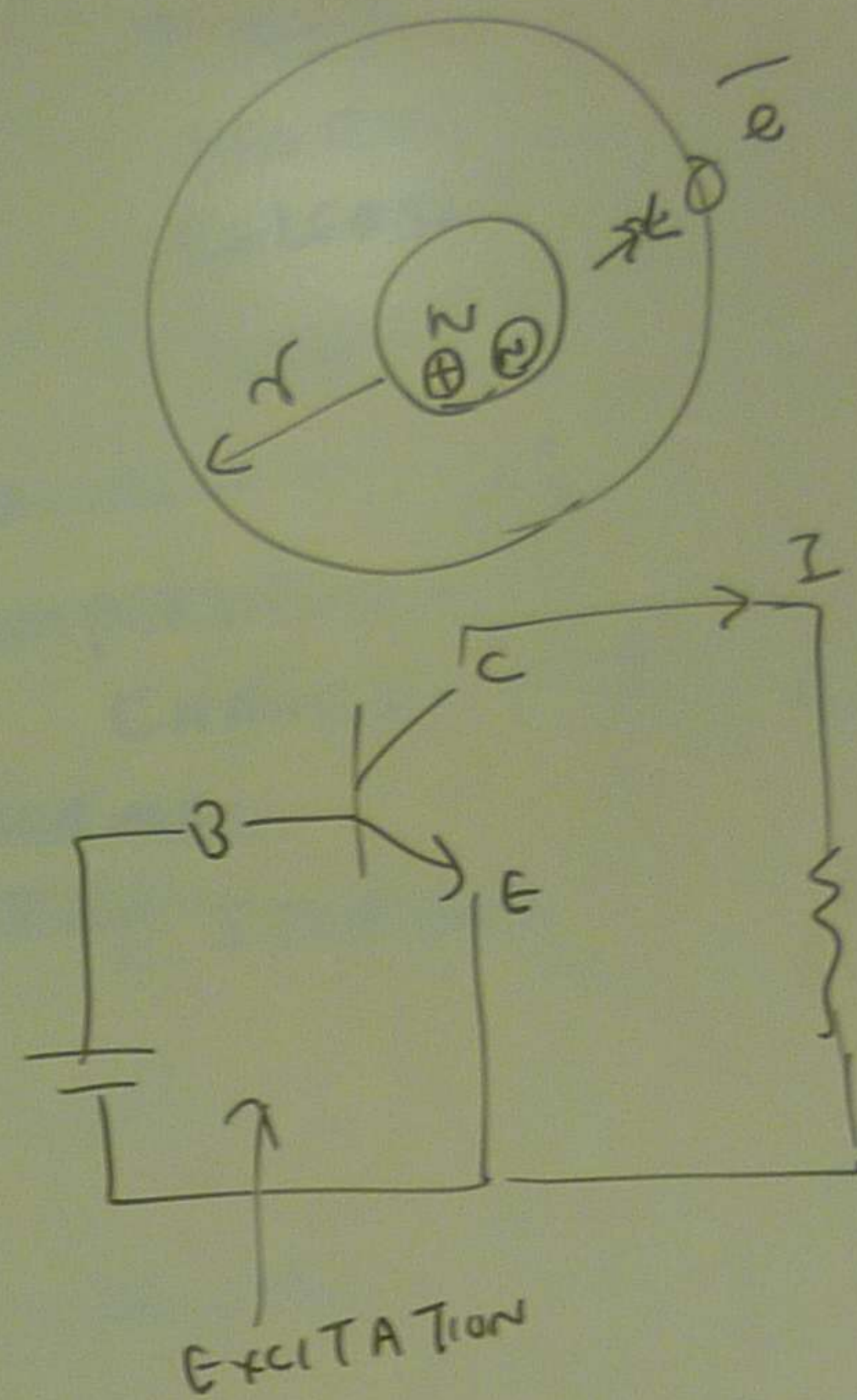
P-TYPE SEMI CONDUCTOR MATERIAL ENERGY

N-TYPE SEMI CONDUCTOR MATERIAL ENERGY

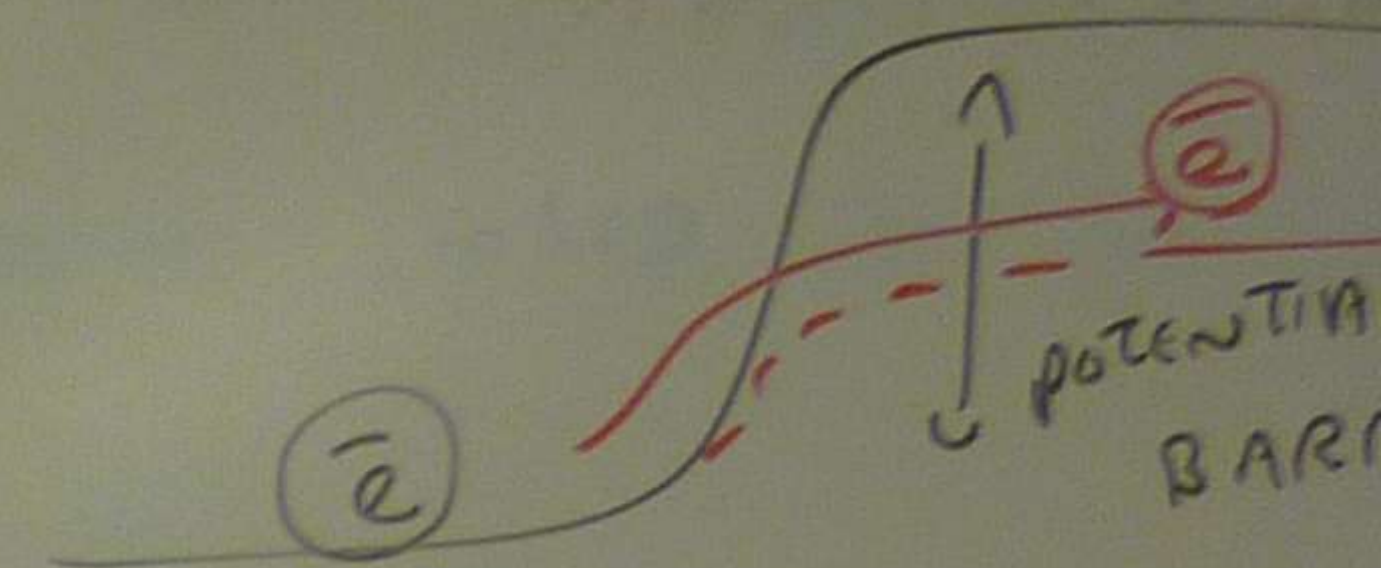
INSULATORS - RESISTIVITY MORE THAN $10^8 \Omega\text{-cm}$
GLASS, MICA

SEMI-CONDUCTORS - RESISTIVITY LESS THAN $10^3 \Omega\text{-cm}$

SEMICONDUCTOR - Ge / Si



TRANSISTOR IS SOLID STATE DEVICE
PASSAGE OF ELECTRICAL CURRENT
IS DETERMINED BY BINDING FORCE
WHICH ACTS BETWEEN ELECTRON
AND POSITIVELY CHARGED NUCLEUS

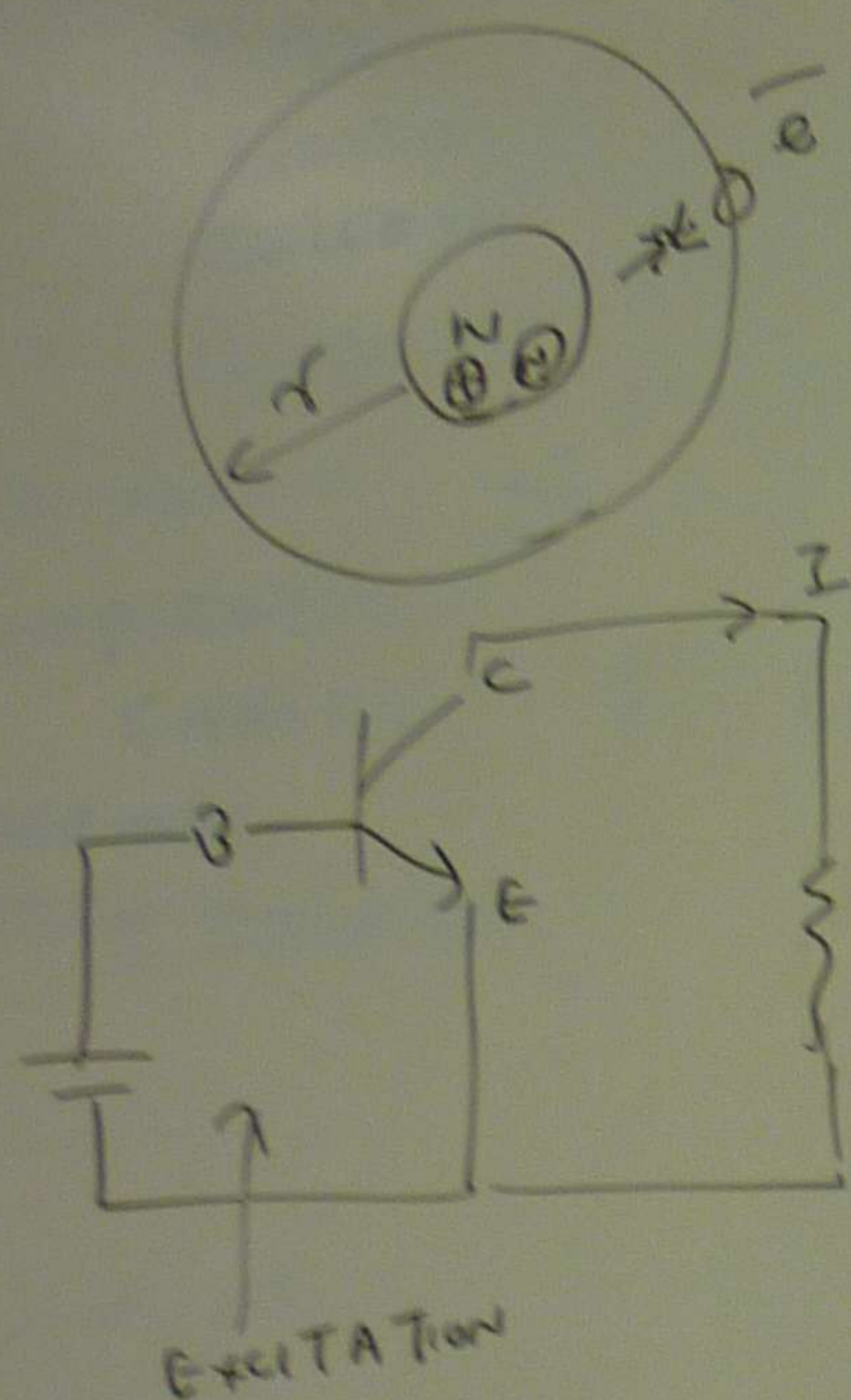


SEMI CONDUCTOR

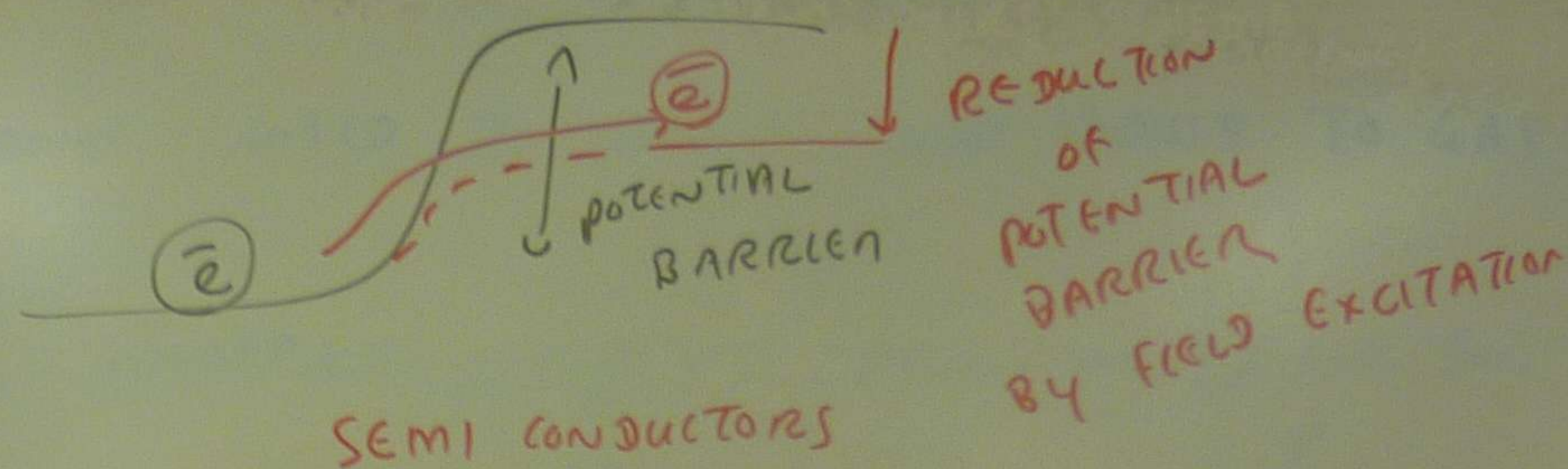
$$\frac{e^2}{4\pi\epsilon_0 r^2} = \frac{m v^2}{r}$$

e = ELECTRON CHARGE
 m = MASS OF ELECTRON
 v = VELOCITY OF ELECTRON

THIS EQUATION IS USED TO DETERMINE THE VELOCITY OF ELECTRON, m



TRANSISTOR IS SOLID STATE DEVICE
PASSAGE OF ELECTRICAL CURRENT
IS DETERMINED BY BINDING FORCE
WHICH ACTS BETWEEN ELECTRON
AND POSITIVELY CHARGED NUCLEUS



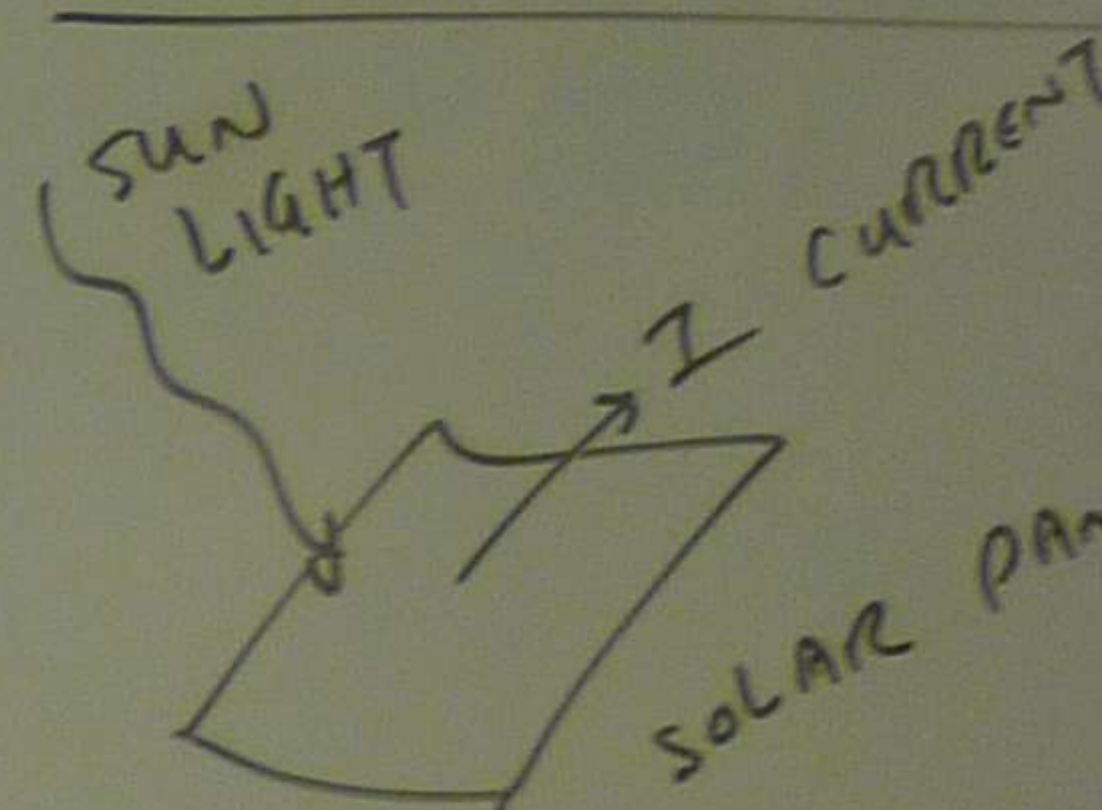
$$\frac{e^2}{4\pi\epsilon_0 r^2} = \frac{m v^2}{r}$$

e = ELECTRON CHARGE
 m = MASS OF ELECTRON
 v = VELOCITY OF ELECTRON

r = RADIUS ORBIT
 ϵ_0 = PERMITIVITY
 $\pi = 3.1416$

THIS EQUATION DESCRIBES THE CHARGE
OF ELECTRON, MASS, VELOCITY.

BOHR'S THEORY OF



ALL ENERGY IS
THE FORM OF
QUANTUM

ENERGY IN EACH
QUANTUM

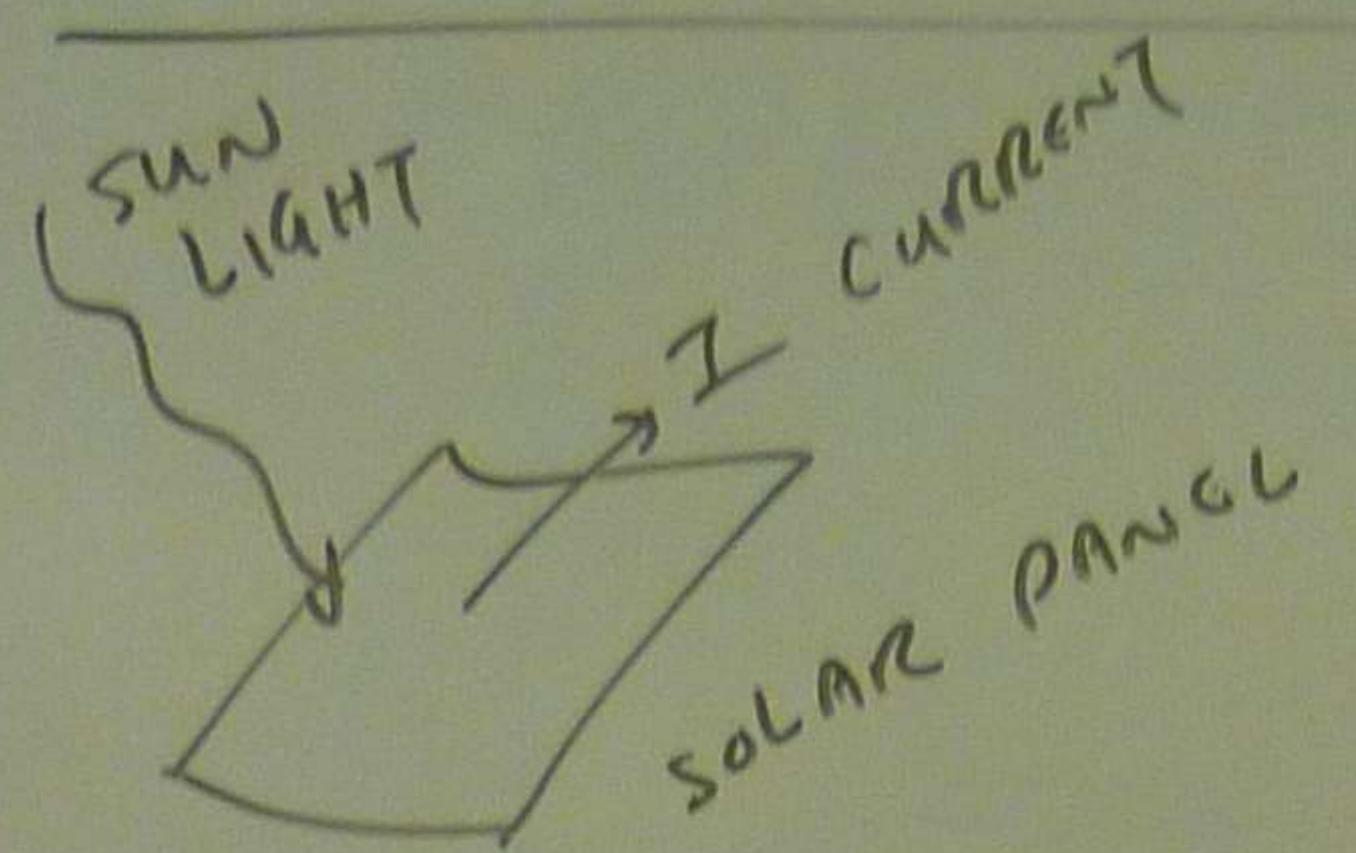
②
POTENTIAL BARRIER
REDUCTION OF POTENTIAL BARRIER BY FIELD EXCITATION
DUCTORS

$$\frac{m v^2}{r}$$

CHARGE ELECTRON OF ELECTRON
 $r = \text{RADIUS ORBIT}$
 $\epsilon_0 = \text{PERMITIVITY}$
 $\pi = 3.1416$

DESCRIBES THE CHARGE
 MASS, VELOCITY.

BOHR'S THEORY OF HYDROGEN ATOM



ALL ENERGY IS EMITTED AND ABSORBED IN THE FORM OF MULTIPLES OF UNIT IS CALLED QUANTUM

ENERGY IN EACH QUANTUM

$$E = h \nu$$

$h = \text{PLANK CONSTANT } 6.62 \times 10^{-34} \text{ J-sec}$

$\nu = \text{FREQUENCY OF RADIATION (Hz)}$

IONIZED EN
 IT IS
 MOVING

CHG
 BI
 +
 2H2 -

IONIZED ENERGY $E = E_c - E_v = h \nu$

IT IS PHOTON RADIATION \rightarrow ABSORBED ELECTRO-MAGNETIC ENERGY

MOVING ELECTRON POSSESSES KINETIC ENERGY AND POTENTIAL ENERGY

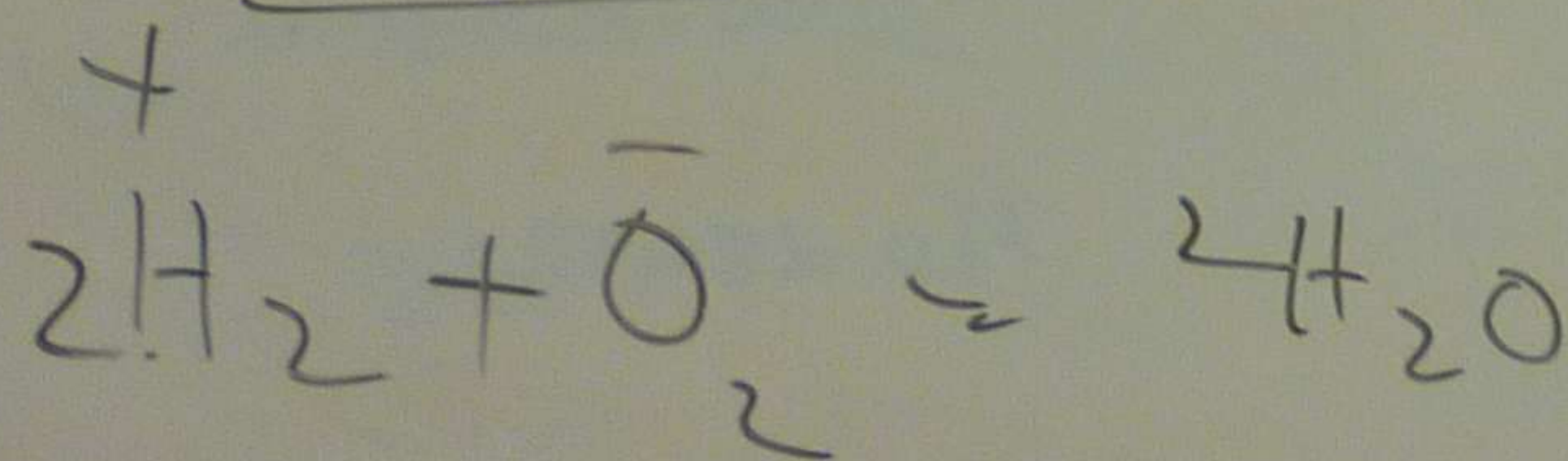
$$KE = \frac{1}{2} m v^2 = \frac{e^2}{8 \pi \epsilon_0 r}$$

$$PE = -\frac{e^2}{4 \pi \epsilon_0 r}$$

$$E_m = \text{MOVING ELECTRON ENERGY} = KE + PE = \frac{e^2}{8 \pi \epsilon_0 r} - \frac{e^2}{4 \pi \epsilon_0 r}$$

CHEMICAL BALANCE VALANCE AND ATOMIC BINDING

$$= -\frac{e^2}{8 \pi \epsilon_0 r}$$



POSITIVE VALANCE AND NEGATIVE COMBINES \rightarrow COMBINATION

APPROACHES THE CHEMICAL STABILITY.

INSULA.

$$6.62 \times 10^{-34} \text{ J-sec}$$

RADIATION (Hz)

ELECT
THE ENER
THE

Q32

Q33

Q34

Q35

Q37

ELECTRO-MAGNETIC

AND POTENTIAL
ENERGY

$$\frac{2}{\epsilon_0 r} - \frac{e^2}{4\pi\epsilon_0 r}$$

$$- \frac{e^2}{8\pi\epsilon_0 r}$$

ANCE AND NEGATIVE

→ COMBINATION

APPROACHES THE

CHEMICAL STABILITY.

INSULATOR

ELECTRON ENERGY LEVELS

THE ENERGY LEVELS OF INNER SHELL ARE HIGHER THAN
THE OUT SHELLS.

TUTORIAL

Q32

DESCRIBE TRANSISTOR

Q33

DESCRIBE BOHR'S THEORY OF HYDROGEN ATOM

Q34

WRITE THE EQUATION FOR PHOTON RADIATION

Q35

HOW DOES CHEMICAL STABILITY ACHIEVE?

Q37

EXPLAIN CHEMICAL AND ATOMIC STRUCTURE
OF INSULATOR AND CONDUCTOR.

activity

Q32

TRANSISTOR IS SOLID STATE DEVICE. PASSAGE OF CURRENT IS DETERMINED BY THE BINDING FORCE WHICH ACTS BETWEEN ELECTRON AND POSITIVELY CHARGED ATOM NUCLEUS.

Q33

BOHR'S THEORY

ALL ENERGY IS EMITTED AND ABSORBED IN THE FORM OF MULTIPLES OF UNIT CALLED QUANTUM.

ENERGY IN EACH QUANTUM $E = h \nu$

ν = FREQUENCY OF RADIATION

h = PLANCK CONSTANT

$$6.62 \times 10^{-34} \text{ J/s}$$

CURRENT IS
~ ELECTRON

HE FORM OF

FREQUENCY OF
RADIATION

PLANCK CONSTANT

$$6.62 \times 10^{-34} \text{ J/s}$$

Q34

PHOTON RADIATION ACTS

IONIZED ENERGY = ENERGY DIFFERENCE

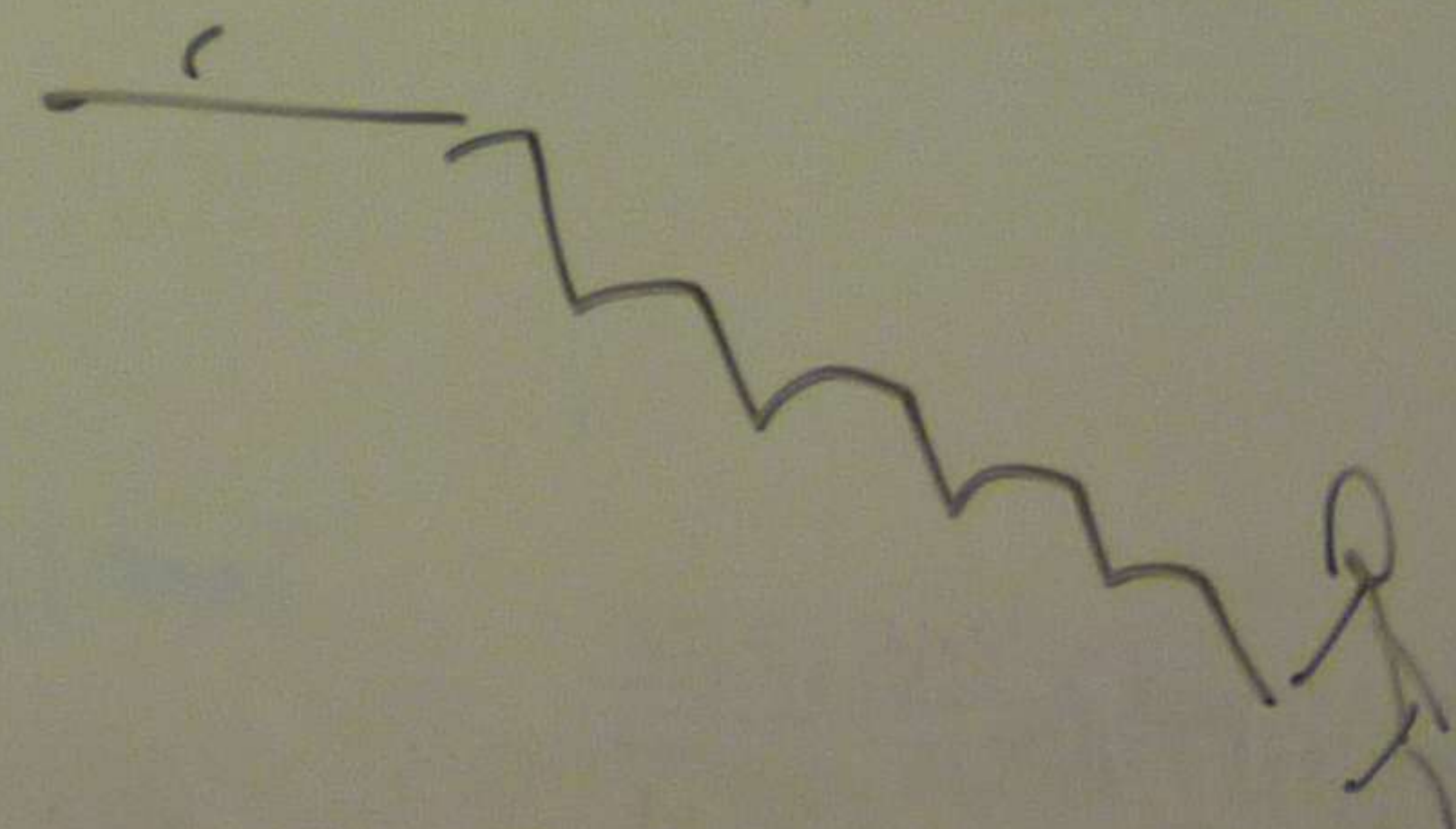
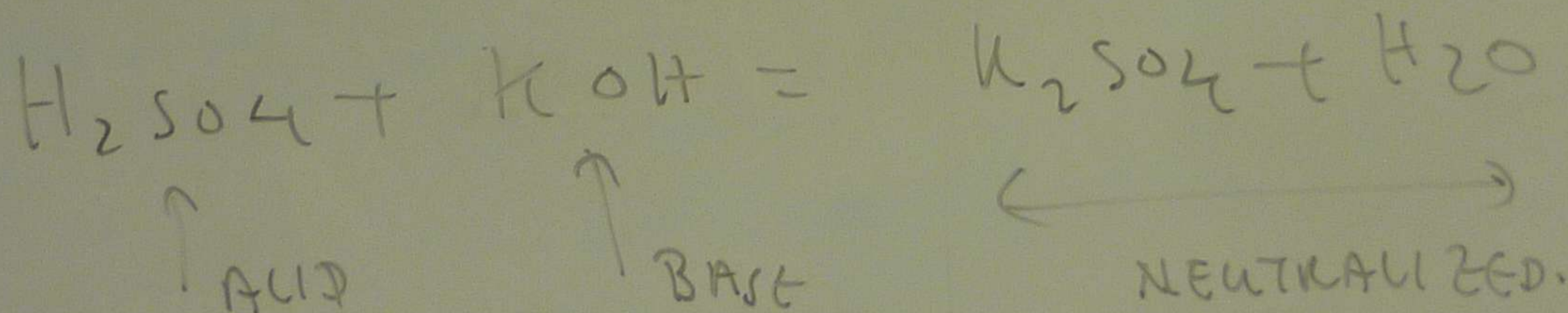
BETWEEN $n=1$ AND $n=\infty$

$$E = E_{\infty} - E_1 = \frac{m e^4}{8 h^2 E_0^2}$$

Q35

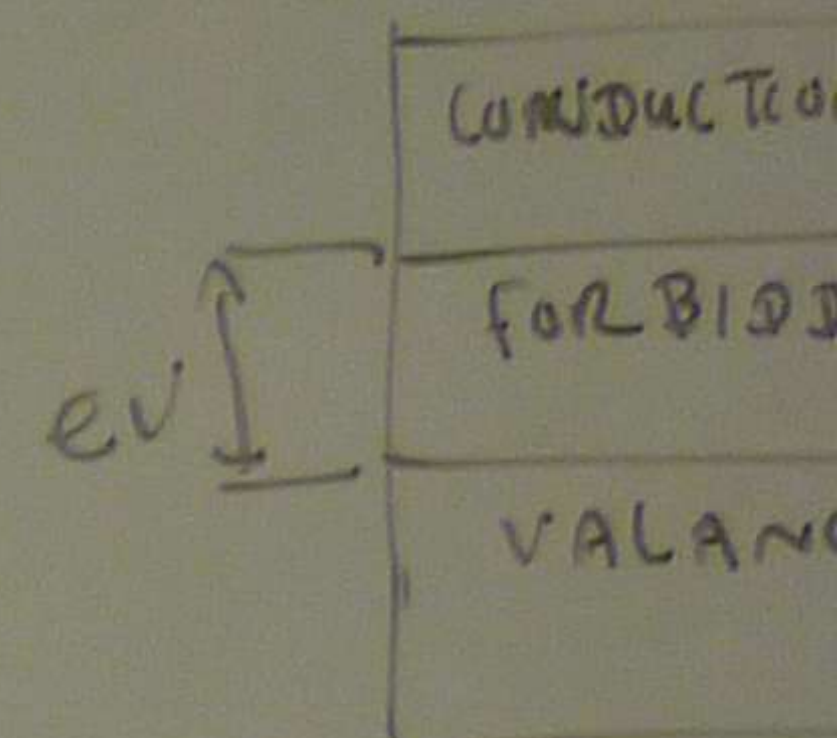
CHEMICAL STABILITY

WHEN POSITIVE CHARGES AND NEGATIVE CHARGES COMBINE, THE
COMBINATIONS APPROACHES CHEMICAL STABILITY.



Q37

INSULATOR



AT ROOM
IS EMPTY

- THERE IS
CAN GAIN
FORBIDDEN

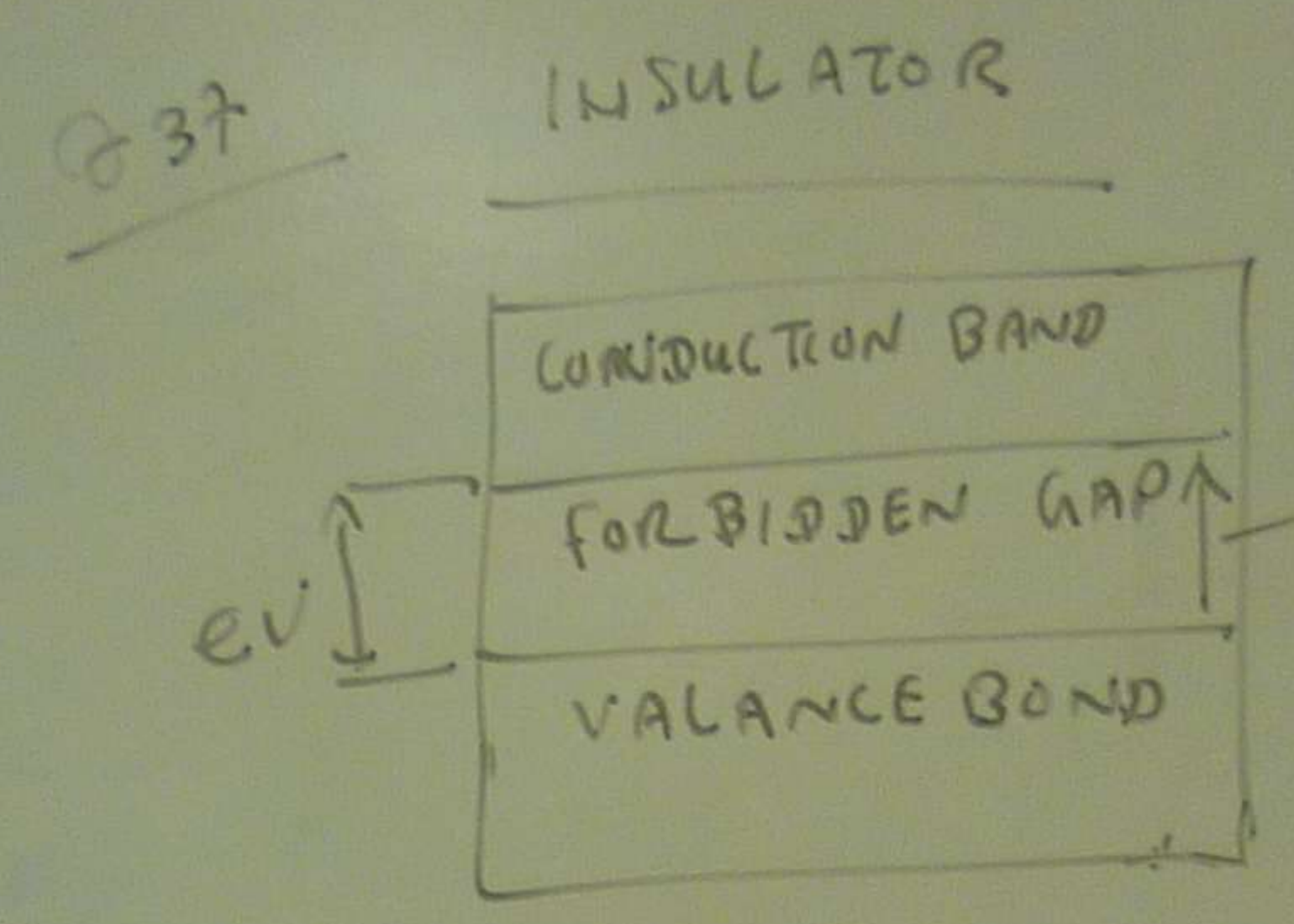
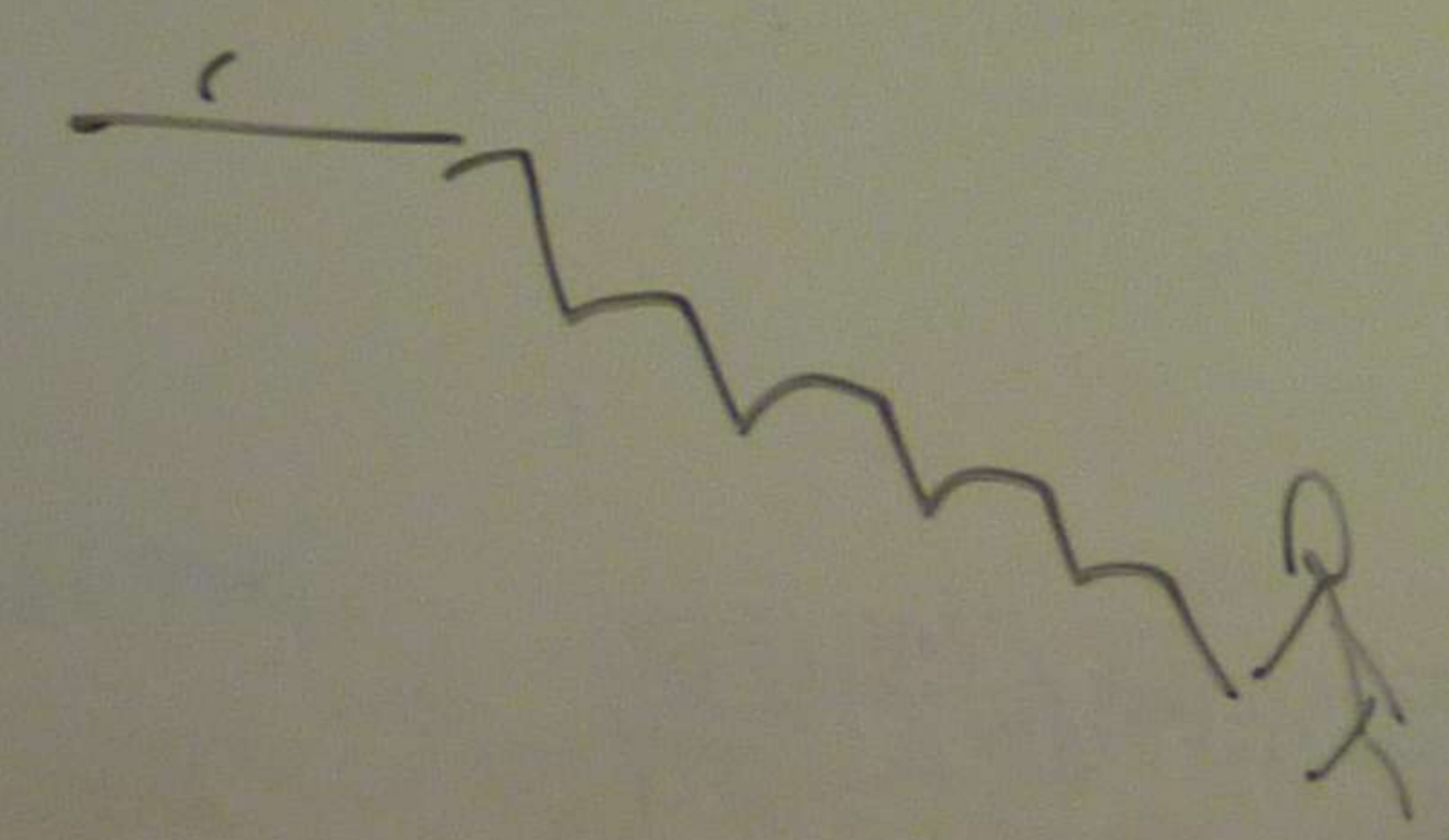
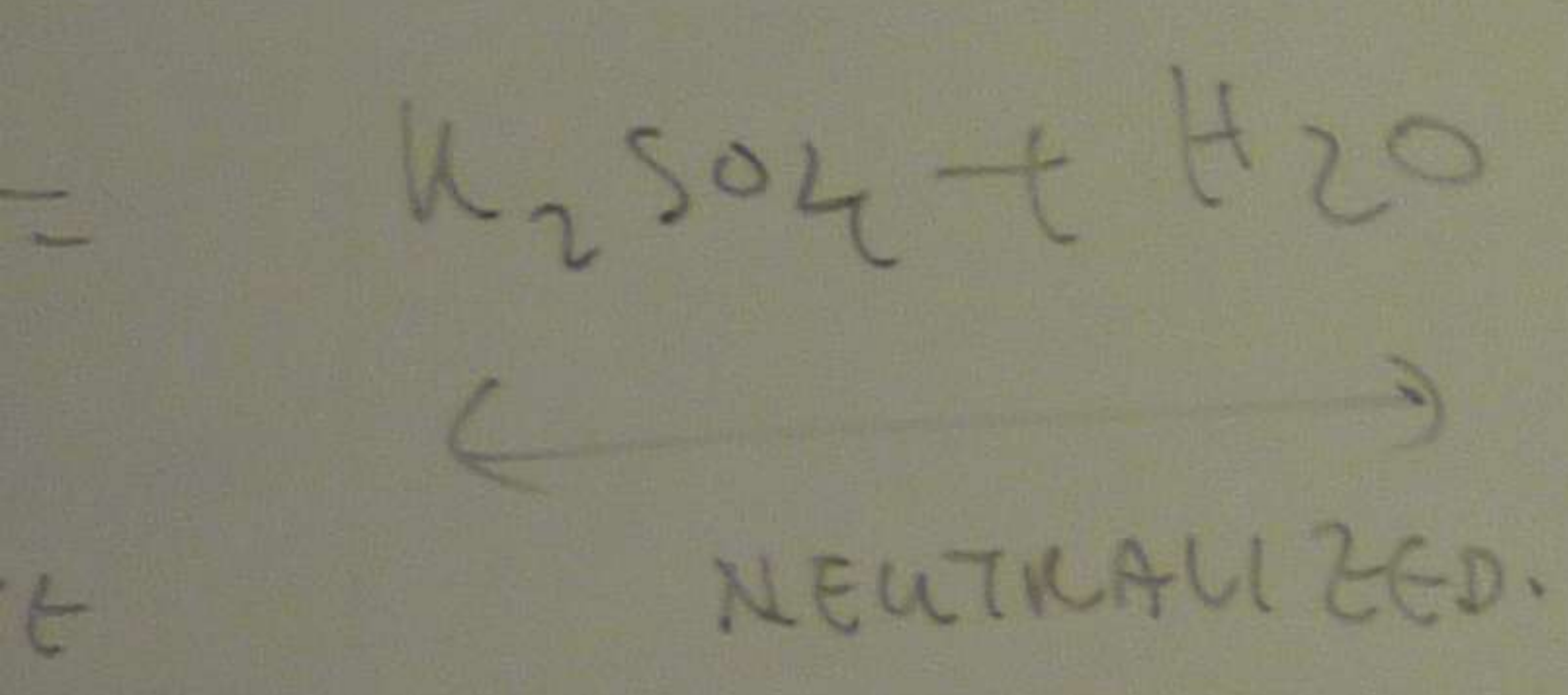
CONDUCTOR

- OUTER
TO PART

WHEN ELECTRON
ENERGY, IT
CURRENT

DIFFERENCE
 $n=1$ AND $n=\infty$
 $E_{\infty} - E_1 = \frac{m e^4}{8 h^2 E_0^2}$

AND NEGATIVE CHARGES COMBINE, THE
 CHEMICAL STABILITY.



ELECTRON MOVING
 FROM VALANCE TO
 CONDUCTION BAND

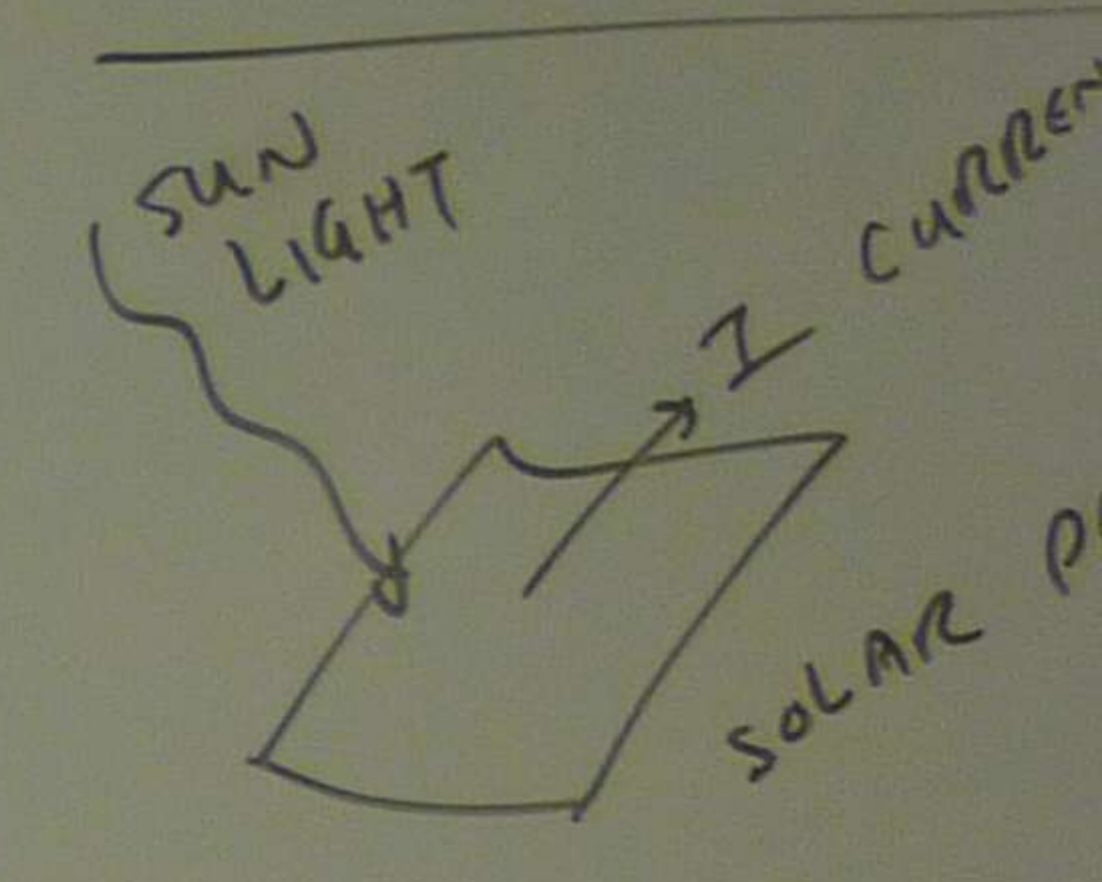
AT ROOM TEMPERATURE, CONDUCTION BAND
 IS EMPTY. FORBIDDEN GAP $> 1 eV$

- THERE IS NO ELECTRON IN MATERIAL WHICH
 CAN GAIN ENOUGH ENERGY TO CROSS THE
 FORBIDDEN GAP

CONDUCTOR
 - OUTER ELECTRONS ARE LOOSELY BOUND
 TO PARENT NUCLEUS

WHEN ELECTRON GAINS THE SMALL AMOUNT OF
 ENERGY, IT CAN MOVE AND ELECTRIC
 CURRENT FLOWS.

BOHR'S THEORY OF



ALL ENERGY
 THE FORM OF
 QUANTUM

ENERGY IN EACH
 QUANTUM