USED LUMINAIRES

USAGE OF ENERGY.

HOURS IN PUBLIC

T REDUCED BY

IC SWITCHING

UE SWITCH

LE TIME

Q46

A GERMASIUM CRYSTAL SPECIMEN 1mm HAS A TOTAL OF 2.5×10^{7} ELECTRONS IN IT'S CONDUCTION BOND, WHAT ELECTRON CURRENT FLOWS WHEN THERE IS A FIELD OF $6\ V\ cm^{-1}$ PARALLEL TO ONE FACE OF CUBE?

$$v = \mu E$$

$\mu = 3400$

$E = 6\ V/cm$

$$v = 3400 \times 6 = 23400$$

J_{en} = ELECTRON CURRENT = $n e \times v$

$= 2.5 \times 10^{7} \times 1.601 \times 10^{-19} \times 23400$

$= 9.36 \times 10^{-8}$ Amp/cm

n_e = NO. OF ELECTRONS IN CONDUCTION BAND

e = ELECTRON CHARGE 1.601×10^{-19}

Q47

DETERMINE

IN CONDUCT

OF FERM

F(E)

Q48 A

A HALL

AND RES

HALL E

DENSITY

R

R_H

HAS A TOTAL OF

WHAT ELECTRON

$6\ V\ cm^{-1}$ PARALLEL.

$= 3400$

$= 6\ V/cm$

n_e = NO. OF ELECTRONS IN CONDUCTION BAND

e = ELECTRON CHARGE 1.601×10^{-19}

Q47

DETERMINE THE AVERAGE ENERGY OF AN ELECTRON IN CONDUCTION BAND OF METAL AT 0 K AS FUNCTION OF FERMI LEVEL.

$$f(E) = \frac{1}{1 + e^{\frac{E - E_F}{273}}}$$

Q48

A SPECIMEN OF A SEMI CONDUCTOR HAS A HALL EFFECT COEFFICIENT OF $3.6 \times 10^{-4}\ m^3 c^{-1}$ AND RESISTIVITY OF $8.93 \times 10^{-7}\ \Omega$-cm. IN A HALL EFFECT EXPERIMENT, MAGNETIC FLUX DENSITY IS $0.5\ wb/m^2$, FIND HALL ANGLE.

R_H = HALL EFFECT COEFFICIENT $3.6 \times 10^{-4}\ m^3\ coulomb^{-1}$

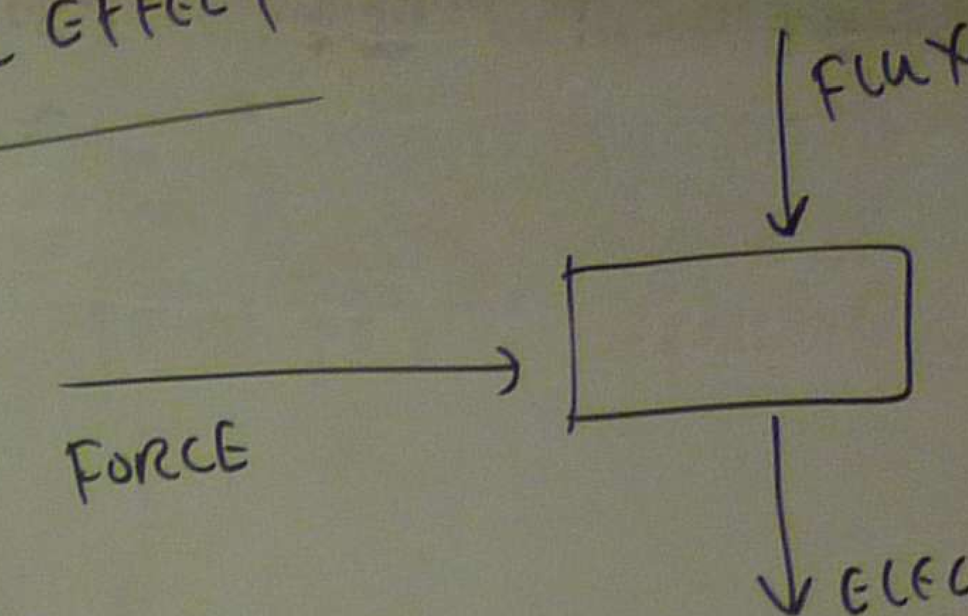
$$R_H = \frac{E_y}{B_x J_x} = -\frac{1}{e\, n_e}$$

E_y = Y AXIS FIELD DENSITY

J_x = CURRENT DENSITY (X-AXIS)

B_x = X-AXIS FLUX DENSITY

HALL EFFECT



MICROPHONE

FORCE - VOICE

MAGNETIC MATERIAL INSIDE

HALL AN

$B_x = 0.5$

$3.6 \times 10^{-4} = \frac{E_y}{0.5 \ldots}$

J_x = CURRENT DENSITY

E = VOLT

ρ = RESISTIVITY

L = LENGTH

A = C.S.A

BUT

$R = \frac{\rho L}{A}$

F AN ELECTRON

T AS FUNCTION

UCTOR HAS

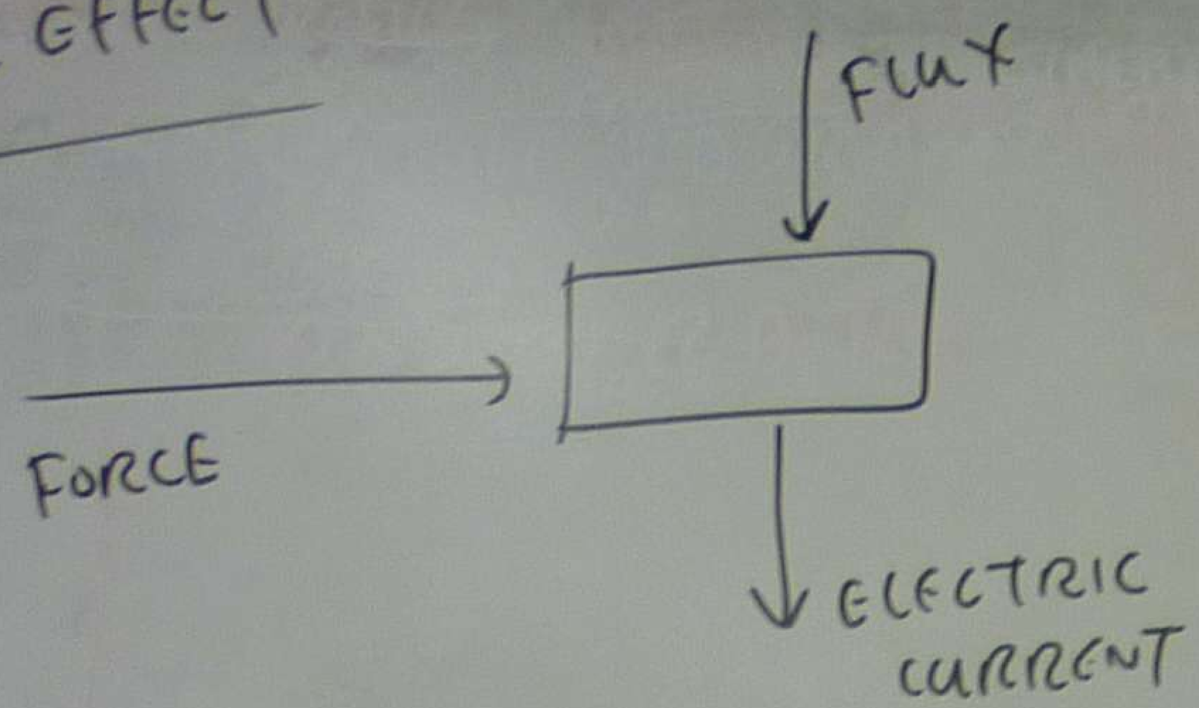
$.6 \times 10^{-4}\ m^3 C^{-1}$

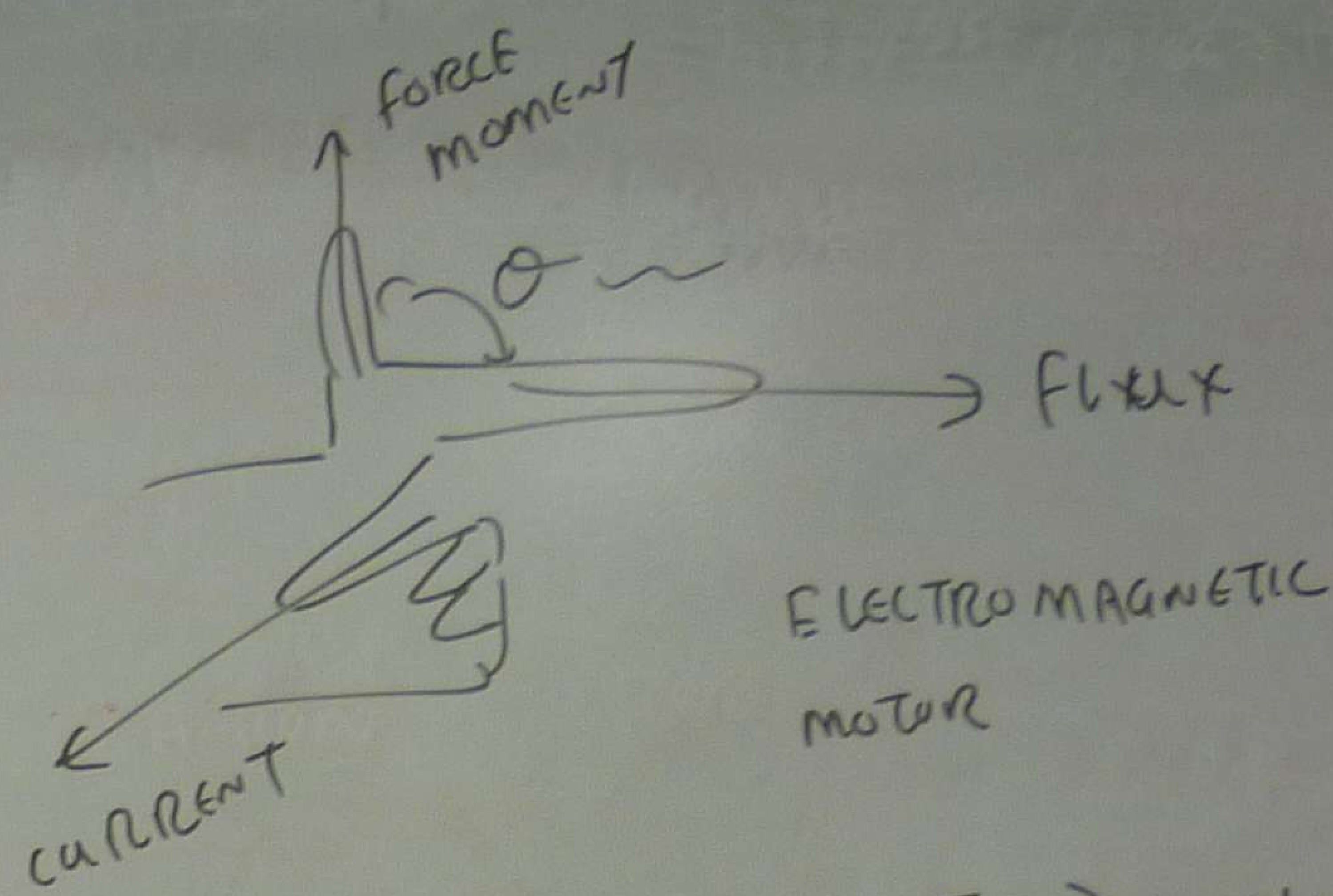
m. IN A

ETIC FLUX

ALL ANGLE.

HALL EFFECT





ELECTROMAGNETIC MOTOR

MICROPHONE

FORCE – VOICE

MAGNETIC MATERIAL INSIDE $\Longrightarrow$ MODULATED SIGNAL CURRENT $\Longrightarrow$ AMPLIFIER $\Longrightarrow$ DRIVER

HALL ANGLE – ANGLE BETWEEN FORCE & FLUX

$3.6 \times 10^{-4}\ m^3$ coulomb^{-1}

E_y = Y AXIS FIELD DENSITY

J_x = CURRENT DENSITY (X-AXIS)

B_x = X-AXIS FLUX DENSITY

$B_x = 0.5$

$$3.6 \times 10^{-4} = \frac{E_y}{0.5 \times J_x} \quad \text{— (1)}$$

$$J_x = \text{CURRENT DENSITY} = \frac{\text{CURRENT}}{\text{AREA}} = \frac{I}{A}$$

E = VOLT

ρ = RESISTIVITY

L = LENGTH

A = C.S.A

$$= \frac{E/R}{A} = \frac{E}{RA}$$

BUT

$$R = \frac{\rho L}{A} \qquad = \frac{E}{\frac{\rho L}{A} \times A}$$

$$J = \frac{E_x}{\rho L} \quad \text{— (2)}$$

x-AXIS ELECTRICAL VOLTAGE

(2) → (1)

$$3.6 \times 10^{-4} = \frac{E_y}{0.5 \times \frac{E_x}{\rho L}}$$

$$3.6 \times 10^{-4} = \frac{E_y}{E_x} \times \frac{\rho L}{0.5}$$

$l = 1cm$

$$\frac{E_y}{E_x} = \frac{0.5 \times 3.6 \times 10^{-4}}{\rho L}$$

$$\tan\theta = \frac{0.5 \times 3.6 \times 10^{-4}}{8.93 \times 10^{-3} \times 1} =$$

$$\theta = 1.1$$

RES

SOLID, LIQUID, GASES

SOLID

- RIGID STRUCTURE
- RESISTANCE TO CHANGE OF SHAPE / VOLUME
- DOES NOT FLOW LIKE AS LIQUID
- DOES NOT FILL THE CONTAINER LIKE AS GAS.

LIQUID / GAS — LOOSE STRUCTURE

Q1 DEFINE SOLID

SOLID IS CHARACTERIZED BY STRUCTURAL RIGIDITY AND RESISTANCE TO CHANGE OF SHAPE (OR) VOLUME.

SOLID

SOLID MOLECULE STRUCTURE

Q2 EXPLAIN THE BOUN

OF SOLIDS.

SCHE

OF A

AND

LAT

CH

...UID, GASES

...RE

...HANGE OF SHAPE / VOLUME

...OW LIKE AS LIQUID

... THE CONTAINER LIKE AS GAS.

— LOOSE STRUCTURE

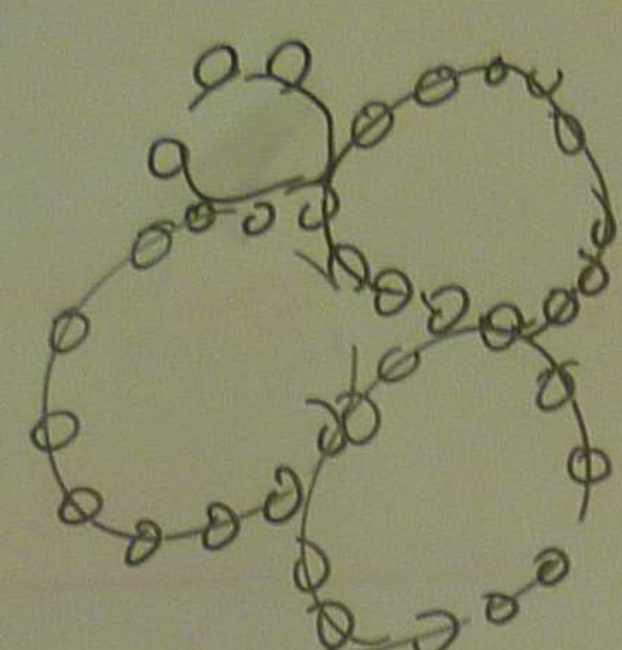
...E SOLID

...ARACTERIZED BY STRUCTURAL

...ND RESISTANCE TO CHANGE

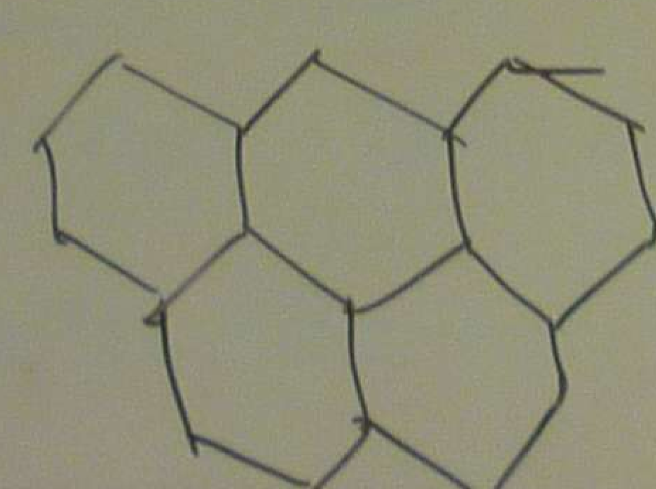
(OR) VOLUME.

SOLID



SOLID MOLECULE STRUCTURE.

Q2 EXPLAIN THE BOUNDARY OF SOLIDS.



SCHEMATIC REPRESENTATION OF A RANDOM-NETWORK AND ORDERED CRYSTALLINE LATTICE OF IDENTICAL CHEMICAL COMPOSITION

SOLID → METALLIC

SOLID → NON METALLIC

Q3 EXPLAIN THE CHARACTE... METAL

METALS TYPICALLY ARE DENSE AND GOOD CONDUCTO... ELECTRICITY AND HEAT.

BONDING IN SOLIDS

METAL — IONIC BOND ...

SILICON — COVALENT BO...

ORGANIC COMPOUND — VAN... BON...

CHARGE

POLAR... ELEC...

...TURE.

BOUNDARY

...CHEMATIC REPRESENTATION
...F A RANDOM-NETWORK
...AND ORDERED CRYSTALLINE
LATTICE OF IDENTICAL
CHEMICAL COMPOSITION

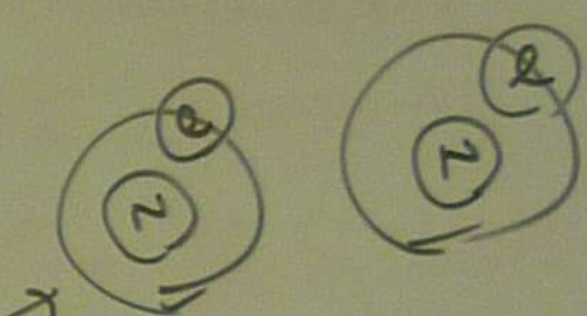
SOLID → METALLIC
SOLID → NON METALLIC

Q3 EXPLAIN THE CHARACTERISTICS OF METAL

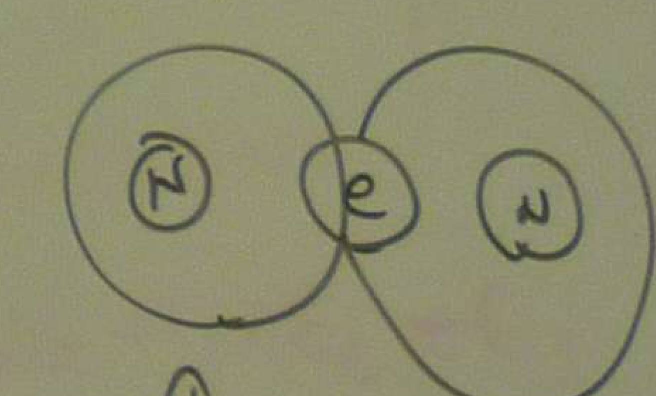
METALS TYPICALLY ARE STRONG, DENSE AND GOOD CONDUCTORS OF BOTH ELECTRICITY AND HEAT.

BONDING IN SOLIDS

METAL — IONIC BOND — ELECTRONS ARE SHARED IN METALLIC BONDING



SILICON — COVALENT BOND — ATOMS SHARE ELECTRONS.

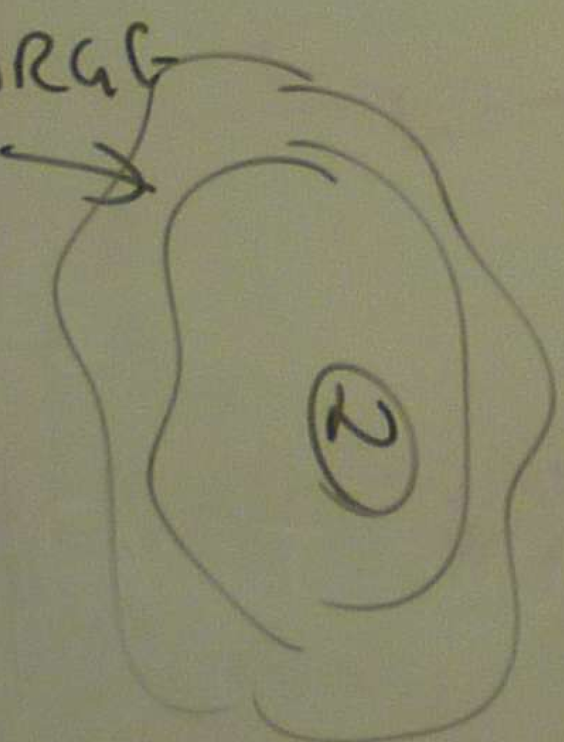


ATOM (1)   ATOM (2)

ORGANIC COMPOUND — VAN DER WAAL BOND

POLARIZATION OF ELECTRIC CHARGE CLOUD

CHARGE



Q4 WHAT IS M...

IN METALS, THE E...
IN METALLIC BO...
METALIC SOLIDS ...
BY A HIGH DENS...
DELOCALIZED ELE...
METALLIC BONDING...
ARE SPREAD OVE...
IN METAL, ATOM...
OUTER MOST ELE...
THE FREE ELECTR...
TOGETHER FIR...
INTERACTION
& ELECTRON ...

Q4 WHAT IS METALLIC BONDING?

IN METALS, THE ELECTRONS ARE SHARED IN METALLIC BONDING.

METALIC SOLIDS ARE HELD TOGETHER BY A HIGH DENSITY OF SHARED, DELOCALIZED ELECTRONS, KNOWN AS METALLIC BONDING. THE FREE ELECTRONS ARE SPREAD OVER THE ENTIRE SOLID IN METAL, ATOMS READILY LOSE THEIR OUTERMOST ELECTRONS.

THE FREE ELECTRONS ARE HELD TOGETHER FIRMLY BY ELECTROSTATIC INTERACTION BETWEEN THE IONS & ELECTRON CLOUDS.

LIQUID

Q6 DEFINE LIQUID

LIQUID IS THE ONLY STATE WITH A DEFINITE VOLUME BUT NO FIXED SHAPE.

A LIQUID IS MADE UP OF TINY VIBRATING PARTICLES OF MATTER, SUCH AS ATOMS AND MOLECULES HELD TOGETHER BY INTRAMOLECULAR BONDS.

Q7 HOW DOES LIQUID PARTICLES BOUND?

LIQUID MOLECULES ARE HELD TOGETHER BY INTRA MOLECULAR BONDS.

LIQUID VOLUME DEPENDS ON PRESSURE AND TEMPERATURE

$$\frac{PV}{T} = \text{CONSTANT}$$

P = PRESSURE
V = VOLUME
T = TEMPERATURE

PRESSUR

P =

P = PRES
ρ = DEN
g = GR
h = DE

Q8

(a)

(a) U

LIQUID

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$$\frac{PV}{T} = \text{CONSTANT}$$

P = PRESSURE
V = VOLUME
T = TEMPERATURE

PRESSURE AND BUOYANCY

$$P = \rho g h$$

P = PRESSURE
ρ = DENSITY
g = GRAVITY
h = DEPTH OF LIQUID

Q8 DESCRIBE THE FOLLOWINGS

(a) VOLUME (b) PRESSURE & BUOYANCY.

(a) VOLUME OF A QUANTITY OF LIQUID IS FIXED BY PRESSURE AND TEMPERATURE. QUANTITIES OF LIQUIDS ARE COMMONLY MEASURED IN UNITS OF VOLUME.

(b) IN A

PRESSU

AS WE

IT SO

IN A

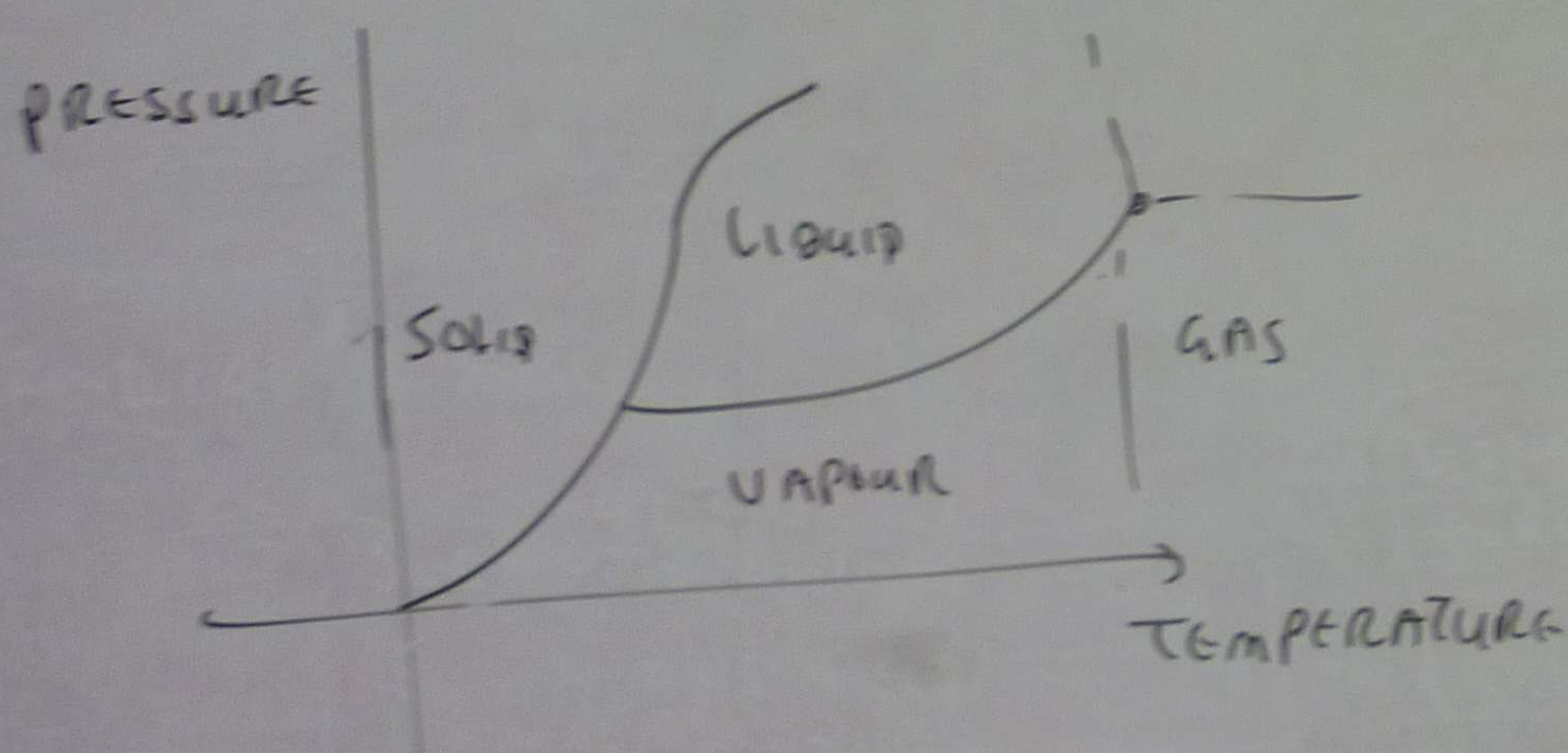
OBJEC

SUBJ

PRESSU

(b) IN A GRAVITATIONAL FIELD, LIQUIDS EXERTS PRESSURE ON THE SIDES OF A CONTAINERS AS WELL AS ON ANYTHING WITHIN THE LIQUID IT SELF. THIS PRESSURE IS TRANSMITTED IN ALL DIRECTION AND INCREASES WITH DEPTH.

OBJECTS IMMERSED IN LIQUIDS ARE SUBJECT TO PHENOMENON OF BUOYANCY



Q10 WHAT IS GAS?

A PURE GAS MAY BE MADE UP OF INDIVIDUAL ATOMS, ELEMENTAL MOLECULES MADE FROM ONE TYPE OF ATOM OR COMPOUND MOLECULES MADE FROM VARIETY OF ATOMS

O_2 , WATER VAPOUR H_2O

Q11 WHAT ARE THE PROPERTIES OF GAS.

GAS PARTICLES ARE WIDELY SEPARATED FROM ONE ANOTHER AND HAVE WEAKER INTERMOLECULAR BONDS THAN LIQUID AND SOLID.

GAS CHARACTERISTICS ARE PRESSURE, TEMPERATURE VOLUME AND NUMBER OF PARTICLES.

SPECIFIC VOLUME = INTENSIVE PROPERTY

$$\text{DENSITY} = \frac{\text{MASS}}{\text{VOLUME}}$$