Toppersnotes
Unleash the topper in you

NEET - MDS

MASTERS OF DENTAL SURGERY

BY NBE

NATIONAL ELIGIBILITY CUM ENTRANCE TEST

Volume – 5

Dental Materials, Oral Pathology, Oral Radiology & Medicine, Pedodontics

SIERRA INNOVATIONS

CONTENT

DENTAL MATERIAL

ORAL PATHOLOGY

ORAL RADIOLOGY & MEDICINE

PEDODONTICS AND PREVENTIVE DENTISTRY

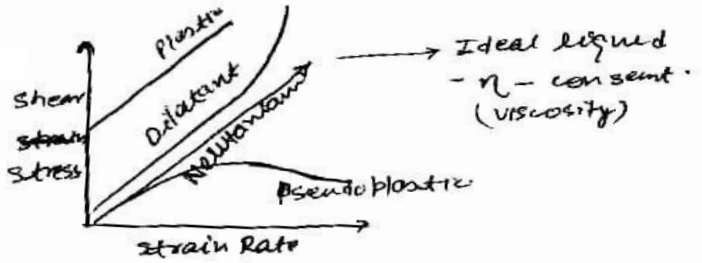
Dental Material

Physical a Mechanical Properties :-

Rheology :- - Study of deformation/flow of matter.

- Viscocity → the resistance of material to flow.

e.g cement
Restoration.



1) **Newtonian liquid :-** Ideal liquid
- Viscosity constant.
- Shear stress α Strain Rate.

2) **Pseudoplastic :-** Force ↑ → Viscosity ↓ → consent. (thin)

3) **Dilatent :-** Force ↑ → η ↑ (thicker)

4) **Plastic :-** - Initial viscosity ↓ve.
- Certain amount of stress then flowing.

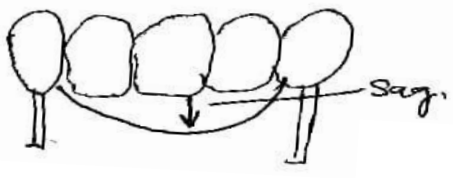
Thicsotropic :- - force ↑ → η ↓
- Time depended
- Repated application of pressure.

ex pop
- prophylaxis past.

Creep, Flow, Sag :-

Creep :- Time depended plastic Strain under static load.

Sag :- seen in long span FPD. occur porcelen firing temp.
- occur because of prosthesis own weight.



Flow :- It is use to denote. rheology of a amorphous material. ex wax.

colore :- visible range 400-700 nm
<400 → UV
>700 → IR,
cells responses → cone → 500 nm (green)

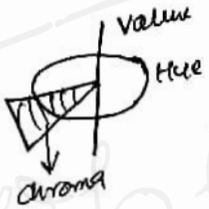
Hue, value, chroma :-

Hue :- Dominate colour of in object.

Value :- Relative brightness.

Chroma :- Degree of saturation (intensity)

munsell colour chart :- Go around periphery → Got hue.



Go vertical ↓↑ → Got value.

Go centre → periphery → Got chroma

—munsell colour system describe ~~to~~ co quantitively

- LAB Chart.
  L – Value
  A – Red green axise.
  B – blue yellow axises.

Bezold Brucke effect :- Brightness changes the colour of object appears to changes.

Metamerism :- When sources changes ⟶ colour changes.

Fluorence :- Object absorbed near UV light 300-400 nm when source has been remove it emitt back light back 400-450 nm

Thermal Properties :-

Thermal conductivity :- Denote. "How well heat is transmitted

Unit → Watt/mtK — measured at steady Rate.

Higest — pure gold → 297 $W m^{-1} k^{-1}$

amalgam → 226 "

min. GIC — 0.51 – 0.72 $W m^{-1} k^{-1}$

Thermal Diffusivity :- the Rate at which object attain equilibrium.

$$\sqrt{T.d} \propto \frac{1}{\text{thermal insulation}}$$

- measured at dynamic rate.
- unit $cm^2 s^{-1}$

Coefficient of thermal expansion :- $\frac{DL}{L}$ (change in length) when Temp ↑ 1°c.

- Higest α = 400. (Dmlay wax)
- min. α = 6-6 (Aluminous porcelin)

$$\frac{\alpha \text{ metal}}{\alpha \text{ tooth surface}} = 1$$ Ideal condition.

Tarnish & corrosion :- (Electrochemical Properties) :-

corrosion :- It is electrochemical phenomenon in which the metonal attack by some external agent resulting into complet/ Partial dissolution of metal.

Tarnish :- It is surface discolouration - It does not complete/ partial dissolution of metal

- It is manly Became of Oxides, Sulphides, Chlorides.

Types of corrosion

Dry
- electrolytes Present
- Chemical corrosion
- Metallic
- Non metallic

Occur Due → Chemically reacts each other

Wet
- electrolytes Absent

Occur Due → Dissimilar metal, Heterogenous composition, Conc. cell Corrosion, Stress corrosion

(i) Electrochemical cell :-

Anode - oxidation → more reactive - corrosion

Cathod → Reduction → Less reactive

Electrolytes → medium of ion

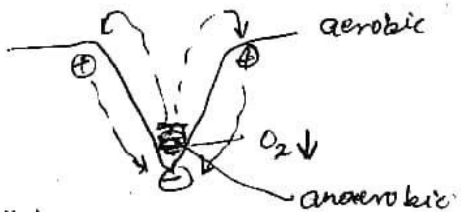
ion Anode to → cathod

ex. Dissimilar metal (Galvanic shock)

2) Heterogenous composition :- eg Eutectic alloys
- 2 or more alloys.
- Less noble alloy → corrosion

3) Stress conc :- some area deform.
↓
↑ internal energy
↓
corrosion.

4) Conc cell corrosion :- e/g pitting corrosion



- O_2 conc ↓

Mechanical Properties :-

Type

Elastic or Reversible deformation	Plastic or Irreversible Deformation	combination of elastic & plastic Deformation
- Proposnal limit	- % Elongation	- Toughness.
- Resilience.	- Hardness	- Yield Strength.
- Elastic modulus.		

Stress :- F/A

Strain :- $\frac{\Delta L}{L}$

Types of ~~Strain~~ stress

1) Compression ~~Strain~~ Stress.

2) Tensial

3) Shear

4) torsion

5) bending (flexural)

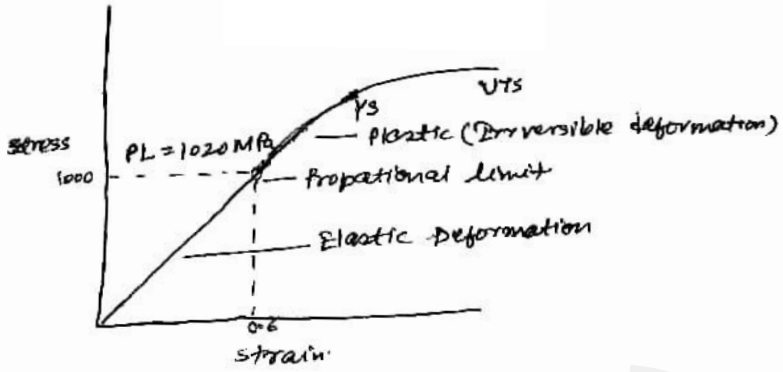
stress
↓
Body deform
↓
Reversible — k/a elastic strain — Elastic stress
Irreversible — k/a plastic strain — Plastic stress

Elastic Properties :- Measure Elastic & Plastic strain.

- Elastic modulus
- Dynamic modulus
- shear modulus.
- Flexibility
- Resilerans
- Possion Ration

Elastic modulous :- k/a young modulous / modulus of elasticity.

- Describe Relative Rigidity/stiffness of a material.
- Measure by slope of stress – strain graph but below propatronal limit.



- ↑ slope → ↑ elastic modulus → ↑ stiff / Rigid
- constant
- Idepended of ductility
- Not measure of strength
  - For a given stress → lower strain produce
    → ↑ Elastic modulous
  - E. modulus = $\frac{\text{Stress}}{\text{strain}}$ Stress value < Proporcnal limit (PL)

Dynamic young's modulus :- Elastic modulus can be measure by

- Static Tech.
- Dynamic Tech. → use velocity of sound
  - Density of material.

Shear modulus (G) = 38% E. modulus.

Flexibility :- small stress → Resultant deformation is ↑ (larger strain is produced)

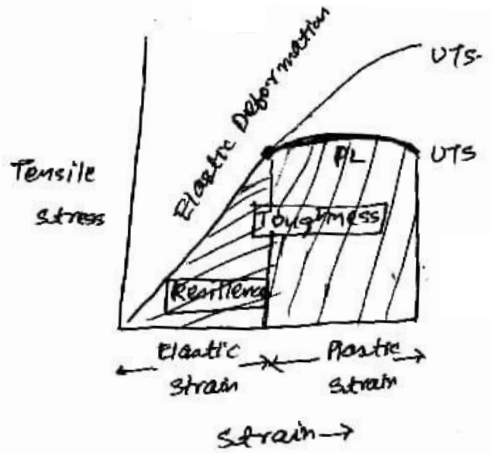
↓

Flexible

Readlience :- Interatomic spacing ↑ → Internal energy ↑

If stress < PL this energy called as resilience.

- The area under elastic region of stress – strain graf.
- Total area under stress strain graf = Toughness.



- Till stress < PL energy absorbed / area Vol.

- Poisson's Ration :-

$$V = -\frac{E_x \text{ (strain produce x-axise)}}{E_z \text{ (strain produce z-axise)}}$$

Strength :- Stress value < fratuare.
Produce certain amount of deformation

1) Propotional limit :- Stress value till which stress ∝ strain.
- stress above prop. limit → plastic deformation.
- stress < prop limit → elastic deformation.
- stress > prop limit → stress ∝ strain

2) Elastic limit :- It is max. stress which can be subjected to a body such that it returns to it's origin dimention.

3) Yield Strength :- where pro. limit can not be determinate aquiratly
- Stress value req to produce a particular amount of strain (-1%, 0.2%)
↓
(% offset)

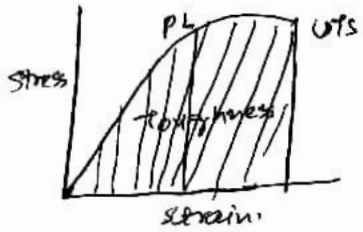
Diametric tensile strength :- for brittle material
e.g Brazilian test
↓
measure the strength
k/a Transeverse strength
- modulus of rapture

Flexular strength :-

Impact strength:- Energy require to fracture material under impact force.

It is charpy type. } Test.
Izod type.

Toughness:-



Fracture toughness:- for brittle material, Strength value are not applicable

- they can fracture ~~below~~ < ultimate strength value.
- because of fatigue failure.
- fracture toughness. (critical stress intensity)

↓

Stress.

Brittleness:- It is inability of material to resist plastic deformation before prature of material.

Ductility:- Test for Ductility

1) % Elongation. → m/c type.
2) cold bend test
3) Reduction area of tansil strength spacemen.

- Ductility measure grain elongation.

Hardness:- It is ability of material Resist Scratching / Indentation of a material.

Brinell test:- It is use for Metallic a Non Metallic
- It is related to pro. limit a ultimate Tensile strength (UTS) of An alloy.
- It uses a hardest steel ball.
- BHN = $\frac{\text{load}}{\text{projected area}}$

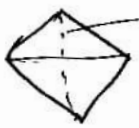
Rockwell test:- use conical diamond.
- use for Metallic a Non Metallic

both brinell a Rockwell test cannot use for brittle material.

Vickers test:- - 136° base pyramid.

$= \frac{\text{load}}{\text{area of indentation}}$

- use for Dental casting gold alloys.
- use for Tooth Structure, enamel, brittle material.

knoop Hardness test:- Diamond elf tooth
- Rhombic in outline.
-  Elastic recovery — shorter diagonal.
- It is independent of ductility.
- use for ductile material, Gold, Porcelain.

- knoop & Vickers test known as micro hardness test.
- Brinell test, Rockwell test — macrohardness test.
- share a ballod test → Rubbers, Plastic

Impression Materials

1) Classification

Impression Material

based on mechanical property

- Inelastic or Rigid
  - Impression plaster
  - ZnO : ZnO Eugenol
  - Impression compound
- Elastic
  - Hydrocolloid eg Agar alginat
  - Elastomers.

2) classification

based on setting rexn

- Reversible
  - ✓ Agar
  - - Impression compound.
- Irreversible. (chemical rexn)
  - - Alginate
  - - ZOE.
  - - Impression plaster
  - - Elastomers.

Elastomers :-

- synthetic polymeric.
- chemically cure

Type
- ✓ polysulphid
- ✓ Poly ethers.
- ✓ silicones — Addition silicons, Condensation

composition :-

1) Polysulphid :- a/a Mercaptan/Thiokol (-SH gp)

Base Post :-

- PS (Polysulphid) polymer
- plasticizer — Dimethyl phthalate
- Fillers → TiO_2 / Litophone.
- SB — accelators.

setting rexn — H_2O is a by product

- Catalyst - :- PbO_2 (cross linking agent) → broun colour.

- Plasticiser - Dibutyl phthalate. (DBE)
- Retarder → Oleic / Stearic acid.

2) Condensation silicones :- k/a conventinal silicon.

Composition :-

Base

α - ω Hydroxiyl Terminated pol Polydimethyl siloxane.

Catalist

- Tri-Tetra functional alkayl silicate.
- Stanus octoate - Octorate catalist.

Setting rexn :- Ethyle alcohol is a by product

↓

Reason for low dimentional stability.

3] Addition silicones :- k/a Polyvinyle siloxane.
Vinyl polysiloxane.

Composition :-

Base paste

- Poly methyl Hydrosiloxane (PMHS)
- ~~Di~~
~~Data~~

catalist

- Divinyle polysiloxane
- Platinum salt
- palladium → Scavenger

Setting rexn :- NO by Product

- Excellent Dimensional stability.

- Unreacted PMHS + moisture → H_2 gas.
- Silicones are Hydrophobic → Non ionic surfactant make it Hydrophilic
- ~~88~~ sulpher → inhibit setting rexn
  - use Nitrill gloves
- Not date x gloves are use.

4) **Polyether :-** **composition :-**

Base past :- - Polyether polymer

- Plastisizer – DBP
- Filler - Colloidal silica

catalist past :-

- alkyl aromatic sulphonates

- Polyether has aziridine rings.
- Polymerization take place via imine group.

Impression trays

- Stock tray
- custom tray.
  - Reduces material quantity.
  - reduce polymerization shrinkage
  - Uniform distribution of material
  - Critical for polysulphid / cond^{n} silicon
  - Not critical for AS/PC.

Tray adhesive :- P.S. → Butyl Rubber

- Styrene / acrylonitril.

  These are dissolved in solvent chloroform.
- when use silicones - Etyle silicate

Manipulation :-

Type

- Hand manipulation
- Static mixing.
- Dynamic Mechanical mixing

Removal of impression:- 10 min → setting tyme.

Polyether → Hard to remove

Polysulphid → more flexible (easy remove)

all Elastomeres → Viscoelastic material.

↳ remove quic snap. (No Rocking move.)

Stone cast a dies:- Casts

Silicones → Hydrophobic

Epoxyresin → Hydrophobic

Gypsm → voids

- Hydrophilic
- wetting agent / surfact

- Pe/PS → Hydrophilic

- Pe/AS → permit multiple cast pouring

Working time / Setting Type:- start of mixing → just before elastic properties develop.

(WT) (ST)

ST → start of mixing → sufficiently cured (set) to be removed without distoration.

- Filler ↑ → WT / ST ↓

- Temp ↑ → WT / ST ↓

↑ catalist/~~base~~ → WT/ST ↑ → base : catalist ratio fixed. if u change ↓ physical properties ↓

Rheological propieties:- - mouth - introduce as a viscous past.

- shear thinning

Elasticity & Viscocity :- under cates $^{+}$ → - Add. silicons (best)

- PS.

- Higest elastic recovery → AS (Addition Silicones)

- Higest deformation on removable → PS.

PS > CS > Pe > Ads

- maxwell - Voigtet

- use snape.

- Eaisest to Remove ⟶ Polyscelphid

- Should be used ⟶ As

Stiffness :-

Pe > As > Cs > Ps

↳ Less stiff

↳ most flexible.

Tear strength :-

T.S → As < Cs < Pe < Ps

Dimensional Stability :- Cs < PS < Pe < As.

Disinfection :-

Pe - chlorin compound.

- iodophores.

CS/AS/PS → chlorin compound

- iodophores

- Glutaraldehydes.

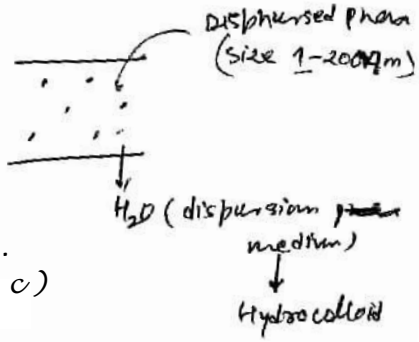
- Phenolic compound

Pe < 10 mint (emersion time)

↑ emersion As ⟶ ↓ Hydrophilic.

Biocompatibility:- - least cytotoxic → PS.
- most " → PE

Hydro colloid :- 4th state of matter.



Setting rexn:-
- asso. with formation of micelles. a brush heap structure.

Agar :-

Gelation Temp. (37° - 50° c)

Gel → Sol → Gel.

Setting rexn:- Liquidation Temp (72° - 100° c)

- gelation tem < oral cavity
↓
make cause impression

Component	function	composition (%)
Agar	Brush Heap structure	8-15%
Borate.	strength	0.2-0.5%
Potesium sulphates	Gypsum Hardner	~~0.5-1.0%~~ 1-2%
Filler (silica, clay)	control, strength, viscocity & Rigidity	0.5-1.0%
Thixotropic Material	-Thickner	0.3-0.5
Water	-Reaction Medium	7 80%

- more active ingradient → Agar
- max Quantity → Water
- Thymol & glycerin → bacteriocidal.