RAGAS DENTAL COLLEGE & HOPTITAL

2/102, East Coast Road, Uthandi, Chennai - 600 119.

(A Unit of Jaya Group of Institution)

FIRST B.D.S.

DENTAL MATERIALS PRACTICAL RECORD

NAME : Nafiya Sabreen. N.

Ragas Dental College & Hospital

2/102, East Coast Road, Uthandi, Chennai - 600 119.

EXAMINATION REGN. NO. 5419111551

DEPARTMENT OF DENTAL MATERIALS

Certified that this is the bonafide record of the work done

by Mr. / Miss ....NAFIYA SABREEN. N.....

of First B.D.S. class in this Dental Materials Laboratory

at Ragas Dental College, Chennai.

During the academic year 20 - 20

Signature of the Staff

Signature of the
Head of the Department

Submitted for the practical examination held in October / April 20

At Ragas Dental College, Chennai.

Date :

Examiners

GENERAL INSTRUCTIONS

1. Students must neatly dressed and wear their coats before entering the Laboratory.

2. Girls must have their hair braided and put inside the coat or have it tied-up to prevent mishap while working on Dental Motor.

3. Avoid wearing gold ornaments like rings and bengles when working with materials particularly with mercury.

4. Record books should be brought to the practical class without fail.

5. Necessary instruments should be brought to the practical class by every student.

6. Students should read the experimental procedure before coming to the practical class. perform the practicals carefully and record the observations.

7. Working piece and the insturments should be kept clean.

8. All instruments and equipments should be carefully handled. Any damage to the laboratory equipments must be reported to the staff incharge.

9. Materials should be used sparingly during practical work.

10. The lids of the bottles and tubes should be replaced immediately after dispensing the materials.

11. Burners should be closed, and motors put off when not needed.

12. At the end of every exercise, the signature of the staff member should be obtained.

13. Record books should be preserved and submitted to the head of the department at the end of the academic session as they carry internal Assessment marks.

14. All instruments can be procured through college Stores.

Sl No.	LIST OF INSTRUMENTS	Qty
1	BP Handle	1 No
2	Vulcanite Trimmer(Indian)	1 No
3	Carbide Burs for SNAP 701, 702, 703	1 Each
4	Acrylic Trimmers	1 No
5	Sandpaper Mandrii	1 No
6	Glass Slab	1 No
7	Cotton Holder	1 No
8	Chip Syringe with Nozzle	1 No
9	Glass Slide	1 No
10	Impression Trays (Reg)	4 Sets
11	Impression Trays (Reg)	4 Sets
12	Impression Trays (Reg)	4 Sets
13	Copying Pencil	1 No
14	Lacrons Carves(S)	1 No
15	Metal Scale	1 No
16	Bees and Paraffin Wax	1 Each
17	Blow Torch	1 No
18	Rubber Bowl S	1 No
19	Rubber Bowl L	1 No
20	Waxknife	1 No
21	Lacrons Carver	1 No
22	Wax Spatula	1 No
23	Plaster Spatula Straight	1 No
24	Plaster Spatula Curved	1 No
25	Cement Carrier	1 No
26	Bunsen Burner W/stopcock	1 No
27	Sprit Lamp	1 No
28	Flask No: 7	2 Nos
29	Handfile	3 Nos
30	Articulator Brown	1 No
31	Scissors Small Straight	1 No
32	Scissors Small Curved	1 No
33	Paint Brush	1 No
34	Glass Making Pencil	1 No
35	Metal Scale	1 No
36	Universal Plier	1 No
37	Glass Plate	1 No
38	Enamel Tray	1 No
39	Mackintosh Sheet 1 Metre	1 No
40	Hot Plate	1 No
41	Mouth Mirror With Handle	1 No
42	Straight Probe	1 No
43	Explorer/ Probe	1 No
44	Dental Tweezer	1 No
45	Plaster Knife	1 No

CONTENTS

Expt. No. 1 Date ..... Page No. 1

Gypsum Products

Introductions :

Gypsum was found in mine around the city of Paris. So, it is called as plaster of paris. Mineral gypsum $CaSO_4 . 2H_2O$ is usually white in colour and it is formed as compact mass of gypsum. It is also an individual product.

Manufacture :

The process of heating gypsum for manufacturing plaster is known as calcination. The mixed gypsum is grounded and heated to a temperature of 110°c – 130°c to drive off part of water by crystallization. It changes to $CaSO_4 \cdot \frac{1}{2} H_2O$ remaining water of crystallization, is removed and the product formed are hexagonal anhydrate and orthodontic hydrate.

$$CaSO_4 \cdot 2H_2O \xrightarrow{110 - 150^\circ c} CaSO_4 \cdot \frac{1}{2} H_2O \xrightarrow{130 - 200^\circ c}$$

Calcium Sulfate dihydrate — calcium Sulfate hemihydrate

$$CaSO_4 \xrightarrow{200 - 1000^\circ c}$$

Hexagonal anhydrite — Orthodontic anhydrite

Setting Reaction

When plaster is removed, mixed in water, it takes up one and half molecule of water and becomes $CaSO_4 \cdot 2H_2O$.

$CaSO_4 \cdot \frac{1}{2}H_2O + 3H_2O \rightarrow 2CaSO_4 \cdot 2H_2O$ + unreacted hemihydrate.

Hemihydrate dihydrate + heat

This reaction is a exothermic reaction is seen for all the gypsum Products.

Three theories have been proposed to explain setting reaction, they are :-

- Colloidal theory
- Hydration theory
- Dissolution precipitation theory.

Setting expansion

The setting expansion of gypsum product can be detected during the change from hemihydrate to dihydrate during setting the gypsum product show linear expansion.

The setting expansion is due to Crystallization mechanism, Here, the enlargement of the dihydrate crystal which interlock with each other and obstruct the growth of a adjacent crystal.

This process is repeated by thousand of crystal during growth, an expansion of entire

mass will occurs.

If the expansion is done underwater immersion it is called hygroscopic expansion of the setting if the expansion of is without immersion under water is called normal setting expansion.

Types of gypsum products:

Type I - Impression plaster
Type II - Dental plaster
Type III - Dental stone
Type IV - Die stone
Type V - Dental stone, high strength, high expansion.

Type I - Impression plaster.

Impression Plaster are Composed of plaster of paris, where modifiers are added to regulate the setting time and setting expansion

W/P ration - 0.50 to 0.75
Setting time - 4 ± 1 min

Uses :- It is restricted to final wash impression of complete denture.

Type II - Dental plaster.

It is a type II plaster

W/P ratio - 0.45 - 0.50
Setting time - 12 ± 4 mins.

Uses :- It is used to fill the flask during flasking procedure in denture Construction.

Type III - Dental Stone

Intended for Construction of cast in the fabrication of full denture that fits soft tissues Stone dies are reproduction of prepared teeth as the Compressive strength of 20.7 mpa but doesn't exceed 34.5 mpa.

W/P ratio - 0.28 - 0.30

Setting time - 12 ± 4 min

Use :- Dental Stone are preferred for cast and are used to process denture because the Stone has adequate strength for that purpose and the denture is easy to remove after.

Type IV - Die Stone.

This material has high Strength hardness abrasion resistance and minimum Setting Expansion.

It hard Surface and sharp instruments are necessary for a die Stone.

W/P ratio - 0.22 — 0.24

Setting time - 12 ± 4 min.

Use :

A hard surface is necessary for a die stone because cavity preparation is filled with wax and carried flush with margins of die. A sharp instrument is used. Stone must be resistant to abrasive.

Type IV - Dental stone, high strength, high expansion.

This material has higher Compressive strength. This is obtained by lowering w/p ratio.

w/p ratio = 0 - 18

Setting time = 12 ± 4 min

Use :

The rationale of increase in setting expansion limit is that certain newer alloys such as base metal, have greater casting shrinkage than the traditional noble metal alloys. So, high expansion is required for fabrication of die to aid in compensating for the alloy solidification shrinkage.

Expt. No. 2 Date ..... Page No. 6

Plaster of paris

Introduction

Model plaster is used to fill the flask in denture construction, it reproduces minute detail. while pouring the cast an impression. This is very hard and strong.

Composition

- $CaSO_4 . \frac{1}{2} H_2O$
- $CaSO_4 . 2 H_2O$
- Modifiers (accelerator & Retarder)
- Common accelerator is K_2SO_4.
- Retarder – Borax
- Surface active agent

Manufacturing of Plaster of Paris:

Gypsum is ground in a open container and heated at 110°c – 130°c by a process called dry calcination. fine crystals aggregate of fibre to form a B-type as B-hemihydrate forming an end formed product of needle like crystal.

$CaSO_4 . 2H_2O \xrightarrow[110°-130°c]{Heat} CaSO_4 . \frac{1}{2} H_2O$ (B hemihydrate)

Dihydrate B-Hemihydrate

Manipulation:

Instruments required: Flexible rubber bowl, Soft powder mixing Spatula, Proper w/p ratio is assumed.

Procedure :-

- Measure quantity of water is clean and dry rubber bowl is taken.
- pre-weighed quantity of powder is sprinkled into the bowl.
- It is allowed to settle upto 30 sec to avoid air entrapment
- Spatulation is done with a hard Spatula vigorously for 45-60 sec till smooth and Creamy mix is obtained.

w/p Ratio : 0.45 - 0.50
Working time : 3 min
Setting time : 12 ± 4 min

Properties :-

- It is ivory white natural Colours.
- Relatively weak as Compressive Strength - 9 mpa and tensile strength - 0.6 mpa
- low w/p ratio for high Strength.
- Dimensionally accurate and stable.
- Good colour Contrast.

Uses :- • Used for making diagnostic Cast and model
• For mounting Cast on articulator.

Dental stone

Introductions:

Also called as type III Gypsum Product used for manufacture of die of Prepared teeth for fabrication of Prosthesis and for Construction of full dentures.

- Casoy . ½ H_2O - Principle Constituent
- Surface active agent
- K_2SO_4 - accelerator
- Borax - retarder.

Gypsum is Calcinate under Steam pressure in a autoclave or a kettle at 120°C - 130°C for 5-7 hrs. The product obtained is much stronger and harder than β-hemihydrate called α - hemihydrate.

$CaSO_4 \cdot 2H_2O \xrightarrow[\text{Pressure}]{120°C - 130°C} CaSO_4 \cdot \frac{1}{2} H_2O$

α - hemihydrate

Crystals in the form of rods and prisms is seen microscopically.

Manipulation :-

This involves proportional mixing and of plaster gypsum product and water to get a smooth creamy mix of slurry.

Materials required

Porcelain flexible rubber bowl, Stiff spatula

w/p ratio : 0.28 - 0.30

Working time : 3 minutes

Setting time : 12 ± 4 min

Properties :-

- It is green or yellow in Colour.
- Comparatively smaller in size.
- Compressive strength - 20.7 mpa - 34.4 mpa
- Setting expansion - 0.16% - 0.30%
- Hardness - 20
- Easy to manipulate
- Cheap and economic
- Exothermic in nature
- Absorbs moisture when placed in tissue.

Uses :-

It is used to construct a cast for the fabrication of complete denture. It is used for construct study models and for preparing master cast and models

Impression Materials

Introduction:

Impression material are used to register or reproduce the form and relationship of teeth and oral tissue in a negative aspect.

The negative reproduction of tissue is called Impression.

Classification:

classified based on mode of setting and elasticity (or) plasticity of material.

	By Chemical / irreversible	By physical / reversible
Elastic	Alginate / Hydrocolloid Elastomeric material • Polysulfide • Condensation Silicone • Addition silicone • Polyether	Agar hydrocolloid
Rigid	Impression Plaster Zinc oxide eugenol	Impression Compound Impression wax

Impression Compound

Introduction

Impression Compound is one of the oldest of the impression materials.

ADA Specification number : 3. It is also called modelling plastic mainly used for making impression of edentulous ridges.

Classification :

Type I - Impression Compound
Type II - Tray Compound

Mode of Supply :-

Supplied as sheets, Sticks, Cakes and Cones in various Colours.

Composition :-

- Resin (30%) - Major ingredient
- Copal resin (30%) - Provides thermoplasticity.
- Carnauba (10%) - provides thermoplasticity.
- Acid (5%) - Plasticizer.
- Talc (25%) - Filler
- Colouring agent

Manipulation :-

The Compound is placed in hot water, bath for minute and it is taken out. It is manipulated by wet kneading method.

Materials Required :-
Hot water bath - impression Compound.
Two Method :- Dry heat and hot water bath

Dry heat - Small amount of Compound are obtained over a flame directly.

Hot water bath - The Compound is immersed in hot water bath of 65-70°C and above and softened into a soft dough kept on tray and impression is taken and set to harden, withdrawn from mouth.

Properties :
- The flowing temperature of the - impression Compound is 42.5°C.
- The Thermal Conductivities are very low.
- The Co-efficient of thermal expansion - 0.2%
- The dimensional stability of impression Compound is poor surface detail product is relatively less because of its high viscosity and low flow.
- It is non-toxic and non-irritant.
- Flow of flow is needed during impression making.

Advantages :-
- The Materials can be autoclaved for a number of times.
- It is cheap and Economic.

- The Accuracy can be improved by flaming the surface and moulding it with dual tissue.

Disadvantages :-

- Compress the soft tissue.
- Distortion due to less dimensional stability.
- Difficult to remove if there is severe undercut.

Uses :-

- To make an impression of complete edentulous
- It is used in border moulding technique for fabrication of complete denture.
- To make impression of individual teeth.

Zinc Oxide eugenol impression Paste

Introduction :-

Zinc Oxide eugenol is properly known as the impression material for making impression of edentulous arches for the Construction of Complete denture.

Classification :-

Type I - Hard
Type II - Soft

Available as :-

- Base plate - white colour.
- Accelerator plate - red colour.

Composition :-

Base plate :-

- Zinc Oxide - 37%
- Vegetable Oil - 13%

Accelerator paste :-

- Clove Oil (or) eugenol - 12%
- Green (or) polymerized resin - 13%
- Filler - 20%
- Resin balsam - 10%
- Calcium chloride of Colour - 5%

Setting Reaction :-

The Setting reaction is typical acid base reaction to form Chelate. The reaction is known as Chelation and product is Zinc Sulfate.

$$ZnO + H_2O \longrightarrow Zn(OH)_2$$

$$Zn(OH)_2 + 2HE \longrightarrow ZnE_2 + 2H_2O$$

Salt + water

(Zinc eugenolate)

Manipulation :

The mixing is done on a non-Sticky oil paper on glass slab. Two Scoops of paste of same length and width One from each Tubes are Squeezed into the mixing slab and a flexible Stainless steel Spatula are mixing until the uniform Colour is Obtained.

mixing time :- 1 minute

Setting time :-	Initial	Final
Type I	3-6 min	10 min
Type II	3-6 min	15 min

Properties :

Consistency and flow :- good flow and homogeneous Consistency

Type I - 30-50 min

Type II - 30-45 min

Compressive Strength - 7 mpa.

Advantages :-
- Register accurate surface detail.
- It is dimensionally stable
- Minor defect can be corrected locally without discarding a good impression.
- Does not required seperating medium.

Disadvantages :-
- It is sticky in nature.
- It require special tray for impression making
- Eugenol Causes tissue irritation and burning
- Not used for making impression of teeth and undercuts as it inelastic.

Uses :-
- Used as special impression material in Completely edentulous patient with less undercuts.
- Temporary Cement are used to relieve an area to improve accuracy of second Surgical paste.

Disinfection :-
Zinc Oxide eugenol can be disinfected by immersion in 2% glutaraldehyde at 1:2:3.
The manufacture recommendation for proper disinfection should be followed.

Alginate

Introduction :-

Alginate is irreversible hydrocolloid. It is process of cross linkage algin acids with Calcium ions.

ADA Specification - 18

Type I - Fast Setting

Type II - Normal Setting.

Composition :-

Supplied in Container as paste form.

Ingredient	Percentage	Uses
Na or K alginate	15	Main ingredient
Calcium Sulfate	16	Reaction
Zinc Oxide	4	Fillers
potassium titanium fluoride	3	Gypsum hardener
Diatomaceous earth	60	Filler
Calcium phosphate	2	Retarder
Odouring and coloring agent	Traces	Flavour addition.

Setting reaction :-

The chemical sol gel reaction can be described simply as a reaction of Soluble alginate with calcium sulfate and formation of an insoluble Calcium alginate gel. Ca^{2+} must rapidly be produce insoluble calcium alginate in an aqueous Solution. The production of calcium alginate doesn't

Expt. No. ..... Date ..... Page No. .....

allow significant sufficient working time. So, water solution salt such as sodium phosphate is added to solution to prolong working time. When the supply of trisodium phosphate is exhausted. The calcium ion begin to react with potassium alginate to produce calcium alginate as follow. The retarder must be adjusted carefully to provide to proper gelation time.

$2Na_3PO_4 + 3CaSO_4 \rightarrow Ca_3(PO_4)_2 + 3Na_2SO_4$

Sodium alginate + $CaSO_4 + H_2O \rightarrow$ Ca alginate + Na_2SO_4

Manipulation :-

The powder supplied in a can is accurated by shaking and 1 scoop of powder is used for the one measure of water with the measuring component supplied along with pack.

Cooling the water increase the working time and setting time.

The powder is sifted into water and it is mixed with help of curved spatula in a flexible bowl by a figure of eight method.

W/P ratio : 15 g 40 ml

Mixing time : Fast setting : 45 Sec

Normal setting : 1 to 60 Sec

Setting time : Fast setting : 15 Sec

Normal setting : 120 Sec

Properties Flexibility :-

It is about 1% and act as stress of 100 gm/cm² same hand set material have values from 5% to 8%, lower w/p ratio result in lower flexibility.

Elasticity :- Elasticity is less when compared with agar and about 97.3% elastic recovery occur permanent deformation is less than when impression is removed from mouth quickly.

Strength :- Compressive Strength - 5000 - 8000 g/cm²
Tear Strength - 30 - 700 g/cm²

Advantage :-

- Inexpensive
- Easy to manipulate
- pleasant taste and Odour
- Hydrophilic easily poured with dental Stone
- They can be used with Stock trays.

Disadvantages :-

- Tears easily.
- Must be poured immediately after removal.
- Has limited detail reproduction.
- Can be used for single cast
- Incompatible with die material

Disinfection:

Disinfecting the hydrocolloid impression by using household bleach, iodophores or synthetic phenols. It is used thoroughly the disinfection is sprayed liberally on surface. It is immediately wrapped in disinfectant soaked paper towel & placed in a sealed plastic bag for 10 mins.

Uses:

Primary impression for diagnostic and incomplete edentulous and dentulous patient.

Expt. No. 8 Date Page No. 39

Agar

Introduction:

Agar is an organic hydrophilic colloid present from certain types of seaweeds. It is a sulphonic ester of linear polymer of galactose. The principle ingredient by weight is water, greater than 80%. Modifiers are present in minor amount and exert a considerable influence on properties. ADA specification number: 1

Composition:

Ingredients	Percentage	Function.
Agar	12 - 17%	Main ingredient.
Borax	0.2 - 0.5%	Improves strength.
K_2SO_4 retarder	1 - 2%	Retarder.
Thermophobic material	0.5 - 1%	Plasticizer.
Alkyl Benzoate	0.3 - 0.5%	Plasticizer
Colouring flavouring	Traces	Colour & flavour
Water	Balance	Dispersion medium.
Hard wax	0.5 - 1%	Filler.

Manipulation:

- Prior to impression procedure.
- Impression making.
- Post impression procedure.

Preparation of material:

Proper equipment for liquifying and using agar material is essential. The hydrocolloids is usually supplied in syringe and tray material. The only difference between them is the colour and viscosity of material. Tray material is more viscous.

Reversal of hydrocolloid from gel to sol state. A special water bath with 3 chamber and cooling trays are used.

Heat in water bath at 100°C for 8-12 min & stores in second chamber at 46°C water for 3-10 min. After seating the tray in oral cavity. Cool with water. No less than 18-20°C for gelation. After impression is removed from the mouth, wash to remove saliva to avoid interference during setting of Gypsum.

After initial setting of gypsum, model & impression in a humid location.

Properties:

Flow: The material is sufficiently fluid to record fine detail if it is correctly manipulated.

Gelation temperature: The agar solution should be released to get at a temp. of 37°C but not more than 45°C.

Flexibility: The flexibility of gel from time of removal is between 4 & 12% when a stress of 0.212 gm

is applied.

Elastic Recovery: Highly elastic, extend upto 98-87.
Working Time: 7 - 14 min
Setting Time: 5 min.

Advantages:
- Inexpensive
- Have pleasant colour
- Non toxic and non staining
- Doesn't require custom tray as adhesive
- Component do not require mixing.
- material is hydrophilic and can be used in presence of moisture.

Disadvantages:
- Material requires use of impression equipment.
- Tear Easily
- Must be poured immediately
- Dimensionally unstable.

Use:
Used as duplicating material in the convenient of cast partially dentate case the accuracy for frequently cast and other restoration.

Disinfection: Agar hydrocolloid are disinfected by Immersion in sodium hypochloride, iodopher phenolic glutaraldehyde.

Polysulfides

Introduction:

Polysulfides are widely used for crown and bridge fabrication due to high accuracy and suitably unpronounced and unpronounced curing time is needed They are supplied in tubes of base plate and catalyst paste are mixed together. It is also called as thiokol. ADA -19.

Composition:

Base Plate:

Liquid polysulphate polymer - 80 to 85%

Inert filler - 16 - 4%.

Plasticizers.

Accelerator Paste:

Lead Dioxide - 60 - 65%.

Dibutyl Opthalate - 30 - 35%.

Sulfate - 3%.

Magnesium Retarder - 2%.

Manipulations:

The catalyst and base plate is dispensed in glass slab of same length. The catalyst paste is collected in stainless steel spatula.

The mixture of spread over the mixing pad. The mass is then trapped for both blade and spread back

used forth on mixing pad. This process is continued until mixing pastes are uniform in colour.

Setting Reactions:

Lead Dioxide react with polysulfide polymer & causes

- Chain lengthening by oxidation of terminal OH group
- Cross linking by oxidation

$HS-R-SH \xrightarrow{PbO_2} HS-R-S-S-R-SH + H_2O$

Properties:

Unpleasant colour & odour. Excellent reproduction of surface details. Pot life is good. The mixing viscosity is high - 0.45%. It has high permanent deformation and its 25% - average elasticity.

Advantages:

- Long working time.
- Good tear strength
- Good flow
- Good production & surface detail.
- High flexibility

Disadvantages:

- Needed use of custom tray
- Bad odour.
- Lower viscosity

- Lead dioxide material stains clothing

Use:
Polysulphide impression material is often used with custom tray to increase the accuracy of impression. Light and medium body material are used for complete denture impression.

Disinfection:
Disinfected by Sodium hypochloride, iodophor phenolic Glutaraldehyde

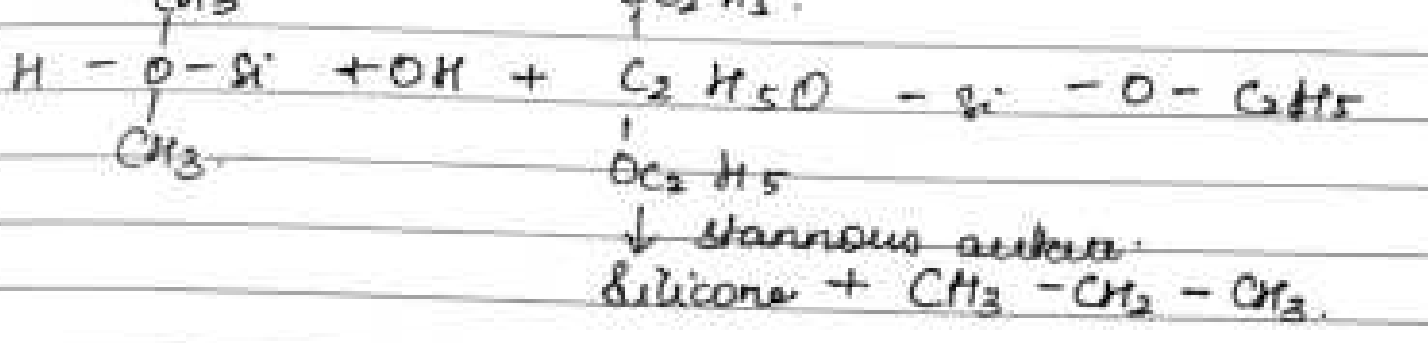
Expt. No. 10 Date Page No. 28

Condensation silicone.

Introduction:
They are used mainly for crown and bridge impressions making they are ideal for single unit. They supplied by two pastes - as paste liquid catalyst system.

Composition:
Base Paste:
Polydimethyl Siloxane - Principle constituent
Ortho silicate - Plasticizer.
Colloidal silica - Filler.
Pigments - 2g - 75%
Catalyst Paste:
Metal Organic Ester.
Tin Acetate.
Dibutyl tin Laurate.

Manipulation:
Equal lengths of base & accelerator is squirted into mixing pad side by side without touching. The accelerator paste is incorporated into base plate. Just before loading the tray, the material should be spread as thin layer dimensional network is formed. Stannous acetate acts as catalyst.



Setting Reaction:
It is a condensation reaction occurs as a result of cross linking between ortho ethyl silicate & terminal hydroxyl group of dimethyl silicone to form 3D network.

Dimethyl siloxane + Orthoethyl silicate $\xrightarrow{\text{Stannous octoate}}$ silicone rubber + CH_3CH_2OH.

Mechanical Properties:
Accuracy is greatly improved by first taking impression with a highly filled silicone putty and later setting heavy to second impression with light bodied silicone. Thus the final total shrinkage is lower.

Advantage:
- Clean, pleasant material for patient.
- Highly elastic and setting time can be controlled with amount of accelerator.
- Eliminates needs for custom tray.

Disadvantage:
Evaporate due to leakage on standing and should be framed within 1hr. They are very hydrophobic, require a dry field and are difficult to pour in stone.

Uses:
Heavy and slight bodies syringe material may be used to make condensation silicone impression using the multiple mix technique discussed for polysulphide.

Disinfection:
Disinfected by sodium hypochlorite, iodophor complex phenolic glutaraldehyde.

Addition Silicone.

Introduction:
Represent an advancement in many ways over condensation silicone. This has been achieved by change in polymerisation reaction to an addition type and elimination of no alcohol by product that takes place.

Composition,
Base plate:
Hydrid silicone.
Palladium.
Silicone polymer OH group.

Accelerator paste:
Platinum salt.
Silicone polymer with vinyl group.

Manipulation:
It is available only in two putty system. The two systems are dispersed in volume by equal no. of scoops of each putty. The best mixing technique is to mix with fingers until a uniform colour is not obtained during manipulation that is not uniform and it causes distortion.

Setting Reaction:

It is an addition reaction. In this case the polymer is terminal with vinyl group and linked with silicone. This reaction is activated by platinum salt.

Vinyl Silicone + Silicone Siloxane $\xrightarrow[\text{salt}]{\text{Pt}}$ Silicone Rubber.

Properties:

* Setting time - 4-7 min.
* Mixing time - 45 sec.
* Good tear strength.
* Low flexibility and shelf life ranges from 1-2 years.

Mechanical Properties:

The working and setting time of addition silicone are so faster than polysulphide retarder is often used to extend the working time.

They have excellent elasticity and show very little dimensional change upon storage. Therefore can be safely poured twice.

Advantages:

- High accuracy and dimensional stability.
- Recovery from deformation.
- Pleasant odour.

Disadvantages:

- Expensive, more rigid than condensation silicone and difficult to remove from cured set.
- Sulphide like latex, gloves & rubber can exhibit polymerization.

Uses:

- Bite Registration material.
- Diagnostic aids.
- Fabricate mold for fabrication of temporary crown, heavy viscosity tray material.

Disinfection:

Immersed in sodium hypochlorite, Iodophor, phenolic glutaraldehyde.

Expt. No. 12 Date ..... Page No. 34

Polyether.

Introduction:

Used for accurate impression for a fixed prosthesis teeth without retentive undercuts.
They high stiffness and short working time restrict their use to impression of a few teeth.

Composition:

Base Plate:
Polyether Polymer
Colloidal silica
Glycol ether (or) ophthalate
Accelerator paste
Aromatic sulphate ester
Colloidal silica filler.

Manipulation:

Equal length of base & catalyst paste is dispensed on glass slab with graduation. The catalyst paste is collected in Spatula and be distributed over the base. The mixture is then scrapped back and forth over the mixing pad.

Setting Reaction:-

It is a reaction between terminal ring and an end of branched polyether molecule. The main chain is a copolymer of ethylene dioxide and tetrahydrofuran

Cross linkage is brought about by aromatic sulphonic esters.

polyether + Sulphonic acid ester → Cross linked rubber.

Properties :-

- Setting time - 5 min
- Mixing time - 30 sec
- Hydrophilic So moisture in impression is not critical.

Mechanical Properties :-

Because the rubber absorbs water and changes dimension. Storage in water is not recommended. Elastic recovery values average 98.5% between these polysulphides and addition.

Advantages :-

- Pleasant to handle, easy to mix.
- These materials are more accurate than polysulphide and condensation silicone impression.

Disadvantages :-

- Include high cost, short working and setting time, high stiffness (after setting which limit their use).
- Their bitter taste is objectionable to some patient.
- They cannot be kept for long time in disinfection solution.

Uses :-

Used in dispensable triple tray technique & fitted partial denture, medium viscosity used in border moulding and low viscosity as wash impression.

Disinfection :-

By Immersed in Sodium hypochlorite.

Classification of denture base resins

Denture base material

Metallic
- Cobalt Chromium
- Gold alloys
- Aluminium Stainless Steel

Non - Metallic
- Acrylic Resin
- Vinyl Resin

Denture base Material

Temporary
- Self use acrylic
- Shellac base plate
- Base plate wax

Permanent
- Heat Cure resin
- Light Cure resin
- Pain type resin
- Metallic resin

Heat activated denture base resin

Introduction :-

Heat activated material are used in the fabrication of nearly all denture base. Thermal energy required for polymerisation of such material should be provided using a waterbath or microwave oven. Because of first prevalence of microwave oven, resin emphasis is placed on heat activated system. Ans -

Composition

	Ingredients	Function
Liquid	Methyl methacrylate-	plasticizer
	Dibutyl phthalate	plasticizer
	Glycol methacrylate-	prevent
	Hydroquinone	Inhibitor of setting
powder	Composed of mercury Sulfide	Dyes
	Zn as TiO2	
	Dibutyl phthalate	Plasticizer
	Dyed Organic filler	
	Inorganic particle like glass fibre	

Manipulation :-

- Preparation of waxed denture pattern.
- Preparation of Split material
- Application of Separating medium, mixing of powder and liquid of denture base resin.
- packing
- Curing
- Cooling
- Deflasking, finishing and polishing.

Preparation of waxed denture pattern :-

The Tech is arranged in wax or wax pattern is flasked in the denture flask. The Cast is placed in base flask and it is invested with plaster of paris. It is called as base flasking.

Preparation of Split mould :-

After the plastic gypsum hardens a second mix of plaster is replaced, prepared and poured into the denture flask. The investment is added until all surfaces of wax arrangement and base a covered completely. The Remainder of all the flask is filled with tin a gently placed in position. The flask is placed in the warmed from water and segment are separated.

Application of Separating Medium :-

Currently most popular Separating medium agent are water Soluble alginate Solution. When Applied to dental stone surface such dissolution produce thin

relatively insoluble Calcium and alginate film that prevent direct Contact of denture base resin and Surrounding dental stone.

Mixing of Powder and liquid :-

Polymer of monomer ration 3:1 by volume and 2:1 by weight. The measured liquid is poured in to Clean, dry, mixing bowl, powder is added and allowing each of particle is wetter by monomer.

Packing :-

The packing process Should be performed while the denture base resin in dough Stage. The Resin is removed from it mixing Container and roller it in a mixing Container and roller it in pipe form (a) rod from which is beat into horse-shoe Shaped and placed in portion of flask that hower portion teeth.

Polymerisation Cycle :-

processed at 74°C approx 2 hours and then increased to temp 100°C/moist boil for 1 hrs. The flask is Cooled after the procedure for 30 min then immersed in cold water for 15 min.

Setting Reaction :-

Setting Reaction takes place between polymer and monomer is achieved by heat and pressure.

Pre-polymer + monomer $\xrightarrow{\text{Heat}}$ polymer + heat Tec.

Wet Sand Stage :-

Polymer gradually settles into monomer forming a fluid or viscous mass.

Sticky Stage :-

Monomer attack the polymer, it become penetration into polymer. The mass is sticky and strong when touched and pulled apart.

Dough Stage :-

As monomer diffuse into the polymer it become some smooth and dough like and it doesn't adhere to walls of container an ideal stages of joining DBR is a desirable result to mine.

Rubbery Stage :-

Monomer disappear by penetrating into polymer. Non elastic and can be molded at this stage.

Ideal Properties :-

Good Appearance, high flexural Strength, high impact Strength, high Stiffness, long fatigue life, high Crack resistance, high Creep resistance, high Radiopacity.

Advantages :-

- High glass transition Temperature
- Ease of fabrication.
- Low capital cost
- Good surface finish. Good Appearance.

Disadvantages :-

- Free monomer content of formaldehyde can cause sensitization, slow impact strength and radiopacity. Flexural strength slow enough to produce poor denture design, fatigue kept to short.

Uses :-

- Fabrication of permanent denture base in implant supported over denture.
- Used in occlusal splint.

Chemically activated denture base resin

Introduction :-

In Addition to the use of heat energy Chemical activation are also used to induce denture base polymerization. It does not require application of heat and this Completed at room temperature.

Manipulation :-

- Manipulated by following technique.
- Sprinkle on technique.
- Adapting technique.
- Fluid Resin Technique.
- Compression moulding Technique.
- Injection moulding technique.

Sprinkle on Technique :-

Operating medium is applied on Cast and powder and liquid is alternatively strewn dapper. The prosthesis is Carried Section by Section until the Completion to improve the Strength and appliance is used in hot pressure to laminate it.

Adapting Technique :- Powder and liquid is proportionally & mixed in porcelain jar. It Reaches dough Stage. It is quickly removed and adapted on Cast and manually moulded.

Fluid resin technique :-

The completed arrangement of teeth positioned in fluid resin technique flask and is inserted with agar. The teeth is removed from reversible hydrocolloid agar investment and sprues are attached for resin introduction. The resin is poured through sprue and completely packing is removed.

Compression mould Technique :-

Completed tooth arrangement is prepared for flasking procedure, the waxed cast is embedded in flexible poured stone. The surfaces of tooth are covered with stone.

Injection mold Technique :-

Completed tooth arrangement is prepared from flasking procedure, the sprues are placed for introduction of resin, wax elimination is done, the separating medium is applied on mould space, and resin is introduced into the cavity and placed in water bath.

Setting reaction :-

Monomer + polymer ⟶ Polymer + heat.

To obtain a workable mass it has to undergo 5 stages. In Sandy stage the mixture is coarse & grainy. In Stringy stage, the monomer enters bead stage increased polymer chain. enters the solution and dissolves and enters a dough stage.

Advantages :-

- Easy to deflask.
- Dimensional accuracy.
- Capable of higher flexural Strength.

Disadvantages :-

- Not Cheap
- Increased Creep
- Colour instability.
- Reduced Stiffness
- Tooth adhesion failure.

Uses :-

- Used for relieving and repair work.
- Used in diagnostic aid.
- In the Construction of immediate a denture
- In maxillo facial prosthesis.

Expt. No. ..... Date ..... Page No. 46

Light activated denture base resin

Introduction :-

Light activated denture will compare well to conventional heat cured material and those of impact strength and hardness, but low elastic modulus.

Composition :-

Ingredients	Uses
Urethane dimethacrylate	Principle ingredient
Inorganic Silica	fillers
Camphor quinone	photo initiator

Manipulation :-

It is polymerised in a light chamber with UV to blue light of 400 - 500 nm an high intensity quartz halogen bulb. The denture is rotated continously to provide uniform expose to light.

Setting reaction :-

Light a activator. The stage of polymerisation reaction are wet, Sandy, Stringy, dough, rubber and stiff stage.

Advantage :-

The finished product is desirable and light weight speed of polymerization is accomplished.

Dis Advantages :-

It require Special instrument for reconfiguration temporary denture base.

Uses :-

- Used for denture base.
- for making Special tray.
- Used for making Obturator.
- Formation of light activated denture base contain Copolymer methane dimethacrylate and an acrylic along with silica filler.

Expt. No. ..... Date ..... Page No. 48

Microwave activated denture base resin

polymethyl methacrylate may be polymerised using microwave energy. This technique employs specially formulated resin in non-metallic flasks.

Dental Cement

Introduction :-

Dental Cement are material of different use including restoration cutting and impression. They are generally material of comparatively low strength but have extensive use in dentistry. The first Cement of dentistry was introduced in 1855 by Sorel who created Zinc Oxychloride cement.

Classification :-

I) Iso - Standard Covering Cement.

Iso 9917 - 1 : 2003 - water based Cement Part - I powder liquid base Cement.

Iso 9917 - 2 : 1998 - Water based Cement Part - II liquid activated Cement.

Iso 9917 - 2009 - Zinc oxide Engenol and Zinc Oxide non Eugenol Cement

Iso - 4049 - 2000 - polymer based filling, restorative and luting material.

II) According to Setting reaction :-

- Acid - base reaction Cement
- polymerising Cement
- Dual cure Cement
- Tuning Cement

(iv) Classification of Cement based on application

Type I :- Luting Agent : Eg : Zinc phosphate, fine grain for Cementation, luting medium grain for base, Orthodontic appliance.

Type II :- Restorative application : Eg : Glass Ionomer Cement

Type III :- Lining as Base application
Eg : Calcium hydroxide.

General Structure :-
On mixing powder and liquid only a part of powder react with liquid and form a gel material with a
- a core of untreated powder surrounded by the reacted matrial.
- a matrix of reacted material.

Uses : • Final Cementation
• Temporary Cementation
• Bases
• long term restoration
• Temporary and intermediate restoration
• Pulp therapy
• Obturdent
• Liner
• Root canal Sealants.

Zinc phosphate Cement

Introduction :-

Zinc phosphate is the oldest of cutting agent for the term Crown and bridge. Also used for cementation.

Application :-

- Luting of restoration
- High strength base
- Temporary restoration
- Luting for Orthodontic band and brackets.

Classification :-

Type I - Fine grained for luting.
Type II - Medium grained for luting.

Composition :-

Powder :- Zinc Oxide (90.9%) - Principle Constituent
Magnesium Oxide (8.0%) - Aids in Sintering
Other Oxide (0.2%) - Improves Smoothness.
Silica (1.4%) - Filler aids in Sintering.

Liquid :-

Phosphoric acid (35.2%) - Reacts with Zinc
water (36%) - Control the rate of reaction
Aluminium phosphate (10.5%) - Buffers with Zinc.
Zinc (4.1%)
Aluminium (2.2%)

Setting Reaction :-

When powder is mixed with liquid phosphoric acid attacks the surface particles and release of cementation like aluminium Complex with phosphate and Zn ions to form Zn alumino phosphate gel.

Manipulation :-

Powder is taken on slab along with liquid. Liquid is added to powder in small increment, mixing is done in broad circular motion.

Mixing time - 1 - 1.5 mins

Properties :-

- Compressive Strength - 104 - 119 mpa
- Tensile Strength - Set Cannot be tested
- Modulus of Elasticity - 13.7 Gpa
- Solubility - 10 Solubility
- Biological property - Pts toxic pulp response is moderate.

Advantage :- Long track record
- Good Compressive Strength.

Dis Advantages :-

- No chemical adhesion
- No anti - Cariogenic effect.
- Pulp irritation.
- Poor esthetics.

Zinc Polycarbonate Cement

Introduction :-

Canadian biochemist Smith developed the first polycarbonate cement in 1968 by substituting the phosphoric acid of zinc phosphate cement with polyacrylic acid.

Application :-

- For luting Permanent restoration.
- As base & liner
- Used in Orthodontics for Cementation of band.
- Used in root canal filling in endodontics.

Available as

- Powder and liquid
- Water Settable Cement
- As pre encapsulated powder and liquid.

Composition :-

Powder :- Zinc Oxide - Base Ingredient
Magnesium - Primarily modifies oxides of bismuth and aluminium - Small amount.
Stannous Fluoride - Anticariogenic

Liquid :-
Aqueous Solution of polyacrylic acid or polymer of acrylic acid with unsaturated carboxylic acids

Manipulation :-

Powder & liquid are taken in cooled glass slab. Powder is incorporated in bulk to liquid. Mixing is done using Cement Spatula.

Mixing time - 30 - 40 Sec.

Setting Reaction :-

When powder and liquid are mixed, the surface of powder particles are attacked by acid releasing zinc, magnesium ions. Ions bind to polymer chain in Carboxyl group. They also react with Carboxyl group of adjacent polyacid chain to form cross linked to salt.

Setting time :- 7 - 9 min.

Properties :-

- Compressive strength - 55 mpa
- Tensile strength - 6.8 mpa
- Solubility - absorb water and slightly soluble.
- Biocompatibility - pH - 1.0 - 1.7.
- pulp response is mild
- Anti - Cariogenic

Advantage :-

Less irritation to pulp
Chemically bonds to tooth.

Disadvantage :-

Limited to fluoride release.

Exp. No. ..... Date ..... Page No. 55

Zinc Oxide eugenol Cement

Introduction :-

Cement have been used extensively in dentistry since the 1880's. The general purpose Cement are of low strength. They are least irritating and known to have obtundent effect.

Classification :-

Type I - Temporary restoration.
Type II - permanent restoration.
Type III - Base and temporary restoration
Type IV - Caring lower.

Available as :-

- powders and liquid
- Two paste System

Composition :-

powder :-

- Zinc oxide - 69% - Principle ingredient
- White resin - 29.3% - Reduce brittleness
- Zinc Stearate - 1% - Accelerator plasticizer.
- Zinc acetate - 0.7% - Accelerator improve strength, Magnesium oxide.

Liquid :-

Eugenol - 85% - react with ZnO
Olive oil - 15% - plasticizer.

Manipulation:-

Measured of quantity of powder and liquid is dispensed into Cool glass Slab. The bulk of powder is incorporated with a liquid Spatulated thoroughly in circular motion with a stiff bladed Stainless Steel Spatula tip of Orange is used to clean eugenol Cement from instrument.

Setting Reaction:-

First hydrolysis of Zinc Oxide takes place and form zinc hydroxide later it will react with eugenol to form Zinc eugenol

$$Zn + H_2O \longrightarrow Zn(OH)_2$$

$$Zn(OH)_2 + 2HE \longrightarrow ZnE_2 + 2H_2O$$

Zinc eugenolate

Setting time:- 4 - 10 minutes.

Properties:-

- Compressive Strength - 5 - 55 mpa
- Tensile strength - 0.32 - 5.32 mpa
- Thermal property = Excellent
- High Solubility
- pulp response - mild.

Modified Zinc Oxide eugenol Cement

Aluminium modified Cement. It has greater strength and used as intermediate, filling material and as base. Liquid is substituted with Ethoxybenzoic acid. Alumina is added to powder. Polymer reinforced Zinc Oxide eugenol Cement.

Special Zinc Oxide eugenol product.

ZOE is very popular as endodontic sealer two traditional formulation along with gutta percha resin. These material are used in endodontics therapy to root canal.

Expt. No. ..... Date ..... Page No. 58

Glass Ionomer Cement

Introduction :-

Glass ionomer Cement Solved from general dissatisfaction with Silicate Cement. The first usable g/c for formulated in 1972 by wilson and was known as aluminosilicate.

Application :-

- Anterior esthetic restorative material for Class III
- Restorative material for eroded areas and Class III restoration
- As a luting Agent
- As a liner and base.
- For core build up
- To a limited extension as pit and fissure Sealant.

Classification :-

Type I :- for luting
Type II :- for restoration
Type III :- for liners and bases.

Available as :-

- Powder / liquid in bottle
- proportional powder / liquid in bottle.
- Light cure System.
- powder / distilled water (water Settable)

Composition :-

powder - Silica (SiO_2) - 41.9%
Alumina (Al_2O_3) - 35.6%
Aluminium fluoride - 1.6%
Sodium fluoride - 1.5%
Aluminium phosphate - 8.3%

Liquid :- 50% aqueous solution of polyacrylic acid in the form of co-polymer with Itaconic acid, maleic acid, tricarboxylic acid used to increase relatively of fluid decrease the viscosity and reduce tendency of gelation.

Manipulation :-

powder and liquid are dispersed onto a soak absorbant paper pad. The powder is added in two or more tricarboxylic acid used to increase relatively of fluid decrease the viscosity and reduce tendency of gelation. Spatula is used for mixing and following technique is used.

Setting reaction :-

- Leaching when powder and liquid are mixed together, the acid attacker glass particles, ions Calcium, aluminium, Sodium and fluoride ions.
- Calcium cross link - The initial set occurs when Calcium ions react with polyacrylic chain.

- Aluminium cross link with polyacrylic acid chain Sodium and fluoride ions - Sodium ion may replace hydrogen ions in - Carboxylic groups. The rest Combine F to form NaF.
- Hydration initially water serves as medium, later it hydrates the matrix adds strength to the Silica gel sheath.
- The unreacted glass particle is sheated by hydrated

Properties :-

- Compressive Strength - 85 - 105 Mpa
- Tensile Strength - 6.2 - 6.6 Mpa
- modulus of elasticity - 7.3 Gpa
- Solubility - Initially high.
- Adhesion - Adhere well to enamel, dentin.
- Bio Compatibility - mild pulp response.
- Anti Cariogenic - release fluoride ions.

Modified GIC

Metal modified GIC :- They are introduced to improve Strength, refracture, toughness and resistance to wear and tear. Silver alloy is mixed.

Resin modified GIC :-

They were introduced to overcome disturbances like moisture, Sensitivity, low initial Strength, working time.

Dental Amalgam

Amalgam has been successfully used for more than a century as restorative material for tooth decay. Asm - 1.

Classification :-

Based on Copper Content :-
- Low Copper alloy - less than 6% Cu
- High Copper alloy - more than 6% Cu
  - (a) Admixed
  - (b) Single Composition.

Based on Zinc Content :-
- Zinc Containing alloy - more than 0.01% Zn.
- Zinc free alloy - less than 0.01% Zn.

Based on Shape of alloy particles :-
- Lathe cut alloys
- Spherical alloys
- Spheroidal alloys.

Based on number of metal alloy :-
- Binary alloys - Silver - tin.
- Ternary alloys - Silver, tin, Copper.
- Quaternary alloys - Silver, tin, Copper, Lead.

Based on Size of alloys :-
- Microcut.
- Macrocut.

Setting Reaction :- (Lathe cut)

When powder is mixed with mercury, powder dissolves into it and mercury diffuses into alloy particles and plastic mass is formed. The reaction takes place in three phase :-

Stage 2 eutectic phase

$Ag_3Sn\,(S) + Hg \rightarrow Ag_2Hg\,(S_1) + SnHg\,(S_2) +$ unreacted Ag_3Sn.

Admix :-

When powder is mixed with mercury, it diffuse into alloy particles. The mercury dissolved into lathe cut particle from S_1 and S_2 is eliminated.

$Ag_3Sn\,(s) + Hg \rightarrow Ag_2Hg_3\,(S_1) + SnHg\,(S_2) +$ unreacted particles.

$SnHg + AgCu \rightarrow Cu_2Sn_6\,(n) +$ unreacted particles.

Single Composition :-

When powder is mixed with mercury powder dissolve in mercury & mercury diffuse into powder Silver react with mercury forming phase.

$Ag_3SnCu + Hg \rightarrow Ag_2Hg_3\,(S_1) + Cu_6Sn_5\,(\varepsilon) +$ Cu_6Sn_5

Trituration :-

Hanau technique is 1:1 ratio is followed. The mercury is dispensed by using a dispenser and appropriate portion of alloy is taken. The method of mixing alloy particle is known as trituration.

Consistency :-

On trituration, Silver grey shiny mix must be obtained.

Hand mixing :-

A mortar and pestle is used. The powder and mercury are taken in mortar and mixed using a pestle. Rotatory motion in one direction is followed.

Mechanical mixing :-

It is done using amalgamator proportion capsule are used. The capsule act as mortar. when machine is activated arm holding the capsule vertically at high speed and trituration is done. Mixing time is reduced for obtaining consistency. Should have Shiny lustrous surface when made into balls when made into balls when dropped should not break.

Advantages :-

- present marginal leakage.
- Adequate fracture resistance.
- Have long restore life.

Expt. No. ..... Date ..... Page No. 69

Disadvantage :-

- Subject to Corrosion and galvanic action.
- It is most soluble.
- They will not bind to tooth surface.

Uses :-

- Permanent filling material in class I and III Cavities.
- In retrograde root canal fillings.

Dental Ceramics

Dental Ceramics is defined as inorganic compound with non-metallic properties typically consisting of oxygen and one or more metallic and non-metallic element that is formulated to produce the whole part of ceramic based dental prosthesis. Ans - 69.

Composition :-

Feldspar : Basic glass former.
Kaolin : Binder
Alumina : Glass former and flux
Alkaline : Glass modifies and flux.
Colour pigment : modifies tooth colour.
Specifier : Reduces Temperature.

Classification :-

According to fusion temperature.

- High fusing : 1300°c for fusion denture teeth.
- Medium fusing : 1000°c for denture teeth
- Low fusing : 850°c for denture teeth.
- Ultra low fusing : < 850°c

According to type :-

Feldspar (or) Conventional porcelain
Aluminium porcelain
Tensile reinforcement porcelain
Glass infiltrated porcelain - Glass Ceramic.

According to Use :-

- porcelain for artificial denture tooth.
- packet Crown veneer
- Metal Ceramics.
- Anterior bridge Ceramics

According to Processing method :-

- Sinking porcelain
- Cast porcelain
- Mechanical porcelain.

Advantage :-

- Highly esthetic material.
- Highly biocompatible material.
- Adequate wear resistance.
- Thermal Conductivity is very low.
- Can be modulated to any form.

Disadvantages :- - They are brittle and very Costly.
- Wear off the Opposing tooth.
- Very low fracture resistance.

Uses :-

- Inlays & onlays
- Style all Ceramic Crown, artificial denture
- Short Span all Ceramic bridge.

Composite resin

Introduction :-

It is a resin which has been strengthened by adding silica particle called fillers. Composite is a system composed of a mixture of two (or) more macromolecular material in each other different forms.

Uses :-

- Restoration of anterior and posterior teeth.
- To veneer metal crown and fixed partial denture.
- Pit and fissure.
- Esthetic laminates.

Type :-

Composite resins are different to classify because of the wide range of overlapping filler size.

Based on filler part using mechanism :-

- Class I - Self cured materials.
- Class II - Light cured materials.
- Class III - Dual cured materials.

Based on filler particle size :-

- Fine - particle size > 2 mm.
- ultrafine - particle size < 3 mm.
- microfine - Average particle size (0.04 mm)
- Nanofine - nano range (5 - 10 mm).

Based on viscosity :-
- Conventional
- Packable.

Restorative Composite resin :-
Early Composite resin were generally macrofilled resin and were referred as Conventional Composite.

Supplied as :-
- Two paste System.
- powder and liquid System.

Available as :-
Single paste form in dark and light Dose Syringe

Indications :-
- Resin matrix.
- Filler
- Coupling Agent.

Chemically Polymerisation mechanism:

Based on mode of activation of polymerisation there are of 2 types:-

- Chemically activated resin
- Light activated resin.
- Combination Resin.

Chemically activated resin:-

Base paste material contain benzoyl peroxide.
Catalyst paste - Tertiary amine activator.

Setting:-

When the two pate are spatulated, the amines react with the benzoyl peroxide to form free radical.

Disadvantage:-

- No Control of Curing time.
- No Control of curing Shrinkage.
- Hand mixing increase possibility of voids.

Light activated Composite resins:-

Under normal light, they don't interact, however when exposed to light of correct wavelength, the photo initiation is activated.

Expt. No. ..... Date ..... Page No. 70

Dual Cure resin :-

A Combination of Chemical and light curing is used to overcome some of the drawback. Light curing dual resin are supplied in two pastes.

Microfilled Composites :-

The microfilled resin is introduced soon after the traditional Composites. The resin achieved smoothness of unfilled acrylic filled resin.

Nanohybrid Composite resin :-

A new type of Composite resin based on nanosized filler particles recently introduced nanohybrid.

Bonding :-

One of the critical problem when resin restorative is microleakage which is from the shrinkage of the resin while curing.

Acid etch Technique :-

Initially developed to improve retention to enamel. At the time, it was widely practised. Dentin could not be etched as well as enamel. Acid etching of dentin would cause injury to the pulp.

Etchant :-

The etchant are acidic in nature. They may be grouped as

- Mineral
- Organic
- polymeric

Specialised Composite resins :-

Flowable Composite resin.

These are hybrid Composite modified to have an increased flow.

The materials are :-

- More prone to water.
- Have half the stiffness.
- Heat polymerisation.

Packable Composites :-

They are Composites that have very high viscosity and surface tension. They have higher filler loading with proper irregular shaped particles. They are not Condensable like amalgam.

Bioavailability :-

Internal and External toxicity of the material on the pulp. pulp involvement due to microleakage. Allergic potential on Contact to oral mucosa.

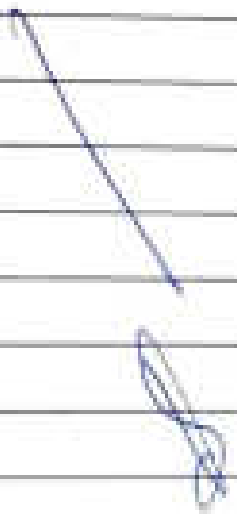
Exp. No. ..... Date ..... Page No. 10

Advantages :-

- Wettable Lining System allow Choices of working time.
- Easy to repair
- Mechanically Strong and durable.
- Does not extend when Compared to analgam.

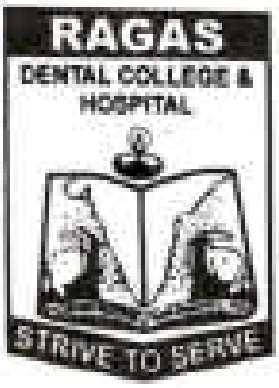
Disadvantages :-

- Highly technique Sensitive.
- Highly Rheinable
- Stick to instrument.
- Non - Condensable like analgam.



RAGAS DENTAL COLLEGE & HOSPITAL

2/102, East Coast Road, Uthandi, Chennai - 600 119.



PRE CLINICAL PROSTHODONTICS RECORD NOTEBOOK

B. D. S. COURSE

NAME J. UJIJA NACHIYAAR

INSTRUCTIONS

1. Students must neatly dressed and wear their coats before entering the Laboratory
2. Girls must have their hair braided and put inside the coat or have it tied-up to prevent mishap while working on Dental Motor.
3. Avoid wearing gold ornaments like rings and bangles when working with materials
4. Record books should be brought to the practical class without fail"
5. Necessary instruments should be brought to the practical class by every student
6. Students should read the experimental procedure before coming to the practical class, perform the practical carefully and record the observations
7. Working place and the instruments should be kept clean
8. All instruments and equipments should be carefully handled. Any damage to the laboratory equipments must be reported to the staff in-charge
9. Materials should be used sparingly during practical work
10. The lids of the bottles and tubes should be replaced immediately after dispensing the materials
11. Burners should be closed, and motors put off when not needed
12. At the end of the every exercise, the signature of the staff member should be obtained
13. Record books should be preserved and submitted to the head of the department at the end of the academic session
14. All instruments can be procured through college stores.

RAGAS DENTAL COLLEGE & HOSPITAL

2/102, East Coast Road, Uthandi, Chennai - 600 119.

DEPT. OF PROSTHODONTICS

B.D.S. COURSE

PRE-CLINICAL EXERCISES

Examination Regn. No. ...5419158...

CERTIFIED that this is the bonafide record of work done by

Mr / Miss ...J. USHA NACHIYAR...

in the PRE CLINICAL PROSTHODONTICS, AT RAGAS DENTAL COLLEGE & HOSPITAL, CHENNAI during the year 20 21 - 2022

Signature of the Staff

10/6/22

Signature of the Head of the Department

INSTRUMENTS LIST

Rubber Bowl	2 Nos
Wax knife	2 Nos
Wax carver	3 Nos
Wax spatula	3 Nos
Alginate spatula - curved spatula	1 No
Cement spatula	1 No
Upper & Lower edentulous trays (U1, U2, U3, U4, L1, L2, L3, L4)	1 (each)
Upper & Lower Dentulous trays (U1, U2, U3, U4, L1, L2, L3, L4)	1 (each)
Bunsen burner with tube	1 No
Spirit lamp	1 No
Alcohol torch	1 No
Flask with Clamp	2 Nos
JC Flask	1 No
Half round file, Rat-tail file, triangular file	1 (each)
3 point articulator	2 Nos
Scissors - straight & curved	1 (each)
Camlin paint brush	2 Nos
Carbon copying pencil	1 No
Stainless steel scale	1 No
Universal plier	1 No
Glass tile (8 cm x 8 cm)	1 No
Enamel tray (square)	1 No
Small towel	1 No
Mackintosh sheet	3 Nos
Hot plate	1 No
Acrylic trimmers	4 Nos
Metal trimmers	4 Nos
PKT instruments	1 set
Plastic Knife	1 No
Straight Spatula	1 No
Porcelain mixing jar	1 No
BP handle No. 3 & No. 4	1 No
Wire Cutter	1 No
Ceramic tile - chip syringe	1 No

CONTENTS

CONTENTS

Ex. No. 1

PREPARATION OF DENTAL PLASTER BLOCKS

Date	Procedure	Assessment	Signature
	Size Manipulation of dental plaster Preparation of Plaster blocks Finished & Polished blocks		

Ex. No. 3

PREPARATION OF EDENTULOUS MODELS (BEADING & BOXING METHOD)

Date	Procedure	Assessment	Signature
	Impression Maxillary Mandibular		
	Beading of Impression Maxillary Mandibular		
	Boxing of Impression Maxillary Mandibular		
	Finished and polished cast Maxillary Mandibular		

PREPARATION OF EDENTULOUS CAST

AIM:-

To prepare maxillary and mandibular edentulous cast

APPARATUS REQUIRED:-

1. Impression Compound
2. Edentulous tray
3. Type II dental plaster Type III dental plaster
4. Modelling wax
5. Wax knife
6. Cavex
7. Edentulous model
8. Rubber bowl
9. Spatula.

PROCEDURE:-

Impression :- A negative likeness or copy in reverse of the surface of an object, an impression of the tooth and adjacent tissues is used in dentistry.

Impression compound is softened in hot water and is placed in suitable impression tray.

The chosen model is lubricated and is placed over the softened impression compound.

The softened impression compound, is then pressed over the edentulous model to impression of tissue

Beading:-

When blocks are completely covered the periphery of both the maxillary and mandibular impressions.

The wax should be 4mm wide and 3-4 mm below the borders of impressions.

The lingual aspect of mandibular impression should be also sealed with wax

Significance:-

The purpose of the beading is to provide the master cast a flared area which actually outlines and preserves peripheral roll.

Boxing:-

Boxing an impression is building up vertical wall (clay) usually in wax. Producing the desired size and form of base of the cast and the previous tentative landmarks of impression.

Preparation of alternative Cast:-

Mixed with proper W/P ratio and poured over the prepared impression.

Tapping is done to avoid air bubbles.

Finishing and polishing:-

The cast is removed from the impression and outer surface of cast is polished with sand paper.

Ex. No. 5 ANATOMICAL LAND MARKS ON EDENTULOUS MODEL

Date	Procedure	Assessment	Signature
	Outlining on maxillary edentulous model		
	Submission	5	
	Outlining on Mandibular edentulous model		
	Submission	D	

ANATOMICAL LANDMARKS

A recognizable anatomic structure used as a point of reference.

MANDIBLE

1) Alveolar structures :-

1. Labial frenum
2. Labial sulcus
3. Buccal frenum
4. Buccal sulcus
5. Mandibular notch
6. Posterior palatal seal

SUPPORTING STRUCTURES :-

Primary stress bearing area :

1. Slope of residual alveolar ridge
2. Posterior labial slope of hard palate

Secondary stress bearing area :-

1. Crest of residual alveolar ridge
2. Rugae

Relief area :-

1. Incisive papilla
2. Mid palatine raphae
3. Fovea palatine
4. Crypts of Wenner

Labial frenum :-

It is a fold of mucous membrane that extends from the labial surface of alveolar ridge to the lip.

Labial sulcus :-

It occupies a potential space bounded by the labial aspect of the alveolar ridge, the mucolabial alveolar fold and orbicularis oris muscle. It terminates the buccal frenum.

Buccal frenum :-

It separates labial and buccal vestibule, erectile the elevator anguli oris muscle, It is bounded by orbicularis oris.

Location : Buccinator

Insertion : Elevator anguli oris.

MAXILLARY TUBEROSITY :-

It is a bulbous extension of alveolar ridge in distal and third molar region terminating in hamular notch.

Pterygomandibular raphe :-

It is a depression present between the maxillary tuberosity and hamular notch.

Incisive papilla :-

It is the exciting point of nasopalatine nerve and vessels. It may need to be relieved to avoid pressure on nerve and vessels.

Posterior palatal seal:-

soft tissue along the junction of hard and soft palate on which pressure within physiological limits can be applied by complete denture prosthesis to aid in retention of the denture. It is identified as area between alveolar and posterior limit

functions:-

1) Retention of maxillary denture
   Prevents food accumulation
   Reduce gag reflex
   Gentle position of vibrissae tag

Residual Alveolar Ridge:-

portion of alveolar process and its soft tissue covering that remain after removal of the tooth.

Torus palatinus:-

Two round pits in the posterior aspect of palate in such way of midline on more near the attachment of soft palate & hard palate.

Mid palatine raphe:-

It extends from the incisive papilla to distal end of hard palate covered with mucous membrane and has little submucosal tissue.

Rugae :-

The irregular fibrous connective ridge located on the anterior part of hard palate.

Mandible :-

1) Muscular attachment :-

1. Labial frenum
2. Labial vestibule
3. Buccal frenum
4. Buccal vestibule
5. Retromolar pad
6. Lingual frenum
7. Alveolingual sulcus.

2) Supportive attachment :-

→ primary stress bearing area :-

Buccal shelf area

→ secondary stress bearing area.

Labial and lingual

Surface Area

1. Crest of alveolar ridge
2. Myelohyoid ridge
3. Mental foramen
4. Frenal attachment
5. Torus mandibularis.

Alveolar process:

Contains a bony groove that helps to attach orbicularis oris muscle.

Retromolar pad:

Triangular pad of tissue at distal end of ridge

Buccal shelf area:

Lies at right angle to vertical occlusal force and covered by

- Medially, Crest ridge
- Laterally, External oblique line
- Anterior, Buccal frenum
- Posterior, Masseter Retromolar pad.

Slope of Residual Alveolar ridge

Provides more support due to underlying cancellous. Sometimes be present as sharp, sloping, Edentulous undercut.

Mylohyoid ridge

Mylohyoid muscle attaches to the ridge, denture flange should extend below the ridge

Retromylohyoid curtain

posterior extension of lingual portion of denture bounded by

- Anteriorly, lingual tuberosity
- Laterally, pterygomandibular raphae.
- posteromedially, Palatoglossus muscle
- posterolaterally, superior constrictor muscle
- Inferiorly, mylohyoid muscle and submandibular gland.

MAXILLA

- Labial Frenum
- Labial Sulcus
- Buccal Frenum
- Buccal Sulcus
- Residual alveolar ridge
- Maxillary tuberosity
- Fovea palatina
- Median palatine raphe
- Papilla
- Incisive papilla
- Rugae
- Posterior palatal Seal

MANDIBLE

- Labial frenum
- Labial Sulcus
- Buccal frenum
- Buccal Sulcus
- Pterygomandibular raphe
- Alveolingual sulcus
- Lingual frenum
- Residual alveolar ridge
- Retromolar pad
- Buccal shelf area.

Ex. No. 6

FABRICATION OF CUSTOM TRAY ON EDENTULOUS MODELS (SHELLAC BASE PLATE)

Date	Procedure	Assessment	Signature
	Marking spacer and tray outline on the cast		
	Maxillary		
	Mandibular		
	Spacer Adaptation		
	Maxillary		
	Mandibular		
	Finished custom tray		
	Maxillary		
	Mandibular		

FABRICATION OF CUSTOM TRAY
(Fujii adapted about method)

DEFINITION:-

also called as special tray, an individualized impression tray made from a cast, retrieved from a previous impression.

MATERIALS REQUIRED:-

plaster cast, wax sheet, cold mould seal, self cure acrylic resin, acrylic trimmer, fissure for peripheries.

PROCEDURE:-

* Mark an outline on cast with a pencil
* In maxilla give the posterior border determined by a line extending between the hamular notch with midpoint approximately 1cm forer palatine
* In mandible it should be just beyond the retromolar pad
* In both by which the outline in premolar areas should be elevated by 1cm to provide adequate space for relief landmarks
* Block the areas undercut with wax and adapt a layer of boxing wax to the cast for relief of width 1-2mm from the cast to the determined outline
* Paint the tin foil on the whole cast over the relief area.

Use of "The final substitute":

Removal of 4mm square of Relief area here will expose the Cast thereby providing the frame wrap over the previous and I number again on either side

2mm square of 4mm recharge

Repositionate the impression tray material acc. to the manufacturer recommendations. Mix and apply on tray or other suitable container. Check the consistency of the mix periodically and remove when it reaches the dough stage.

Fill the mix to desired thickness with a roller or a special gun to make impression material uniformly thick.

Adapt the material to cast carefully to avoid over thinning the mix on convex portion of cast.

Remove the excess impression material from cast from the excessive material with handle and adapt them to tray

In mandibular tray, one handle in anterior portion of the tray.

In mandibular tray - 3 handle as figure not

2 on either of I number again

1 on anterior portion of tray.

Tray thickness - 3.4mm

Length - 8mm

Height - 8mm.

place rectangular grooves along the facing and lying surface of handle to improve grip

put right acrylic adhesive in the suppressor bag with collar as the edge clogged at base of the attachment to ensure bonding of the handle to bag.

Cure the suppressor bag on bench at downward angle

After curing, remove the suppressor bag from the cast and trim the borders.

Smooth the rough areas and store the bag in the cast.

Ex. No. 7

FABRICATION OF CUSTOM TRAY ON EDENTULOUS MODELS
(SPRINKLE-ON METHOD)

Date	Procedure	Assessment	Signature
	Marking spacer and tray outline on the cast		
	Maxillary		
	Mandibular		
	Spacer Adaptation		
	Maxillary		
	Mandibular		
	Custom tray before trimming		
	Maxillary		
	Mandibular		
	Finished and polished custom tray		
	Maxillary		
	Mandibular		

FABRICATION OF CUSTOM TRAY
(Impression technique)

Definition :-
It is an individual impression tray made from a cast obtained from a preliminary impression. It is used in making a final impression

Materials required :-
Impression Cast, wax sheet cold mould seal, self cure acrylic resin, acrylic trimmer

Procedure :-
1. Making a outline :- Tray extension like vestibular space.
2) Relief Area :- Use blade pencil and locate the undercuts also the maximum depth of undercut in preliminary cast.
3) Tray extension :-
Use the colour in such a way that it follow the contour of the outline but should be wide short
4) Spacer :-
Depends upon the type of spacer used, suggested spacer is wax pan.
i) Maxillary arch - labial and buccal space
ii) Mandibular arch - Modified buccal with 2 steps in canine space
5. Adaptation of wax spacer :-
Make sure an outline of impression tray on cast with pencil, block out the undercuts and adapt a layer of base plate to cast for relief, wax spacer is over undercuts depth.

4) Trimming edges :-

Saw spaces on either side of the edge to shape it either 2mm square or 4mm rectangle. This should be applied as a appropriate as edge it increases the workability and result in cracks removing of curtain long at the edge.

5. Assembling :-

Split pattern on cast and have space, mould with dipping powder and dipping is applied until there is uniform layer. approximately 4mm thick.

6. Fabrication of handle :-

Mix more resin, when it is dough edge, handles are formed and adapted to the Requirements. by, Make the handle appear 8-10mm thick & 4mm depth and 4mm height placement of horizontal groove across the facing and lapping surface of handle can support the gauge.

5. Trimming and Polishing :-

After setting, the ring is removed from the cast and trimming with angle grinder machine. The areas which are rough, are carefully carving the corners which are adjusted, trimming and polished.

6. The handle of the ring should be trimming in such that it is smooth at edges and should have smooth handles without irregularities.

Ex. No. 5

FABRICATION OF TEMPORARY RECORD BASE
(SHELLAC BASE PLATE)

Date	Procedure	Assessment	Signature
	Marking record base outline on the cast		
	Maxillary		
	Mandibular		
	Finished record base		
	Maxillary		
	Mandibular		

FABRICATION OF TEMPORARY RECORD BASE
(Shellac base plate)

Aim:
Fabrication of temporary record base (Shellac base plate)

1. Cast
2. Bunsen
3. shellac base plate
4. Scissors
5. Collar
6. Wax

Pages from shellac base plate is selected for maxilla and mandibular arch.
Cast is soaked with soapy water before adapting the baseplate. This will prevent shellac base plate from sticking to the cast while heating it.
Heat the baseplate over the flame, until softened place it over the cast and flame it with the bunsen burner.
Continue finger pressure applied with wet cotton adapting over the cast.
Softened the baseplate and adapt it over the cast. The finger while the material is warm hand cut out the excess with scissors leaving approx. 2mm beyond vestibular areas.

Continuously heat and adapt the material to the cast.
Using a spatula fold the material up to the sulcus depth to form a smooth rounded border.
Overextend cast in shellac to preclude Thinning of the cast and stick to it.
Use file to retain and round off the borders.
Smooth finished base plate to be obtained as they present

Advantage :-

Minimum amount of time is required for adaptation

Disadvantage :-

Chance of doing Thin initial adaptation with the Thermoplastic material
Its brittle as There is chance of breaking.

P.T.O

Ex. No. 9

COMPLETE DENTURE
TEETH ARRANGEMENT IN CLASS-I ARTICULATION

Date	Procedure	Assessment	Signature
2/12/21	Construction of occlusal rims		
	Maxillary	B	
	Mandibular		
8/12/21	Mounting on articulator		
10/12/21	Articulated casts		
13/12/21	Anterior teeth arrangement		
15/12/21	Posterior teeth arrangement		
17/12/21	Waxup & carving		

COMPLETE DENTURE

Definition :-

A removal dental prosthetics That replaces the entire dentition and associated structure of maxilla and mandible

Parts :-

1. Denture flange
2. Denture base
3. Denture border
4. Denture teeth

Surfaces :-

1. Polished surface
2. Impression surface
3. Occlusal and incisal surface

Armamentarium required :-

Impression tray, Impression compound, plaster of paris, modelling wax, alginate, zinc oxide eugenol paste, mixing slab, heat cure acrylic resin, wax knife, Cutter, spatula, acrylic teeth, articulator, flask, clamp, bunsen, rubber bowl, straight spatula, acrylic burrs, sandpaper, colton.

STEPS IN COMPLETE DENTURE

CLINICAL STEPS	LABORATORY STEPS
1. Diagnosis and treatment planning	
2. Selection of tray Primary impression trays i) Impression Compound ii) Plaster of paris	
	4. Beading and Boxing
	5. Pouring of primary cast
	6. Spacer adaptation
	7. Special tray fabrication
8. Border moulding using green stick Compound	
9. Secondary impression with i) Zinc oxide eugenol ii) Elastomeric impression material	
	10. Beading and boxing
	11. Pouring the master cast
	12. Acrylic shellac record base
	13. occlusal rim fabrication

14. Job relation

17. Selection & test

20. Exam fear

15. Mounting
16. Article related

18. Task assignment
19. Exam up and Coming

21. Planning
a) Planning
b) Drawing
c) Packing
d) Coming
e) Depositing
f) Lab reasoning

22. Finishing
(a). Finishing
b) Polishing

Ex. No. 10 **PROCESSING OF COMPLETE DENTURE (CLASS-I)**

Date	Procedure	Assessment	Signature
	Flasking		
	Maxillary		
	Mandibular		
	Dewaxing		
	Maxillary		
	Mandibular	B	
	Packing and curing		
	Maxillary		
	Mandibular		
	Deflasked Denture		
	Maxillary		
	Mandibular		
	Finishing and Polishing		
	Maxillary		
	Mandibular		

PRINCIPLES OF TEETH SETTING.

MANDIBLE

1) Central incisor

front view:- long axis parallel to vertical axis

side view:- slightly labial inclination

occlusal view:- Labial edge is in contact with occlusal plane

2) Lateral incisor

front view:- long axis of the tooth slightly towards the midline of the mouth

side view:- Inclined labial is a greater degree than central

occlusal view:- Inclined edge is 2mm short to occlusal plane

3) Canine

front and side view:-

long axis of the tooth is parallel to the vertical axis

The bulbous cervical half of the tooth towards its prominence

occlusal view:- The cusp tip is in contact with the horizontal plane.

4) first premolar

front and side view:- long axis is parallel

occlusal view:- palatal cusp is 2mm short of plane. Buccal cusp is contact with the plane.

5) second premolar

front and side view:- long axis parallel to the vertical

occlusal view:- Both buccal and palatal cusp are in contact with occlusal plane.

vii) first molar :-

frontview :- long axis slope buccally

side view :- long axis slope distally

occlusal view :- only the mesiopalatal cusp is contact with the occlusal plane.

viii) Second molar :-

frontview :- long axis slope buccally more sloping than the first molar

Side view :- long axis slope distally more sloping than the first molar.

occlusal view :- All the cusps are short of plane except mesiopalatal cusp which is nearest to the plane.

MANDIBLE :-

i) Central incisor :-

frontview :- long axis parallel to vertical axis

side view :- slight labial inclination

occlusal view :- Incisal edges seen above the plane.

ii) Lateral incisor :-

frontview :- long axis parallel to the vertical axis

Side view :- slight labial inclination

occlusal view :- Incisal edge is seen above the plane

v) Canine

front view:- long axis slopes very slightly towards the midline

side view:- slopes slightly lingually

occlusal view:- Cusp tip is seen above the occlusal plane

vi) first premolar:-

front and side view:- long axis is parallel to the vertical axis of the tooth

occlusal view:- lingual cusp is below the horizontal plane and buccal cusp is seen above the occlusal plane.

vii) first molar:-

front view:- long axis slopes lingually

side view:- long axis slopes mesially

occlusally:- All the cusps are above the occlusal plane. First second premolar, buccal and distal cusp are higher than mesial and lingual cusp.

viii) Second molar.

front view:- lingual inclination is more pronounced

side view:- Mesial inclination is more pronounced

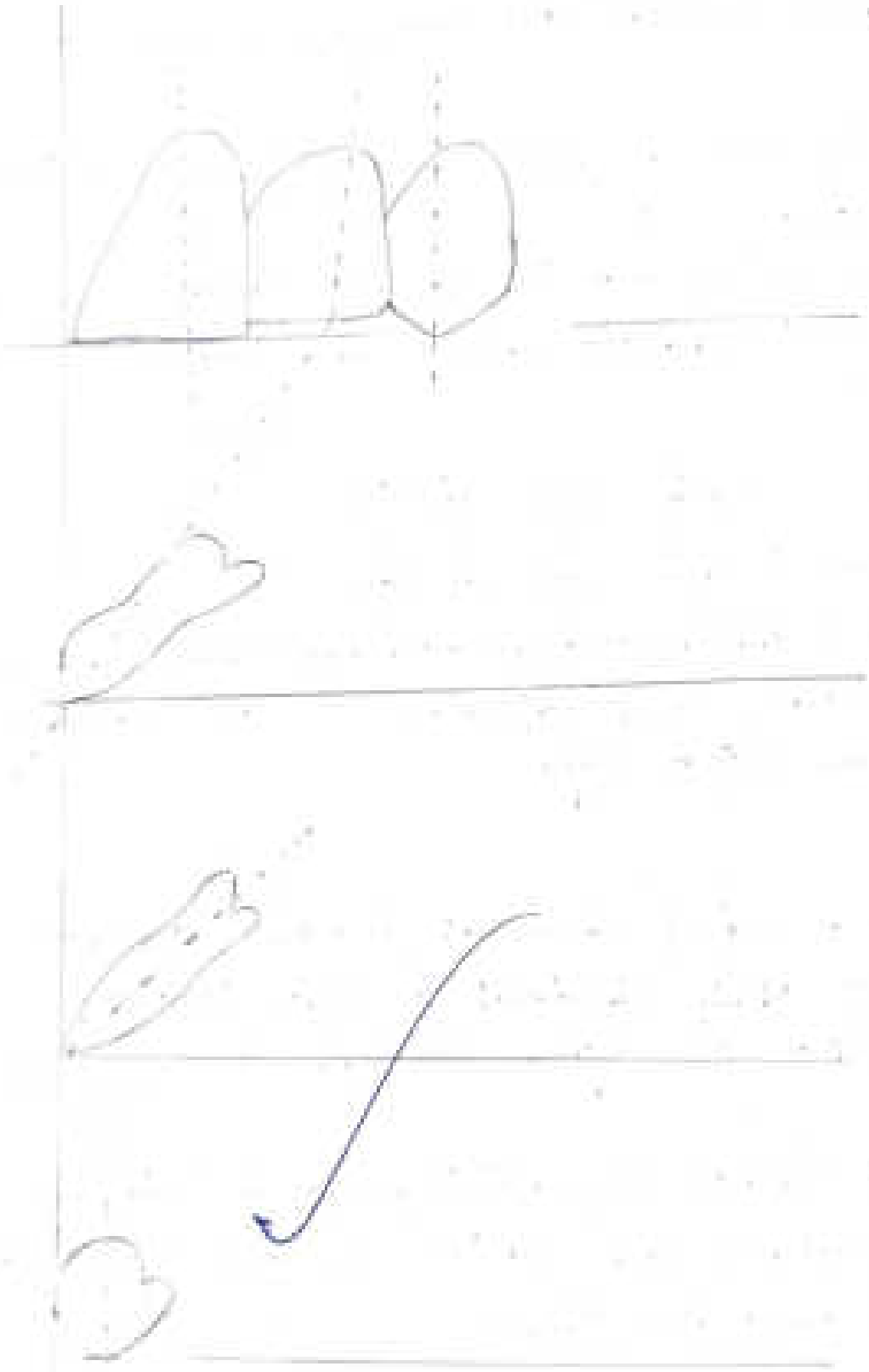
occlusal view:- All cusps are above the occlusal plane.

ix) Second premolar.

front and side view:- long axis is parallel to vertical axis

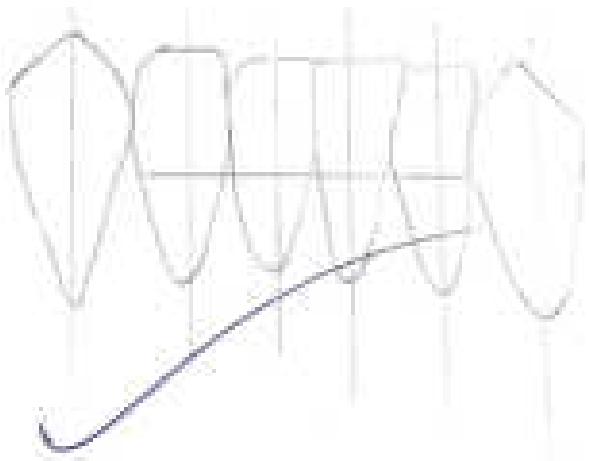
occlusal view:- Both lingual and buccal cusps are seen above the occlusal plane.

Relation of upper and lower teeth to Horizontal and vertical axis



Relaxation of upper portion left to horizontal and vertical

Relaxation of lower portion horizontal and vertical axis



p. 4b

Ex. No. 11

REPAIR WORK OF COMPLETE DENTURE

Date	Procedure	Assessment	Signature
	Assembling fractured parts		
	Maxillary		
	Mandibular		
	Preparation of working model		
	Maxillary		
	Mandibular	B	
	Creation of space at fractured site and placement of retention grooves		
	Maxillary		
	Mandibular		
	Processing		
	Maxillary		
	Mandibular		
	Finishing and Polishing		
	Maxillary		
	Mandibular		

PROCESSING OF COMPLETE DENTURE

Steps :-

Flasking
Removing
Packing
Curing
Deflasking
Finishing

Flasking :-

The process of investing the cast and wax replica of the desired form in a flask preparatory to the acrylization-molding in to the desired product

i) Base
ii) Counter / Body
iii) Lid

check the need of lid/ cloture to the cast and fill in deficient area with base plate wax. Take care of completely fill the periphery borders. However do not overflow the wax on the cast borders.

Select the flask that fit tightly or snugly without molding place the cloture and cast in the flask to check the height of cloture left in the flask.

Place the dental plaster mix in the base of the flask and the wax denture and cast into mix.

Smooth the dental plaster around the cast and allow the plaster to completely setting set.

Paint all the plaster surface in base of the flask with a separating medium

place the body / cavity of flask into the position on the base of the flask.

Pour plaster into the flask, allowing less for the plaster to flow over the denture

Remove the plaster ~~with~~ with a finger to expose the enclosed surface of denture.

A mix of dental plaster is placed over the surface of the denture in deep denture which is referred to a Cuvette

Pour the dental plaster over the plaster surface to fill the flask.

Place the lid on the filled flask and allow the plaster to set.

How allow separation

After the plaster has set ; the flask is placed in the boiling water to soften the wax for 4-5 min.

Then it is removed from water and opened. Then the wax is washed away with boiling water.

Packing :-

Application of appropriate pressure in the mould cavity and the cast.

Mix the heat cure resin in a clean mixing jar until the resin takes place it should until the resin reaches the proper stage for packing.

It is important that the mixing jar be airtight to prevent evaporation of acrylic monomer, which will cause the resin to be grainy.

After the resin has reached the dough stage, remove it from the jar, split and adapt to the flask.

Allow the the heat cure for 1 hour.

Curing :-

After heat curing, place the denture in water bath at room temperature and then gradually temperature increased to 100° for about an hour this provide polymerization better.

Short Curing Cycle :-

Processing the resin at 74° for approx 8hrs and increase the temperature of the water bath to 100° and processing for 1hr.

Long Curing Cycle :-

In processing the denture have resin in a constant temperature water bath at 74°c for 8 hr.

Reflasking:

After the denture has been cured. It is removed from the curing with and allowed to bench cool.

Reflasking is the process of removing the processed denture from the flask.

Trimming, finishing and polishing:

Trim the flask from the Completed denture with shape bur. mounted on a laboratory bulb

finishing is done sequentially with rough and smooth grit sand papers.

Once a smooth surface is achieved polishing the denture with fine pleur pumice in hot buffs is carried out.

Lastly the polishing is done

Note That no pumice is entrapped in the indentation and margin areas. This can be removed by using a jet of steam or brush.

folds

Denture Repair

Accurate assessment and diagnosis of fractured denture
Fracture This might prevent proper position
fracture can occur in denture base and in teeth

Reason for fracture :-
Denture base fracture occur due to

Alveolar resorption
Warpage
Inadequate / poor relief
Inaccurate impression
Tooth / teeth fracture occur due to

Unequal Interference
Faulty tooth
Determination of retention
Contribution of single teeth
Excessive grinding of teeth

Repairing fractured Denture :-
1) Non-separated / multiple fracture :-
glue occur at multiple frequently separating ata deep fracture noted.

Aim:-
Broken pieces are placed together to determine accurate fit.
The denture is held together with sticky wax and small nameless stones
A cavity mould of plaster is provided around the denture after blocking the undercuts.
The denture is removed from cast, free of sticky wax and stones
No:55% burs to grind out fracture line from the beginning to the end and reverse to increase the bonding surface
In the palatal of maxillary denture, place dam tooth alongside the repair joint
Cavity provided with separating medium
place cured resin autopolymerizing resin into groove taking care to avoid air entrapment.
Build up resin repair slightly above the denture line it is to be processed contour and denture fractured into two or more part (components)

Result:-
Denture when dropped on hard surface, repair is done or extended to that denture maxillary fracture
Additionally, reinforcement can be used for strength

2. fracture denture tooth with section missing

When part of denture is missing in the impression, and the mould of patient and cast is made. Pouring, repair alone and impression later. Fitting of missing part in the cast and replace missing tooth.

3. Repairing denture with fractured tooth:

Method to replace these tooth depend on tooth material that involve removal of fractured tooth and replace it.

Note:-

Align part accurately

Do not repair ill-fitting denture

Uneven-contaminated-monomer-denture appear rough

Rigid

Cure denture if used water pressure to avoid porosity

Use wax for enhancement to add rigidity.

Ex. No. 12

REBASING OF COMPLETE DENTURE
(FLASK METHOD)

Date	Procedure	Assessment	Signature
	Preparation of working models Maxillary Mandibular		
	Flasking with index Maxillary Mandibular		
	Preparation of Complete dentures for rebasing Maxillary Mandibular	B	
	Wax-up of Complete dentures Maxillary Mandibular		
	Processing Maxillary Mandibular		
	Finishing and Polishing of rebased dentures Maxillary Mandibular		

RELINING OF COMPLETE DENTURE
(Flanging method)

Definition :-
The laboratory process of replacing the entire denture base material on a existing prosthesis

Indication of Relining
Immediate denture at 3-6 months after the surgical Construction
When residual alveolar ridge have resorbed and adaptation of denture base to the ridge is poor.
When the patient cannot afford the cost of new denture Construction.
When the Construction of new denture with the accompanying Costs of appointment can cause physical and mental stress

Advantages of Relining
Existing denture
Impression material
Dental plaster
Face bow
Denture base material

Clinical steps :-
1) Wax method :-
- open mouth technique (Boucher)
- closed mouth technique
2) functional method :-
Chair side method

Laboratory Diagnosis :-

i) Laboratory procedures for rabbies include antibodies method by method and flash method
The method use is flash method.

ii) The pooled specimens along with the dentures is inserted in the base flask.

iii) A silicon mould material like is packed over the denture to invest the body.

iv) The investing body is done for a flexible mould and flasking is completed.

v) The flask is opened and denture is removed.

vi) The entire denture base material damage the first seen by acrylic around the procedure tool to retain the position of denture teeth

vii) The teeth is placed back into the mould.

viii) The inserted above prevented the base of flask is the cast for denture.

ix) Separating media is painted over the mould space.

x) Resin is packed cured, finished and polished

xi) The finished denture are remounted to check for occlusal discrepancy

xii) Once the dentures are relieved, they are inserted in the mouth.

Ex. No. 13

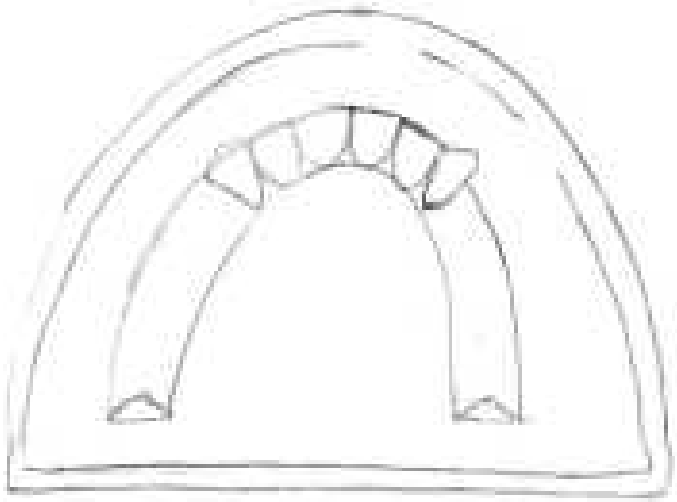
PREPARATION OF CASTS FOR KENNEDY'S CLASSIFICATION OF PARTIALLY EDENTULOUS ARCHES & SURVEYING

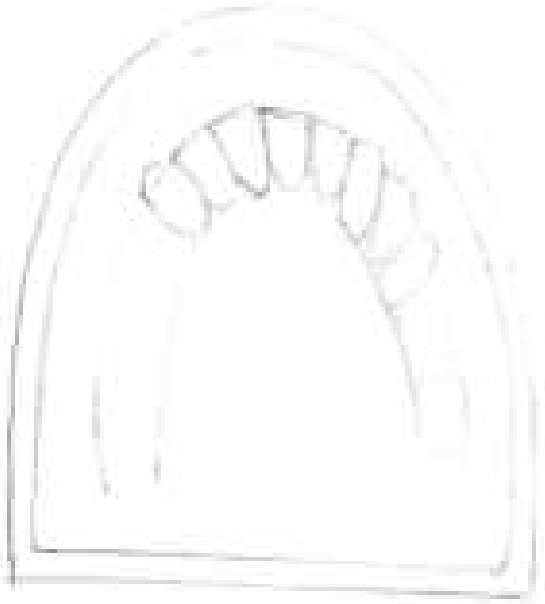
Date	Procedure	Assessment	Signature
	Class I		
	Maxillary	B	
	Mandibular		
	Class IV		
	Maxillary	B	
	Mandibular		
	Surveying of the casts	B	

KENNEDY'S CLASSIFICATION OF REMOVABLE PARTIAL DENTURE

CLASS- I

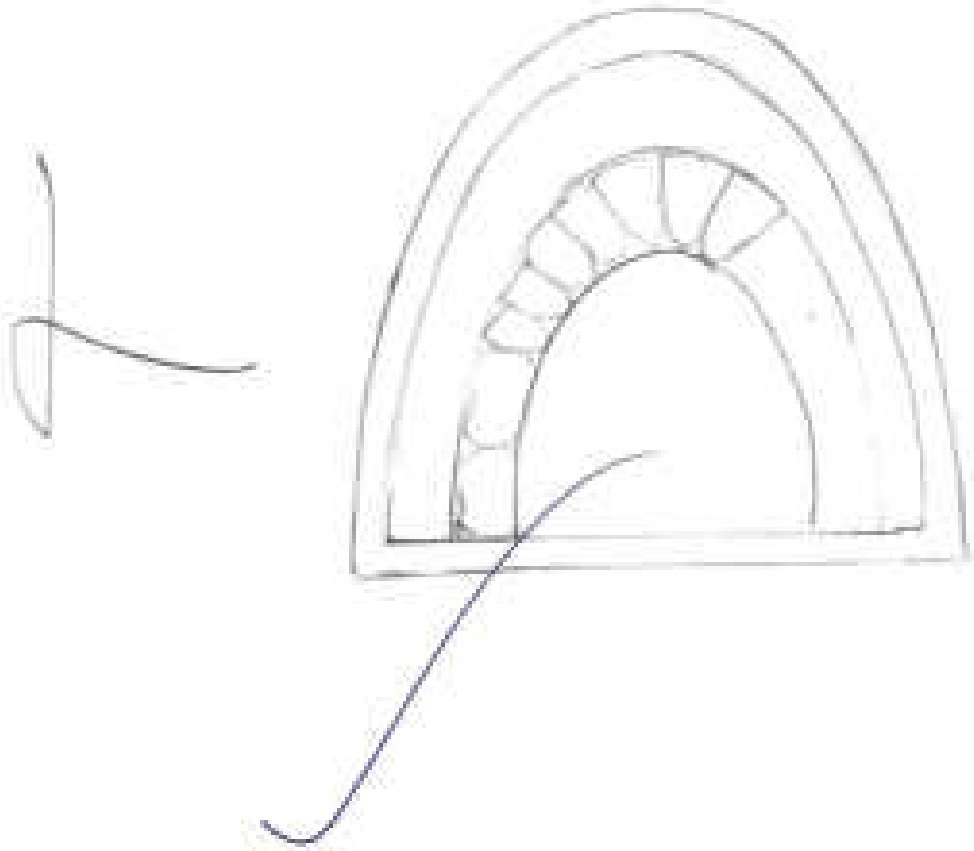
Bilateral edentulous area located posterior remaining natural teeth.





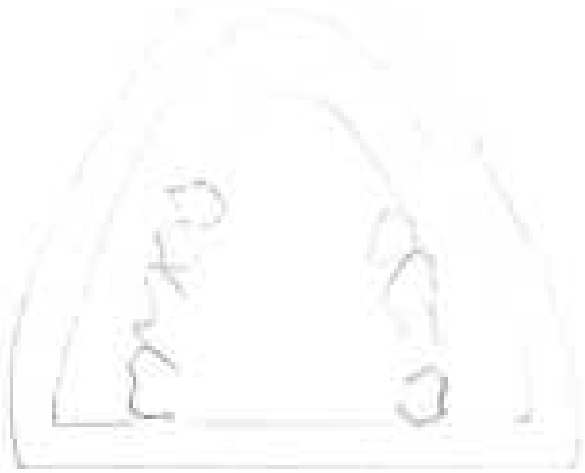
Class III

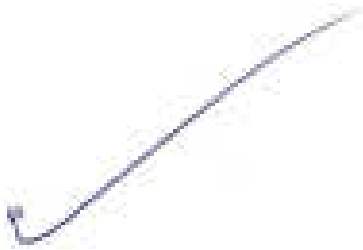
A Unilateral edentulous area with natural teeth remaining both anterior and posterior to it



Case IV

A single but bifurcated (crossing the midline) structure located anterior to the mammillary material (wall





Pr. No. 14

FABRICATION OF REMOVABLE PARTIAL DENTURE (RPD)
(INTERIM RPD)

MAXILLARY CL - IV MANDIBULAR CL - I

Date	Procedure	Assessment	Signature
	Preparation of casts interim RPD		
	Maxillary		
	Mandibular		
	Occlusal rims		
	Maxillary		
	Mandibular		
	Articulation	B	
	Teeth arrangement		
	Preparation of wrought wire clasps		
	Wax-up		
	Flasking and Dewaxing		
	Packing and Curing		
	Finishing and Polishing		
	Maxillary		
	Mandibular		

REMOVABLE PARTIAL DENTURE

Definition :-

Removable partial denture defined as replacement one or more missing teeth in a partially edentulous arch which can be readily placed and removed from the mouth by the patient

Armamentarium :-

1. Impression and mandibular tray
2. Shellac baseplate
3. Modelling wax
4. Acrylic resin
5. Articulator
6. Bunsen burner
7. Curved scissors
8. Wax spatula
9. Cold mould seal
10. Impression cup
11. Acrylic resin.

Preparation of Cast :-

Denture, maxillary and mandibular custom made impression dental stone in a mould.

Required teeth are planned from the cast to achieve class II mandibular arch and class II maxillary arch

Fabrication of occlusal Rim :-

Base plate are adapted over the edentulous ridge with adequate buccal and lingual extension on which occlusal rims are fabricated using modelling wax.

Mounting and Articulation

The upper and lower cast with the finished occlusal rims are articulated in three point articulator according to articulating principle.

Teeth arrangement

Artificial teeth are set, clasp are made for class I mandibular cast with 19 gauge wrought wire at the end.

Wax up and Curing

Seal the base plate wax around the teeth of each artificial teeth along the collar of the edentulous area and finishing is done. This is sealed with the cast after sealing deflasking is carried out to separated the mounted casts.

Flasking :-

It is done by reverse flasking method.

The flask should be placed in boiling water for about 10min and then wax elimination is done.

Make sure that mould cavity is dry and a dagger by separating medium is applied with a brush. Mix resin and powder in 3:1 ratio in a clean mixing jar

close the jar in order to prevent evaporation of moisture
When dough stage is reached, the material is taken out
from packet.

Curing :-

After hand curing place the article in boiling water
bath at room temperature and then gradually the
temperature is increased to 100°C for about an hour.
This provide better polymerization

Deflasking :-

After the article has been cured it is removed from the
Curing unit and allowed to bench Cooling.
Deflasking is a process of removal of plaster mold article
from the flask.

Trimming, finishing and polishing :-

Excess flash is removed with metal blade knives
first trimming is carried out with acrylic knives.
finishing is done separately with rough and smooth grade
sand paper.

Once the smooth surface is achieved, polishing the denture
with the fine flour pumice in wet buffs carried out
dated dry buffing is done.
Note that pumice is not entrapped on the denture
This can be removed by using a jet of steam or brush.

Ragas Dental College & Hospital

No.2/102, East Coast Road, Uthandi, Chennai - 600 119.

Pre-Clinical Record

Conservative Dentistry

NAME SANGEETHAA. G

Ragas Dental College & Hospital

No.2/102, East Coast Road, Uthandi, Chennai - 600 119.

DEPARTMENT OF CONSERVATIVE DENTISTRY

Examination Registration Number : 5191611562

CERTIFIED that this is the bonafide record work done by

Mr./Miss .....SANGEETHAA. G.....

In the Pre-Clinical Conservative Dentistry Laboratory, at Ragas Dental College, Chennai.

During the year 20.17..... to 20..18.....

Signature of the Staff

Signature of
Head of the Department

External Examiner

Date :

Internal Examiner

Date :

Impression and

No.	Date	Requirements	Impression	Plaster model	Final Approval (Finishing & Polishing)	Grade
1.	16-11-17	Upper Premolar	✓	✓	✓	✓
2.	16-11-17	Upper Premolar	✓	✓	✓	✓
3.	16-11-17	Lower Premolar	✓	✓	✓	
4.	16-11-17	Upper Molar	✓	✓	✓	✓
5.	16-11-17	Upper Molar	✓	✓	✓	✓
6.	16-11-17	Upper Molar	✓	✓	✓	✓
7.	16-11-17	Lower Molar	✓	✓	✓	✓
8.	16-11-17	Lower Molar	✓	✓	✓	✓
9.		Lower Molar				
10.		Lower Molar				

Exercise No. 2

G.V. Black's Classification

Class I : ALL PIT AND FISSURE CAVITIES

(a) Occlusal Surface of Premolars and molars

(b) occlusal two-thirds of facial and lingual surface

(c) lingual surface of maxillary incisors.

Diagram : upper Pre Molar Class I

Line Angles : 8 LINE ANGLES

- Mesiopalatal
- Disto palatal
- Mesio buccal
- Distobuccal
- Mesiopulpal
- Disto pulpal
- Buccopulpal
- palatopulpal

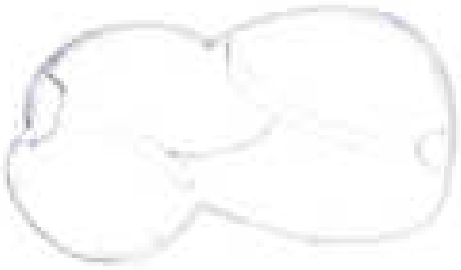
Point Angles : 4 POINT ANGLES

- Mesiobuccal pulpal
- Disto buccal pulpal
- Mesiolinguco pulpal
- Distolinguo pulpal

Grade :

Signature

Diagram : Upper Molar Class I (Conservative)



Line Angles : 8 LINE ANGLES

- Mesiobuccal
- Distobuccal
- Mesiopulpal
- Buccopulpal
- Lingopulpal
- Mesiopalatal
- Distopalatal

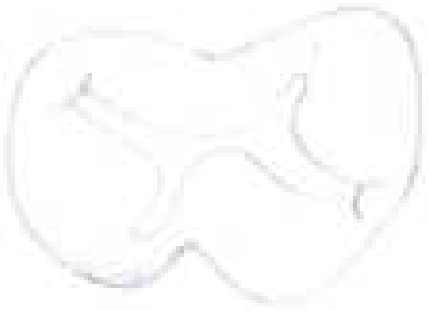
Point Angles : 4 POINT ANGLES

- Mesiobuccopulpal
- Distobuccopulpal
- Mesiolingopulpal
- Distolingopulpal

Grade :

Signature

Diagram : Upper Molar Class I (Conventional)



Line Angles : 8 LINE ANGLES

- Mesiobuccal
- Disto buccal
- Mesiopalatal
- Distopalatal
- Buccopulpal
- Lingopulpal
- Mesio pulpal
- Disto pulpal

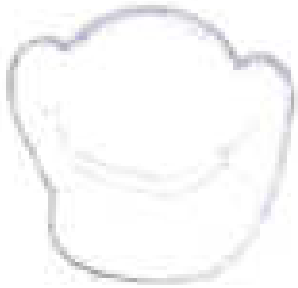
Point Angles : 4 POINT ANGLES.

- Mesiobuccopulpal
- Disto buccopulpal
- Mesiolinguopulpal
- Distolinguopulpal

Grade :

Signature

Diagram : Lower Pre Molar



Line Angles : 8 LINE ANGLES.

- Mesiolingual
- Mesiobuccal
- Mesiopulpal
- linguopulpal
- Distobuccal
- Distolingual
- Distopulpal
- Buccopulpal

Point Angles : 4 POINT ANGLES.

- Mesiobuccopulpal
- Mesiolinguopulpal
- Distobuccopulpal
- Distolinguopulpal

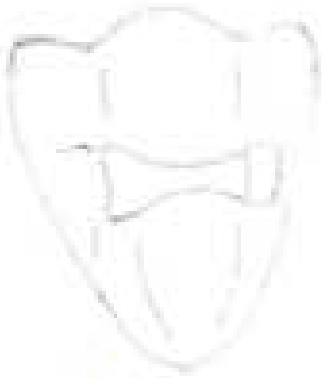
Grade :

Signature

Class II :

cavities seen on the proximal surface of posterior teeth.

Diagram : Upper Pre - Molar



Line Angles : 11 LINE ANGLES

- Facio pulpal
- Linguo pulpal
- Disto pulpal
- Axio pulpal
- Disto facial
- Disto lingual
- Facio gingival
- Axio gingival
- Axio facial
- Axio lingual

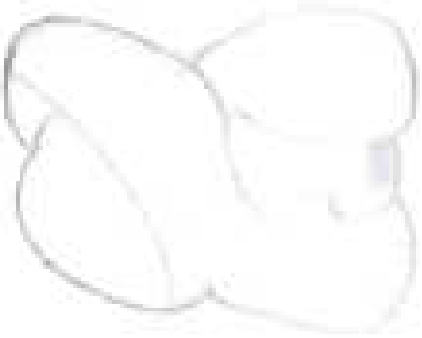
Point Angles : 6 POINT ANGLES

- Disto facio pulpal
- Disto lingual pulpal
- Axio bucco pulpal
- Axio bucco gingival
- Axio linguo pulpal
- Axio linguo gingival

Grade :

Signature

Diagram : Class II - Upper First Molar (MO)



Line Angles : 11 LINE ANGLES

- Distobuccal
- Disto pulpal
- Disto lingual
- Linguo pulpal
- Axio pulpal
- Axio lingual
- Axiofacial
- Faciogingival
- Linguogingival
- Axiobuccal
- Buccopulpal

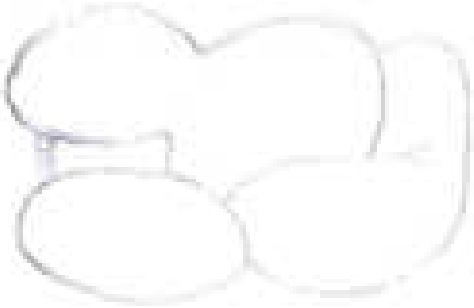
Point Angles : 6 POINT ANGLES

- Distobuccalpulpal
- Disto linguopulpal
- Axio buccogingival
- Axio buccopulpal
- Axio linguopulpal
- Axio linguogingival

Grade :

Signature

Diagram : Class II - Upper Lower Molar (MO)



Line Angles : 11 LINE ANGLES

- Distofacial
- Axiofacial
- Axiolingual
- Distolingual
- Axiogingival
- Faciogingival
- linguogingival
- Faciopulpal
- linguopulpal
- Axiopulpal
- Distopulpal

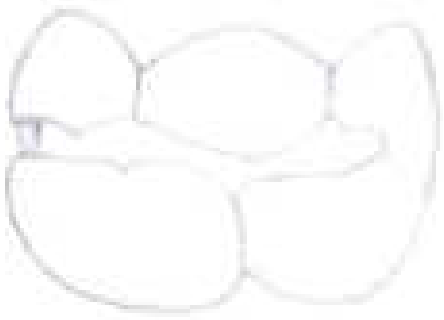
Point Angles : 6 POINT ANGLES

- Distofaciopulpal
- Axiofaciopulpal
- Axiofaciogingival
- Axiolinguogingival
- Axiolinguopulpal
- Distolinguopulpal

Grade :

Signature

Diagram : Class II for amalgam - Uppar Lower Molar (MO)



Line Angles : 11 LINE ANGLES

- Distofacial
- Axiolingual
- Distolingual
- Axiofacial
- Faciogingival
- Axiogingival
- linguogingival
- Faciopulpal
- linguopulpal
- Axiopulpal
- Distopulpal

Point Angles : 6 POINT ANGLES

- Distofaciopulpal
- Axiofaciopulpal
- Axiofaciogingival
- Axiolinguogingival
- Axiolinguopulpal
- Distolinguopulpal

Grade :

Signature

Class III : Cavities seen on the proximal surface of anterior teeth which do not involve incisal edges.

Diagram : Class III for Composite - Upper Central Incisor

Line Angles : 6 LINE ANGLES

- Facio gingival
- Lingua gingival
- Axio gingival
- Axio facial
- Axio lingual
- Incisal

Point Angles : 3 POINT ANGLES

- Axio facio gingival
- Axio lingua gingival
- Axio incisal

Grade :

Signature

Class IV :

Diagram : Class IV for Composite - Lower Central Incisor

Line Angles : 11 LINE ANGLES

- Mesio facial
- Mesio lingual
- Mesio pulpal
- Axio facial
- Axio lingual
- Axio gingival
- Axio pulpal
- Facio gingival
- Lingio gingival
- Lingio pulpal
- Facio pulpal
- Axio linguo gingival

Point Angles : 6 POINT ANGLES

- Mesio facio pulpal
- Mesio linguo pulpal
- Axio facio pulpal
- Axio linguo pulpal
- Axio facio gingival

Grade :

Signature

Class V :

Diagram : Class V - Upper Molar

Line Angles : 8 LINE ANGLES

- Mesioincisal
- Mesiogingival
- Distoincisal
- Distogingival
- Axiomesial
- Axiodistal
- Axioincisal
- Axiogingival

Point Angles : 4 POINT ANGLES

- Axiomesiogingival
- Axiodistogingival
- Axiomesioincisal
- Axiodistogingival

Signature

Grade :

Diagram : Class V for Lower Molar

Line Angles : 8 LINE ANGLES

- Mesioincisal
- Mesiogingival
- Distoincisal
- Distogingival
- Axiomesial
- Axiodistal
- Axioincisal
- Axiogingival

Point Angles : 4 POINT ANGLES

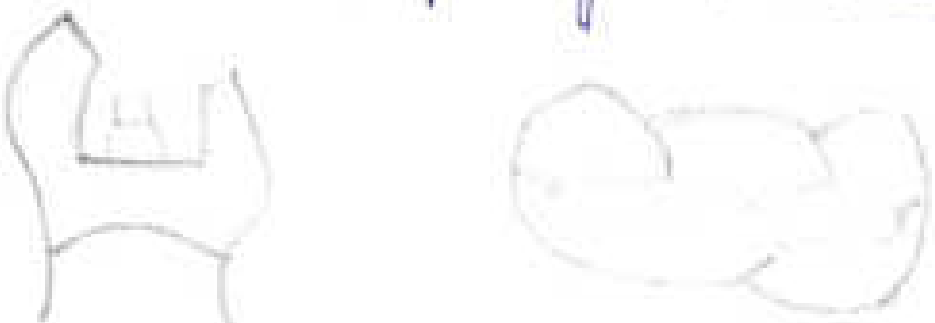
- Axiomesioincisal
- Axiodistoincisal
- Axiomesiogingival
- Axiodistoincisal

Grade :

Signature

STEP 4 ; CONVIENIENCE FORM

Shape of the preparation that provides for adequate detection accessability and ease of operation in preparing and out altering the tooth.



STEP-5 – REMOVAL OF ANY REMAINING INFECTED DENTIN (OR) RESTORATIVE MATERIAL

Elimination of any infected carious tooth structure or faulty restoration material left in the tooth after initial tooth preparation

FEATURES –

It affects the aesthetic result of new restoration
More retention is needed for new restoration
Radiographic evidence of caries under old restoration
Pulp symptomatic pre operatively
Peripherally (or) remaining old restorative material if not needed.

STEP6 :- PULP PROTECTION

Pulp should be protected with either cavity varnish liners or bases

Zinc phosphate cement being a high strength base with compressive strength of 104 mpa is preferred for pulp protection.

STEP7 : SECONDARY RESISTANCE AND RETENTION FORM.

Compound and complex preparation require additional retentive, resistance features.

Features :-

(1) Mechanical features
(a) Retentions locks grooves
(b) Preparation walls
(c) Skirts
(d) Beveled enamel margins
(e) pins and slots.

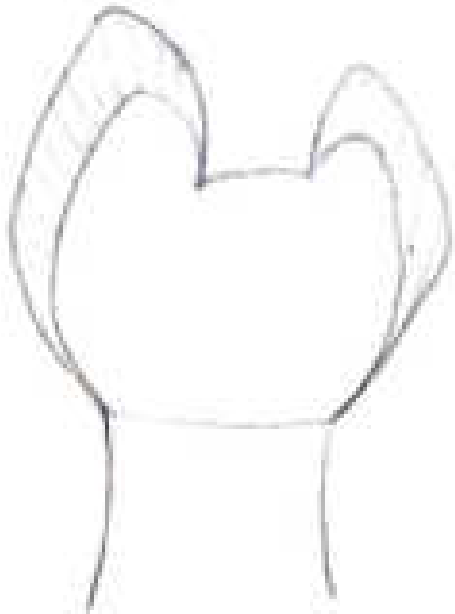
(2) Placement of etchers, primer (or) adhesive on prepared walls.

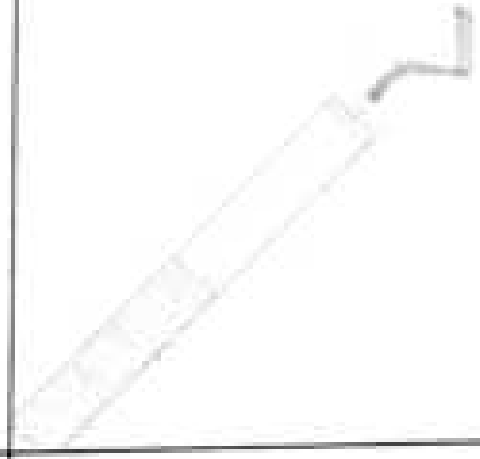
STEP 8 :- FINISHING OF EXTERNAL WALLS.

Development of a specific cavosurface design and degree of smoothness (or) roughness that produces the maximum effectiveness of restorative material being used.

STEP 9 :- FINAL PROCEDURES.

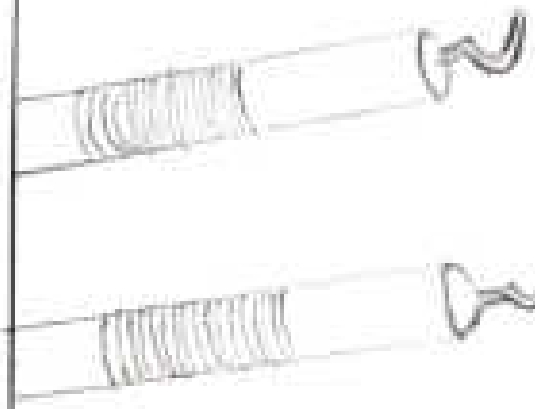
The final procedure of tooth preparation involve
(i) Cleaning and inspecting
(ii) Desensitizing
(iii) Sealing of the dentinal tubules.

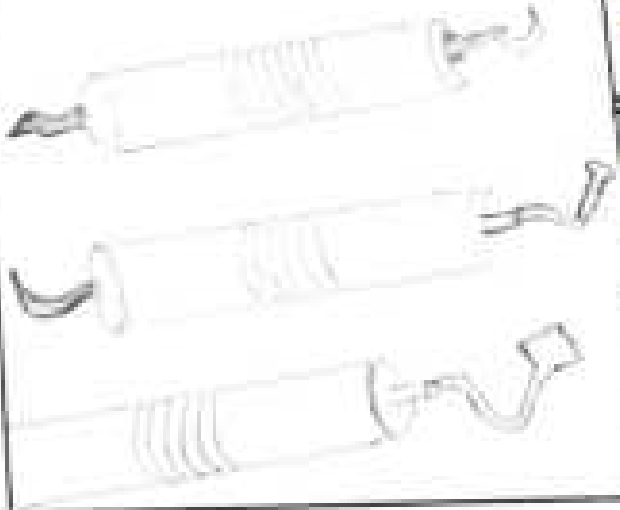


Name of Instrument	Diagram	Description & Uses
Tweezer		* Consists of two arms joined by one end and the other remains apart * Used for carrying cotton rolls and wedges in oral cavity
Excavator		* Used to excavate caries * Used to remove undetermined enamel eg. Hatchet, hoe discoid spoon etc
Enamel Chisel		* Blade is in the same length as is parallel to it * Used for cleaning or splitting of undetermined enamel Formula 10 - 7 - 14

Hoe		* Primary cutting edge is perpendicular to axis of handle * used for smoothening cavity floor, planning cavity preparation, forming angles * Push/pull/downward cutting motion Eg formula - 4½ - 1½.
Hatchet		* Bilateral Instrument * Cutting Edge parallel to long axis of handle * used for removing unsupported enamel, undetermined enamel. Formula 3-2-28
Gingival Margin Trimmer		* Modified hatchet * Double planned instrument * Rounding of axio-pulpal length angle of tmp surface preparation

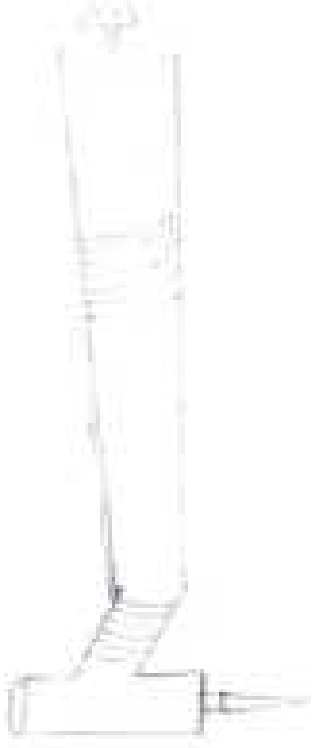
Name of Instrument	Diagram	Description & Uses
Glass Slab & Cement Spatula		* Used for mixing powder and liquid for base. * Used for alloys setting * Used for preparing homogenous mix of liquid and powder.
Plastic Spatula		*Used to mix cements like GIC, zinc, poly carboxylate *Easy to clean *Cement do not stick to spatula
Plastic Instrument		*Carrying mixed cement * Used to place base prepared Cavity * Used to cements which may abroad Spatula *Tend to stick to spatula

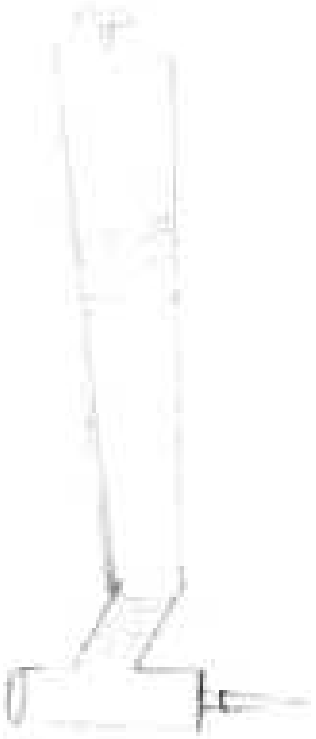
Name of Instrument	Diagram	Description & Uses
Morter & Pestle		* Mortar and pestle for amalgam and repeated grinding till it is absorbed
Amalgam Carrier		* used in filling the restoration * Helps in carrying amalgam to prepare tooth surface
Amalgam Condenser (i) Serrated (Cylindrical) (ii) Serrated (Parallelogram)		* used to condense amalgam into casting * Facilitate contouring buccal and lingual surface * prevents slippage of amalgam

Name of Instrument	Diagram	Description & Uses
Amalgam burnisher (i) Ball Burnisher (ii) Conical Burnisher (iii) T-Burnisher		* Used for smoothening, burnishing, polishing & restoration * Helps to give good appearance to the repaired tooth
Amalgam Carver a) Hollenbeck b) Wards c) Frahms		* For removing excess amalgam * For shaping amalgam to natural anatomic contour * To show cavosurface margin * To carve the morphology of tooth restoration
Wedges		* Made of wood, metal, celluloid or plastic * To stabilize matrix band

Name of Instrument	Diagram	Description & Uses
Matrix Retainer & Band 1.Ivory No.1		* Used to hold matrix to provide wall for proximal surface * Easier to place unilateral partial coverage band
2. Ivory No.8		* Provide band for encircling entire crown & tooth surface for class II and MOD activities * Used for MO MOD and DO
3. Tofflemire		* universal matrix retainer

Name of Instrument	Diagram	Description & Uses
Bur/Diamond abrasives 1.245		* In head & cemented Carbide bur, particle are held together * uses :- In cutting cavity
2. Round		* Spherical shape extension of preparation of retention fractures * used in cavity re- moval
3. Straight Fissure		* It is an elongated cylindrical bur * used for amalgam cavity preparation
4. Tappering Fissure		* Slightly tapered Cone cutter small end directed away from shank * uses : For indirect retention

Name of Instrument	Diagram	Description & Uses
Handpiece		It is the instrument which transmit power to rotatory cutting or abrading instrument Classification ⇒ Straight handpiece ⇒ Contra angled hand piece ⇒ Right angled hand piece Based on head design ⇒ Standard ⇒ Mini ⇒ Torque Maintenance:- ⇒ Sterilising in autoclave ⇒ Periodic oiling of hand piece ⇒ oiling is done with help of pressurized Container ⇒ Surface disinfecting of contamination of handpiece

Name of Instrument	Diagram	Description & Uses
Handpiece		It is the instrument which transmit power to rotatory cutting or reading instrument Classification ⇒ Straight handpiece ⇒ Contra angled hand piece ⇒ Right angled hand piece Based on head design ⇒ Standard ⇒ Mini ⇒ Torgine Maintenance:- ⇒ Sterilising in autoclave ⇒ Periodic oiling of hand piece

Exercise 5 :

Cavity Preparation in Plaster Models & Wax Up

S.No.	Date	Exercise	Tooth	Cavity Prep	Wax Up
1.	22.1.18	Class I	Upper Pre Molar	✓	✓
2.	22.1.18	Class I	Lower Pre Molar	✓	✓
3.	1.2.18		Upper Molar (Conservative)	✓	✓
4.			Upper Molar (Conservative)		
5.	22.2.18	Class I	Upper Molar (Palatal Extn.)	✓	✓
6.	22.2.18	Class I	Lower Molar (Buccal Extn.)	✓	✓
7.	12.2.18	Class II	Upper Pre Molar (MO)	✓	✓
8.	19.2.18	Class II	Lower Molar (MO)	✓	✓
9.		Class II	Lower Molar (MOD)		
10.		Class II	Upper Molar (MO)		

Exercise 6 : Natural Tooth

S.No.	Date	Tooth No.	Requirements	cavity	Base & matrix	Restoration
1.	16·4·18	14	Class I			
2.	23·4·18	34	Class I			
3.	19·4·18	16	Class I (Conservative)			
4.	19·4·18	26	Class I (Conventional)			
5.	15·5·18	46	Class I (Buccal extn.)			
6.	6·6·18	17	Class I Palatal Extn.			
7.	20·7·18	27	Class II (MO)			
8.	28·7·18	15	Class II (DO)			
9.	28·7·18	36	Class II (MO)			
10.	20·7·18	37	Class II (MOD)			
11.		11	Class III			
12.		21	Class IV			

Exercise 7 : TYPHODONT

S.No.	Date	Requirements	Tooth No.	Cavity Preparation	Base & Matrix	Restoration
1.	2·7·18	Class I	14			
2.	2·7·18	Class I (Conservative)	16			
3.	21·7·18	Class I (Conventional)	17			
4.	21·7·18	Class I (Buccal Extn)	37			
5.	21·7·18	Class I (Palatal Extn)	27			
6.	21·7·18	Class I	34			
7.	21·7·18	Class II (MO)	15			
8.	21·7·18	Class II (DO)	26			
9.		Class II (DO)	35			
10.	21·7·18	Class II (MO)	36			
11.	21·7·18	Class II (MOD)	46			
12		Class III	11			
13		Class IV	21			
14		Class V	13/23			

Sterilization of hand instruments

INSTRUMENT	METHOD	STORAGE ADVANTAGE	DISADVANTAGE
Restorative and Endodontic Instrument	Autoclave Chemical Vapour pressure sterilization	Sterilising clothe. Surgical packs	→ Item sensitive to high temperature → cannot be autoclaved ⇒ steam can corrode steel on carbide bur.
Carbon Steel Instrument bure.	Dry heat and chemical vapour pressure	carbon steel and corrode Sensitive burs on instrument	→ High temperature can damage Sensitive towels and clothes.
Handpiece	Autoclave Chemical Vapour Sterilization, Ethylene oxide gas by circulating autoclave for minutes.	carbon steel instrument ben do not corrode.	⇒ High temperature damage rubber and plastic
Filer and Endodontic instruments	Heat or soft sterilization, Heat vapour method works like autoclave but it was alcohol.	Heat can kill blood pathogen in place when sterilized	Doesn't kill spores, can't be used for surgical instrument

Exercise 9 :

Material Used in Practical Exercises :

Materials	ADA Specification	Composition	Chemical Reaction	Uses
Zinc Phosphate Cement	ADA no : 8	Powder :- Zinc oxide Powder = 90% liquid :- Phosphoric acid = 33% Water = 66% Aluminium Phosphate = 2% Zinc = 7-2%	Acid base reaction Phosphoric acid attacks the zinc and the Aluminium complex leads with H_3PO_4 to form Mg_3PO_4 gel	As base temporary restoration Luting of restoration and entire dentine lends
Zinc Oxide Eugenol	ADA no : 30	Zinc oxide white resin, Zinc Stearate, zinc acetate, MgO_2, Eugenol, olive oil clove oil	ZnO hydrolyze followed by Reaction between OH_2 and eugenol to form zinc eugenate	As liner and base Orthodontic cementation Luting permanent restoration
Zinc Polycarboxylate	ADA no : 61	ZnO, MgO Stannous flouride H_2O, polyacrylic acid, tartaric acid	Zn, Mg Sn are released by acid	As base Temporary filling material Temporary permanent Cementation

Materials	ADA Specification	Composition	Chemical Reaction	Uses
Glass ionomer cement	ADA NO: 66	POWDER: Fluoride Aluminium Silicone LIQUID: Polyacrylic acid	Acid base reaction	1) Anterior restoration Luting agent • pit and fissure sealant
Amalgam	ADA NO: 1	Alloy made by mixing mercury and Silver, tin alloy	$Ag\,Sn + Hg \downarrow Ag_2Hg_3 + Sn_7Hg + Ag_2Sn$ (unreacted)	1) For restoration of cavities 2) Permanent filling material in class II, IV Restoration of core material