Dental Materials I

Unit VI-a

Nonaqueous Elastomeric Impression Materials
Aqueous Elastomeric Impression Materials

- Irreversible Hydrocolloid
  - alginate

- Reversible Hydrocolloid
  - hydrocolloid
Nonaqueous Elastomeric Impression Materials

- Polyether
- Polysulfide
- Condensation silicone (polysiloxane)
- Addition silicone (polyvinyl siloxane)
Nonaqueous Impression Materials

• *Elastomerics* are a synthetic rubber

• Not gel-like hydrocolloid

• A solid impression is formed by a chemical reaction between components
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• the chemical reaction that changes the elastomeric base – called a liquid polymer – into the final rubber-like material is called curing, or polymerization
Nonaqueous Impression Materials

- **Curing Methods**
- **Self Curing**
  - chemical reaction
- **Light Curing** (not commonly used)
  - polyether urethane dimethacrylate/resin
  - light or heavy viscosities
  - standard curing light
  - unlimited working time
  - Requires clear tray so light can reach
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General Forms - consistency/viscosity
(interchangeable terms)

Light Body - low viscosity or syringe
Medium Body - regular viscosity or regular
Heavy Body - high viscosity for tray material
Putty/Clay - very high viscosity
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- Methods of mixing (catalyst into base)
  - Single Mix
    - one viscosity
  - Multiple Mix
    - 2 or more viscosities

- Catalyst is small tube
- Base is large tube
- Amounts different, lengths same
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Impression Techniques:

• **Two Step Technique or Putty Wash**
  • Take *primary impression* using putty
  • Cut away material above prepped tooth.
  • Use syringe and *inject light body* around prepped tooth and *reseat primary impression*.

• **One Step Technique**
  • *Light body material load a syringe* and inject around the prep
  • *Higher viscosity material loaded into tray* and seated in the mouth.

• **Extruder Gun technique**
  • *Dual cartridges*
  • Can use two guns or one gun and a syringe
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Pouring Time - Dimensional Stability and Infection Control

- Imbibition/Syneresis
- Not as big of a problem like aqueous hydrocolloids

Polyether

- Can swells when stored in high humidity
- Can be poured 2-3 hours later

Infection Control

- rinse with water
- spray with disinfectant - biohazard bag
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Polysulfide

- Should not be subjected to delayed pouring
- Curing does not stop when removed from the mouth
- Must be poured within 1 hour after removal

- **Infection Control**
  - Rinse with water
  - Spray with disinfectant - biohazard bag
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Addition Silicone-Polyvinyl siloxane

- Can be poured days or weeks later
- Can be mailed to a lab in another state

- Infection Control
- Rinse with water
- Spray with disinfectant – biohazard bag
- Good for late in the day - lab closed
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Curing Stages

Initial Set

- First stage
- Stiffening of the paste
- Material may be manipulated (only during this stage)
- Mix must be completed in manufacturers specified time
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- **Final Set**

- Second stage
- Begins with appearance of elasticity
- Proceeds to change gradually to rubber-like mass
- Must be in the mouth before this stage begins (do not remove from mouth before this stage - messy)
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- **Final Cure**
  - Last stage
  - Occurs from 1 - 24 hours
  - Only a slight dimensional change
  - Detail of impression is consistent
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• **Shelf Life**

• Means the stability of a product
• Unopened or unused material is the key
• Ingredients “settle out”
• Temperature changes and age result in a loss of physical properties and inferior handling characteristics
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- **Shelf Life**
  - Check package box for stamped date
  - Tubes are crimped and dated on ends
  - Use a permanent pen to mark boxes or tubes in the office

- *if bulk amount was purchased:*
  - Condensation silicones more sensitive to prolonged storage
  - Addition silicones claim a shelf life of up to 2 years
  - Store in cool, dry place
  - Refrigerate if possible
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Types of Elastomeric

• Polysulfide
• Polyether
• Condensation Silicones - Polysiloxane
• Addition Silicones – Polyvinyl siloxane
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Polysulfide

• **Brand Names:** Permalastic, Coeflex, Neoplex, Perfection
• Supplied in 2 tubes (accelerator (small) and base (large))
• Tray requires adhesive
• Allow adhesive to dry (6-8 min)
• Ensures polysulfide will “stick” to the tray
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- **Polysulfide - Characteristics**

  - **Accelerator** (catalyst/reactor/oxidizing agent)
    - lead dioxide and sulfur - dark chocolate brown, blue

  - **Base**
    - liquid polymer with plasticizers added to form a paste - white, labeled base

  - base and catalyst mixed = brown or blue
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Polysulfide – Characteristics

• Chemical reaction occurs
• *Vulcanization* – the process of changing into a rubber-like material

• VERY STRONG ODOR
• Unpleasant taste
• Will stain clothes
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Polysulfide - Uses

• Impression for crown and bridge
• Edentulous impressions - usually requires custom tray
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Polysulfide - Consistency/Viscosity

- Light
- Regular
- Heavy and
- Extra heavy
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Polysulfide – Mixing Techniques

• Tubes from same box only
• Dispense equal lengths
• Mix catalyst (brown) into base (white)
• Smooth, homogenous, uniform color
• Non streaking mass-creamy
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Polysulfide – Mixing Techniques

• Process:

  • Mix time 60 seconds, working time 3 minutes, leave in mouth 5-8 minute

  • Have both viscosities ready
  • Mix and load syringe hand to doctor
  • Mix and load tray hand to doctor
  • Clean up: orange solvent
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Polysulfide - Controlling the Setting Time

• Temperature increase will accelerate the set
• Temperature decrease will retard the set
• Water will accelerate the set
Polyether

- **Brand Names:** Impregum, Penta Mix, Impregum F or Polygel

- Polyether chemistry can **provoke or create** an allergic reaction – contact dermatitis
- Supplied in 2 tubes-accelerator and base
- Mixed by hand
- Mixed with Penta-Mix machine
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Polyether – Characteristics

- Accelerator (catalyst)- aromatic sulfonate ester - deep red gel-like
- Base - end aziridine rings - white

- Mixed together it is a dirty purple
- Use equal lengths
- Taste and odor tolerable
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Polyether - Characteristics

• Sets by chemical reaction
• Polymerization

• Viscosity begins to increase as soon as materials are mixed
• A body modifier can be added to reduce stiffness
• Also reduces viscosity
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Polyether – Uses

• Crown and bridge
• Edentulous partials, dentures
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Polyether - Consistencies/Viscosities

• Usually one type - regular
• Supplied in bulk + machine
• Penta- Mix System – tip mixes material
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Polyether - Mixing Technique

- Equal lengths of material
- Quantity will be different
- Mix catalyst into base
- Incorporate all at once
- Mix until smooth homogenous mass
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Polyether - Mixing Technique

• Process

• Mix and load syringe hand to doctor
• Mix and load tray hand to doctor
• Cleans well with paper towels
• Peel off after it has set
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Polyether - Controlling the Setting Time

• higher temperature shorten the setting time