



Dental Amalgam

- Properties of Amalgam

- **Microleakage:**

- ✓ Has the tendency to minimise marginal leakage.
- ✓ Self sealing material

- **Dimensional Change:**

- ✓ May expand or contract depending on its manipulation.

- **Strength:**

- ✓ Hardened amalgams have good compressive strength.

- **Tensile Strength:**

- ✓ Amalgam cannot withstand high tensile or bending strength.
- ✓ Tensile strength is 48-70MPa.

- **Creep:**

- ✓ Time dependent plastic deformation.
- ✓ Slow progressive permanent set amalgam which occurs under constant stress (static creep) or intermittent stress (dynamic creep).

- **Retention of Amalgam:**

- ✓ Amalgam does not adhere to tooth structure.
- ✓ Retention of amalgam is achieved by mechanical interlocking.

- **Tarnish and Corrosion:**

- ✓ Amalgam restoration often tarnishes and corrodes in the mouth.

- **High copper alloys:**

- ✓ Contains more than 6% wt copper.
- ✓ Weakest γ_2 phase is eliminated in high copper amalgam.
- ✓ Preferred because of the improved mechanical properties, resistance to corrosion and better marginal integrity.

- Types:

Admixed alloy powder

Single composition alloy powder



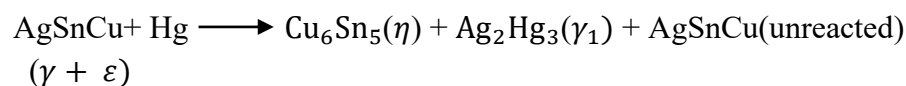
▪ **Single composition alloys:**

- ✓ Each particle of the alloy particle has the same composition.

▪ **Setting Reaction:**

- ✓ When triturated, silver and tin from Ag-Sn phase, dissolve in mercury. Very little Cu dissolve in mercury. The Ag_2Hg_3 , crystals grow forming a matrix that binds together the partially dissolved alloy particles.
- ✓ Later, $\text{Cu}_6\text{Sn}_5(\eta)$ crystals are formed.

▪ **Overall Reaction:**



▪ **Application:**

- ✓ As a permanent filling material in class I and class II cavities and class V cavities where aesthetics is not important.
- ✓ In combination with retentive pins to restore a crown.
- ✓ For making dyes.
- ✓ In retrograde root canal fillings.
- ✓ As a core material.

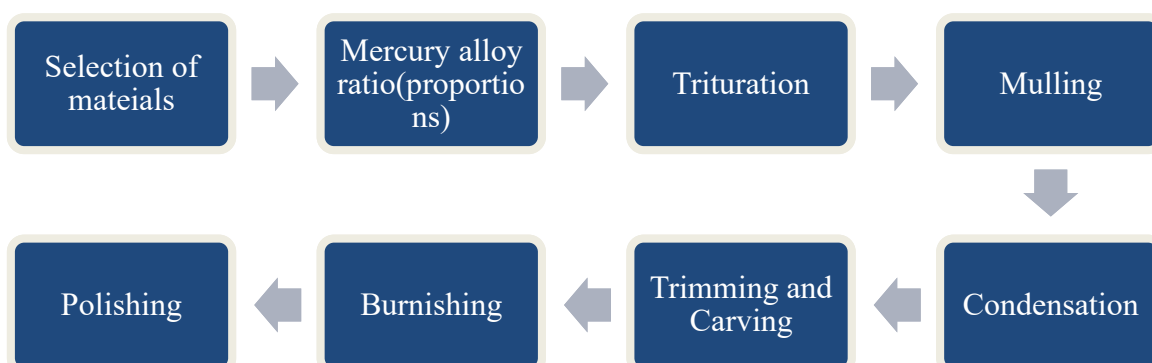
▪ **Merits of Dental amalgam :**

- ✓ Reasonably easy to insert.
- ✓ Not overly technique-sensitive.
- ✓ Maintain anatomic form well.
- ✓ Prevents marginal leakage.
- ✓ Adequate resistance to fracture.

▪ **Demerits:**

- ✓ Colour doesn't match tooth structure.
- ✓ More brittle and less tough than derivable.
- ✓ They are subject to corrosion and galvanic action.
- ✓ Eventually show marginal breakdown.
- ✓ They don't bond to tooth structure.

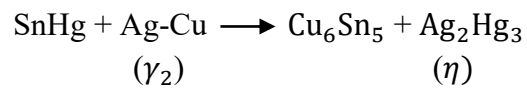
▪ **Stages of Manipulation of amalgam alloys:**





- Admixed alloys:

- **Setting reaction:**



$\gamma_2 \longrightarrow$ eliminated, replaced by γ phase

- **Trituration:**

- ✓ Process of grinding powder, especially within a liquid.
 - ✓ Mixing procedure to remove the oxide film by friction and enhance the amalgamation reactions.
 - ✓ Two types:
 - a. Hand trituration
 - b. Mechanical

- **Eames technique:**

- Better method of reducing mercury content is to reduce the original mercury.
 - Ratio (1:1)
 - The usual Hg/Alloy ratios are as following:
 - ✚ Hg/alloy ratio for high copper alloys is 1:1
 - ✚ Hg/alloy ratio for low copper alloys is 40:60