

Amalgam

Preclinical Dentistry, 1st. Year

Autumn Semestr

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Amalgam

Metal-like restorative material composed of silver-tin-copper alloy and mercury.

Types of amalgam restorative materials

Low – Copper Amalgam (5% or less copper)

Composition – wt%

Silver	63 - 70 %
Tin	26 – 28 %
Copper	2 - 5%
Zinc	0 - 2%

Types of amalgam restorative materials

High – Copper Amalgam (13% - 30%)

copper

Composition – wt%

Silver	40 - 70 %
Tin	26 – 30 %
Copper	2 - 30%
Zinc	0 - 2%

Particles of the alloy

- ✓ Irregularly shaped (filings - lathe cut)
- ✓ Microspheres
- ✓ Combination of the two.

Particles shape

High – Copper Amalgam

Microspheres of the same composition
(unicompositional)

Mixture of irregular and spherical particles of
different or the same composition (admixed)

Production of irregular particles

Metal ingredients heated, protected from oxidation, melted and poured into a mold to form an ingot.

Phases of the alloy:



Production of irregular particles

Ingot cooled slowly

Ingot heated at 400°C (6 – 8 hours)
(homogeneous distribution of Ag₃Sn)

Ingot cut on the lathe, particles passed through a fine sieve and ball milled to form the proper particle size.

Aging of particles (60 - 100°C, 6 – 8 hours)

Particle size: 60 – 120 μm in length
10 – 70 μm in width
10 – 35 μm in thickness

Production of irregular particles

Molten alloy is spraying into water under high pressure



Irregularly shaped high-copper particles

Production of spherical particles

Molten alloy is spraying under high pressure of inert gas through a fine crack in a crucible into a large chamber

Diameter of the spheres: 2 – 43 μ m

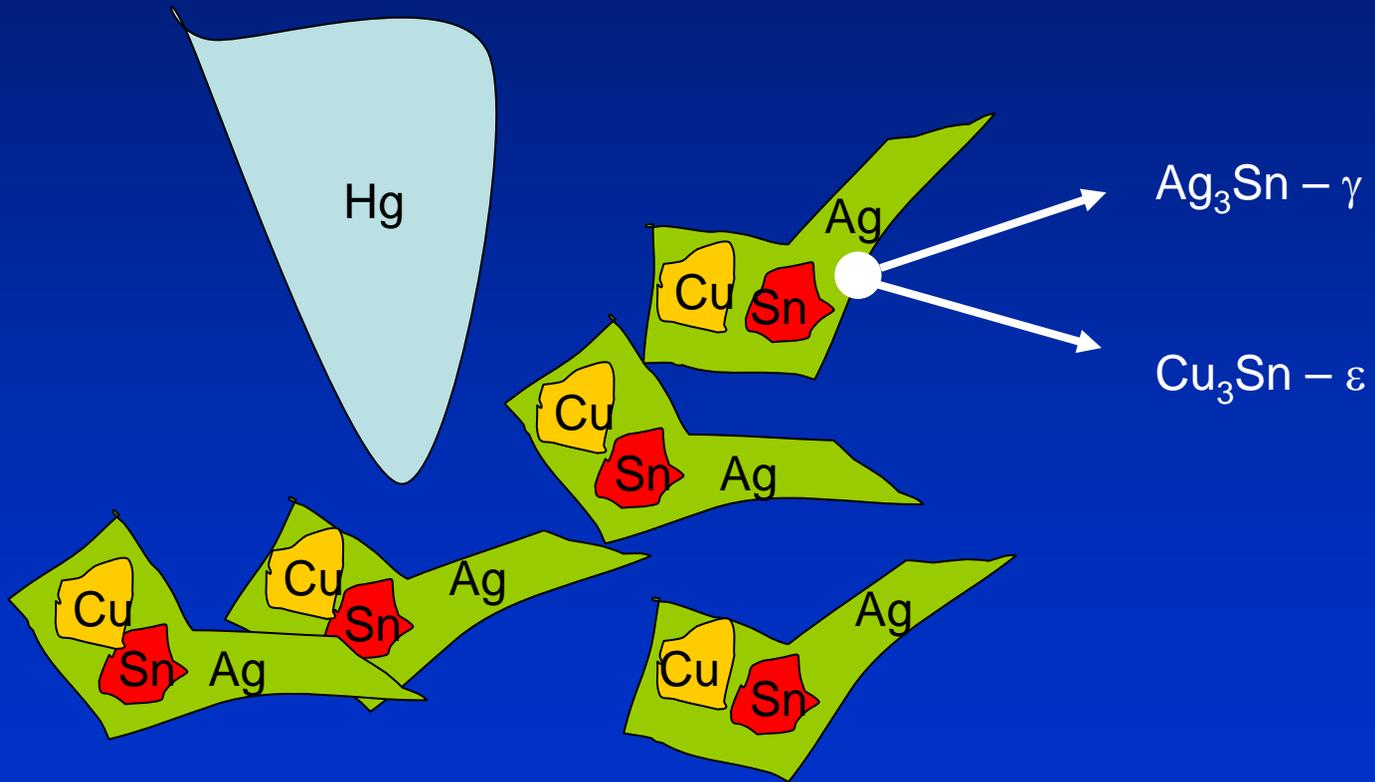
Amalgamation processes

Metal alloy is mixed with pure mercury



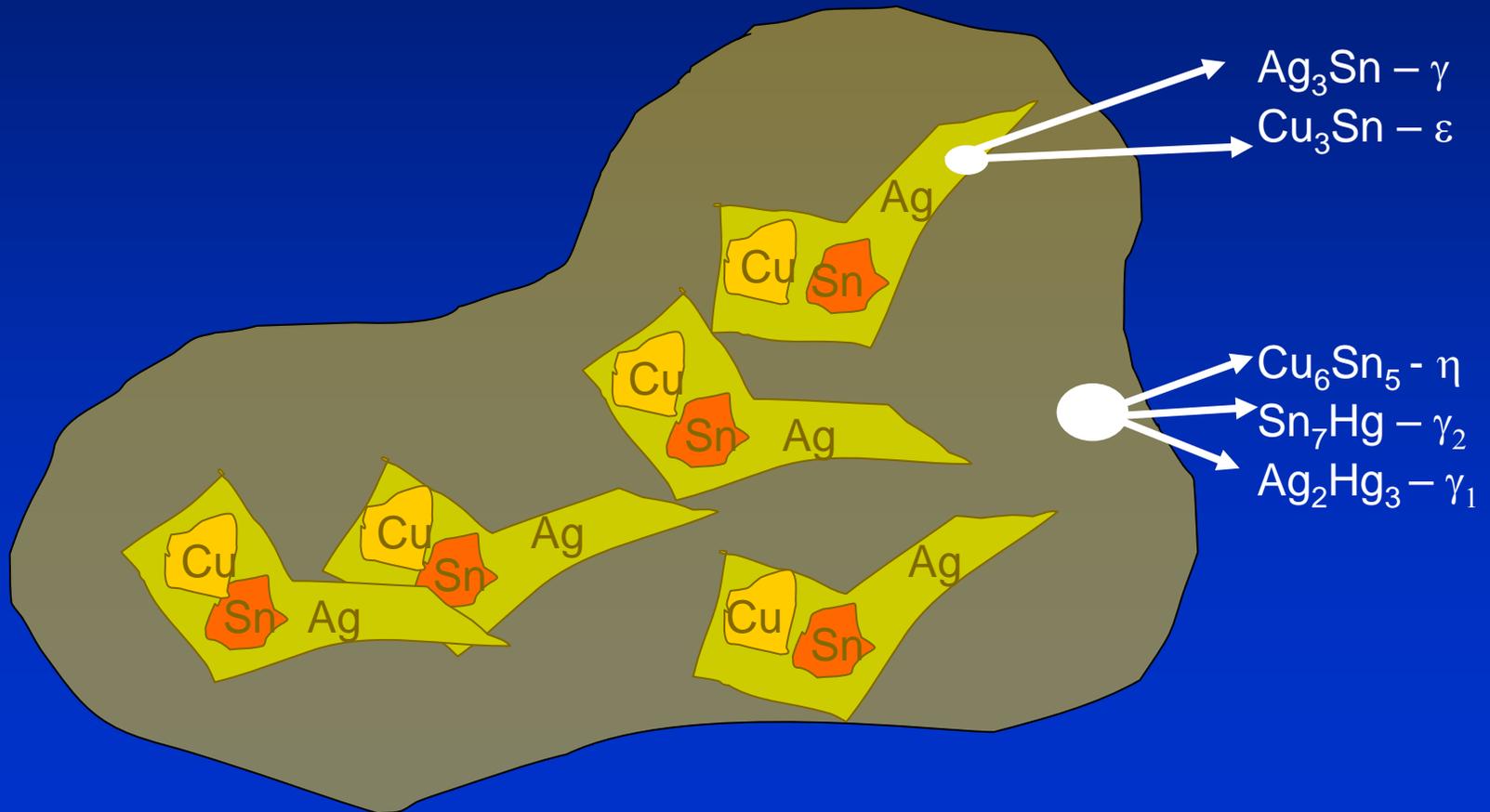
Trituration

Amalgamation processes



Amalgamation processes

Low copper amalgam



Amalgamation processes

High copper amalgam

γ_2 phase disappears or does not occur depending on the content of copper

