Cavity preparation
basic rules

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Preparation of dental caries (cavity preparation)

- Instrumental treatment that removes dental caries
- The rest of the tooth must be restorable with filling materials
- The rest of the tooth as well as the filling must be resistant against occlusal forces
- The risk of secondary caries must be minimized
Basic rules

Access to the cavity
Preparation of cavity borders and extension for prevention
Retention of the filling
Resistance of the restored tooth
Excavation of carious dentin
Finishing of the walls
Final control
Basic rules

Acces to the cavity

Preparation through the hard dental tissues
Removing of the undermined enamel
Separation of teeth
Separation or removing of gingiva
Basic rules

Preparation of cavity borders and extension for prevention

Depends on

Dental material
Oral hygiene

Precautions of secondary caries
Basic rules

Retention of the filling

Precautions of its lost

Macromechanical retention

Micromechanical retention

Chemical retention
Basic rules

Resistance of the restored tooth

Against occlusal and other forces

Depends on
- Material
- Individual occlusal forces
Basic rules

Excavation of carious dentin

Necessary (risk of recurrent caries)

*Ball shaped (spheric) bur - slow speed (3000 rpm)*

or

*Excavator*
Basic rules

Finishing of the walls

Depends on the kind of material
- *Bevel or without bevel*
- *Fine diamond bur*
Basic rules

Final control

Direct or indirect view
Good illumination
Magnification
Preparation

• Hand
  Excavator, cleaver

• Power driven
  Burs, diamonds
Chisel – for enamel
Cleaver
Chisel for enamel
Excavator
Instruments for cavity preparation

Power driven (powered) instruments for cutting
- Rotary instruments

Common design characteristics

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Cutting instruments - burs

Steel
Tungsten carbide
Cutting instruments – burs
head shapes

Round (ball shaped)
Cutting instruments – burs

head shapes

Fissure with flat end

Fissure with pointed end

Straight or tapered form
Cutting instruments – burs head shapes

Pear
Cutting instruments – burs
head shapes

Inverted conus
Cutting instruments – diamonds

Extra coarse – black

Coarse – green

Standard – blue or without any marker

Fine - red

Extra fine - yellow

Ultrafine - white
Cutting instruments – diamonds head shape

- Ball, pear, cylinder, taper, flame, torpedo, lens and others.....
Hazards with cutting instruments

- Pulpal precautions
- Soft tissue precautions
- Eye precautions
- Ear precautions
- Inhalation precautions
Filling materials

- Temporary
- Definitive, permanent
Temporary filling materials

- Zinc oxide sulphate cement and one component derivates
- Zinc oxide phosphate cement
- Zinc oxide eugenol cement
- Polymer based materials
- Guttapercha
Permanent filling materials

Amalgam

Composites

Glasionomers
Amalgam

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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)

✓ Microsphers

✓ Combination of the two.
Particles shape

High – Copper Amalgam
Microsphers 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:

$\text{Ag}_3\text{Sn} - \gamma$

$\text{Cu}_3\text{Sn} - \varepsilon$

$\text{Cu}_6\text{Sn}_5 - \eta$

$\text{Ag}_4\text{Sn} - \beta$
Production of irregular particles

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 – 43μm*
Amalgamation processes

alloy is mixed with pure mercury

Trituration
Amalgamation processes
Amalgamation processes
Amalgamation processes

- Ag₃Sn – γ
- Cu₃Sn – ε
- Cu₆Sn₅ – η
- Sn₇Hg – γ₂
- Ag₂Hg₃ – γ₁

High copper amalgam γ₂ phase disappears or does not occur depending on the content of copper.
Amalgam - properties
Amalgam

- Wear and pressure resistance (2mm thickness at least)
- Easy handling
- Thermal and electrical conductivity
- Corrosion
- Bad aesthetics
Trituration

- Hand mixing (obsolete)
- Power driven trituration

Amalgamators
Instruments

- Preparation instruments
- Filling instruments
- Carvers
- Burnishers
Instruments

Preparation instruments - power driven

Burs

Diamonds
Instruments

- Preparation instruments - hand
  - Chisel
  - Excavator
Amalgam gun

Crucible
Amalgam carrier
Amalgam carrier
Instruments

- Filling instruments condensors and spatulas
Condensor - stamen
Condensor – stamen
Condensor and burnisher - spatula combined
Power driven condensor
- stamen

Special handpiece
Burnisher - spatula
Angular- trough edge trough face
Burnisher – spatula, angular three face
Instruments

- Burnishers
Ball condensor – used as a burnisher at most