

# Restorative dentistry IV2. repetition

## Glassionomers



# Glassionomers

Materials that have been developed by Wilson and Kent was a product of an acid-base reaction between basic fluoroaluminosilicate glass powder and polycarboxylic acid.

Glassionomer cement is a water based material that hardens following the acid-base reaction between this glass and aqueous solution of polyacid.

# Glassionomers contain metals

Aluminium

- Calcium
- Strontium
- Zinc
- Sodium
- Potassium
- Lanthanum

# Phosphates and fluorides

- Are used to decrease the melting temperature in the production process and are incorporated to the glass composition to modify the setting characteristics.

# X-ray contrast - radioopacity

- Lanthanum oxide, strontium oxide (incorporated into the glass)
- Baryum sulphate

# Essential ingredients of the glass are aluminiumoxide and silicium dioxide



# Liquid of glassionomers

– Liquid is based on polycarboxylic acid:

Polyacrylic acid

Polymaleic acid

Acrylic acid- itaconic acid copolymer

Acrylic acid- maleic acid copolymer and others.

Water, tartaric acid (acelerator)

# Acids can be a component of powder also

– Freeze dried powder

These cements are mixed with water or with the polycarboxylic acid.



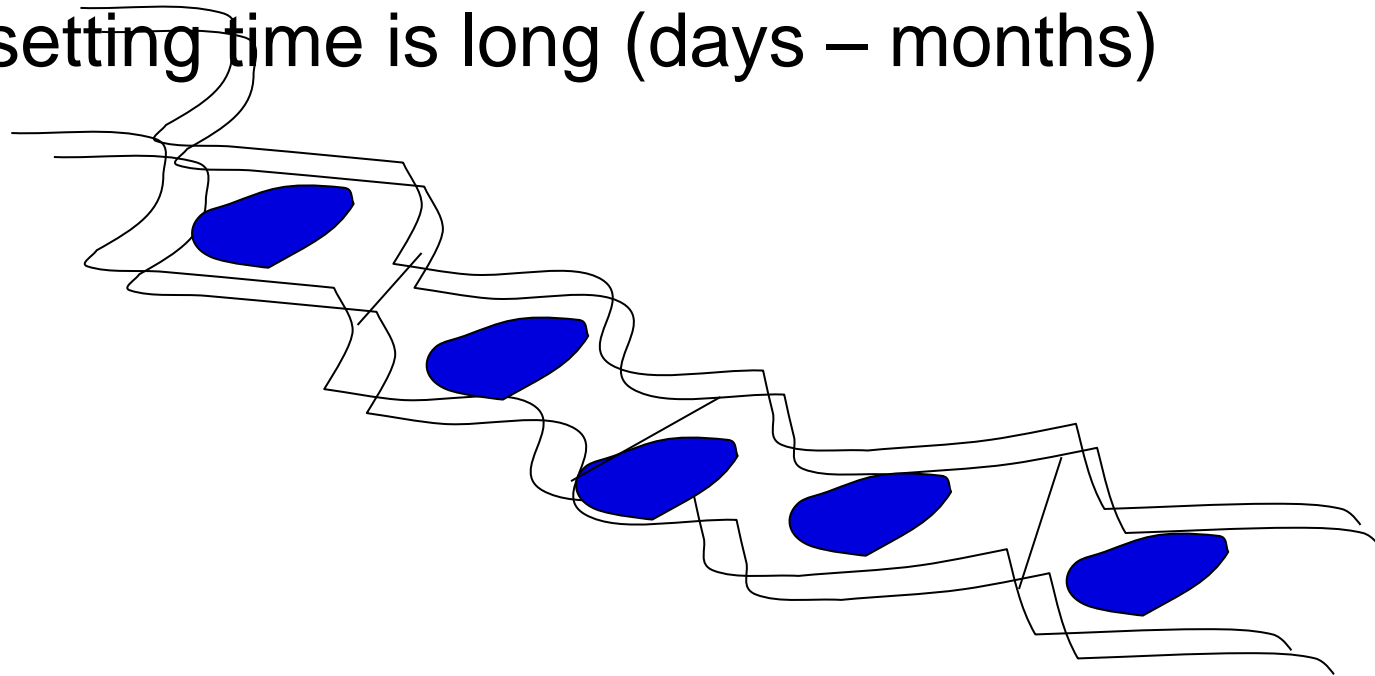
# Glassionomers

– Principle of setting – acid base reaction

1. Hydrogen ions of the acid attack the glass particles in the presence of water, releasing calcium, strontium and aluminium ions
2. The metal ions react with the carboxylic acid groups to form the polyacidsalts matrix. The glass surface is changed to a silica hydrogel. Glass core remain intact.

# Glassionomers

The structure of the cement is a network of polyacid salts. Inside this network remain particles of glass (silica hydrogel on the surface). The setting time is long (days – months)



# Glassionomers - characteristics

- Chemical bonding to hard dental tissues (carboxy groups react with calcium in hard dental tissues)
- Thermal expansion similar to dentin
- Release fluoride ions (cumulative releasing)

Mechanical not strong enough

Aesthetics acceptable

# Types of glassionomers

## Conventional glassionomers

- Conventional glassionomers for direct restorations
- Metal reinforced glassionomers
- Highly viscous glassionomers Low viscosity glassionomers
- Base and liners
- Luting
- Sealers

# Types of glassionomers

## Resin modified glassionomers

These cements were designed to produce favorable physical properties similar to composite materials.

The water soluble resin component has been added into an aqueous solutions of polyacrylic acid.

Liquid: polycarboxylic acid, water and 2-hydroxyethylmethacrylate (HEMA). In some materials pendant methacrylate groups are on polycarboxylic acid.

# Types of glassionomers

Resin modified glassionomers

Two setting reactions:

- acid-base reaction
- polymerization

# Types of glassionomers

Resin modified glassionomers - benefits

- Significantly less sensitivity to water
- Improved mechanical properties
- Higher translucency

# Types of glassionomers

Resin modified glassionomers

Restorative materials

Base and liners

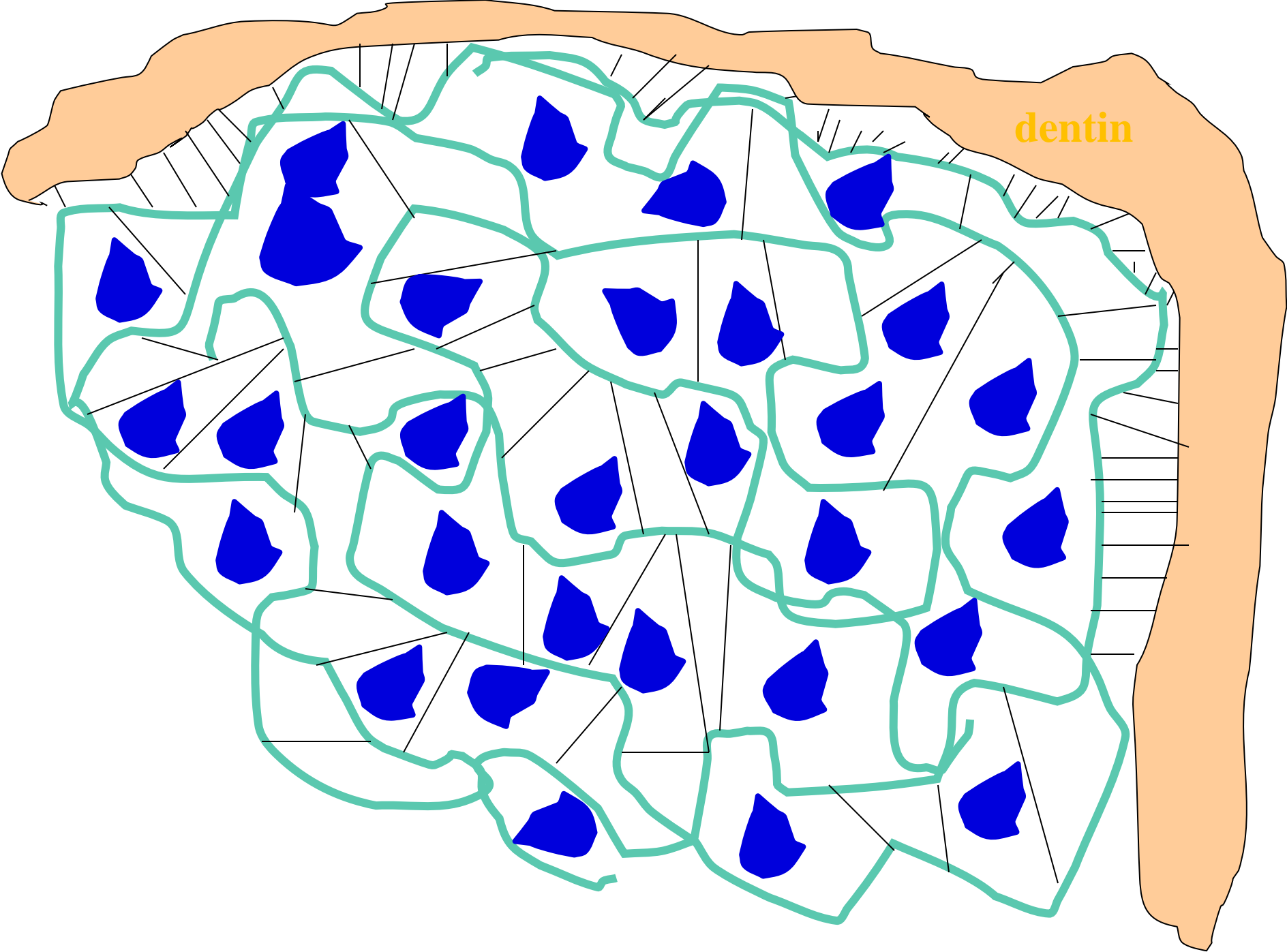
Luting

Orthodontic cementing material



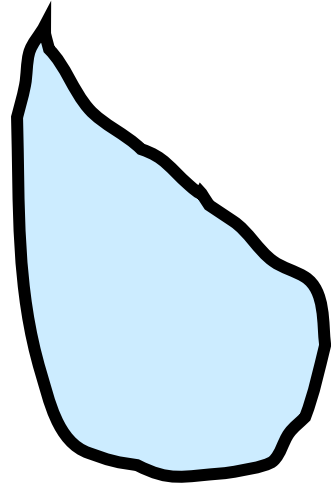
# Glassionomers acc to curing

- Acid – base reaction
- Dual cured glassionomers (resin modified)

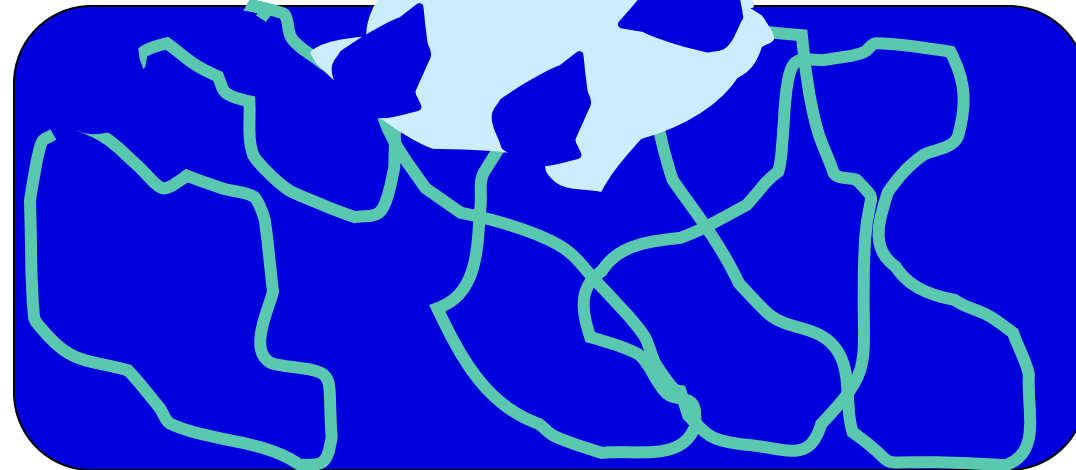
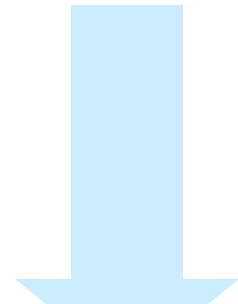


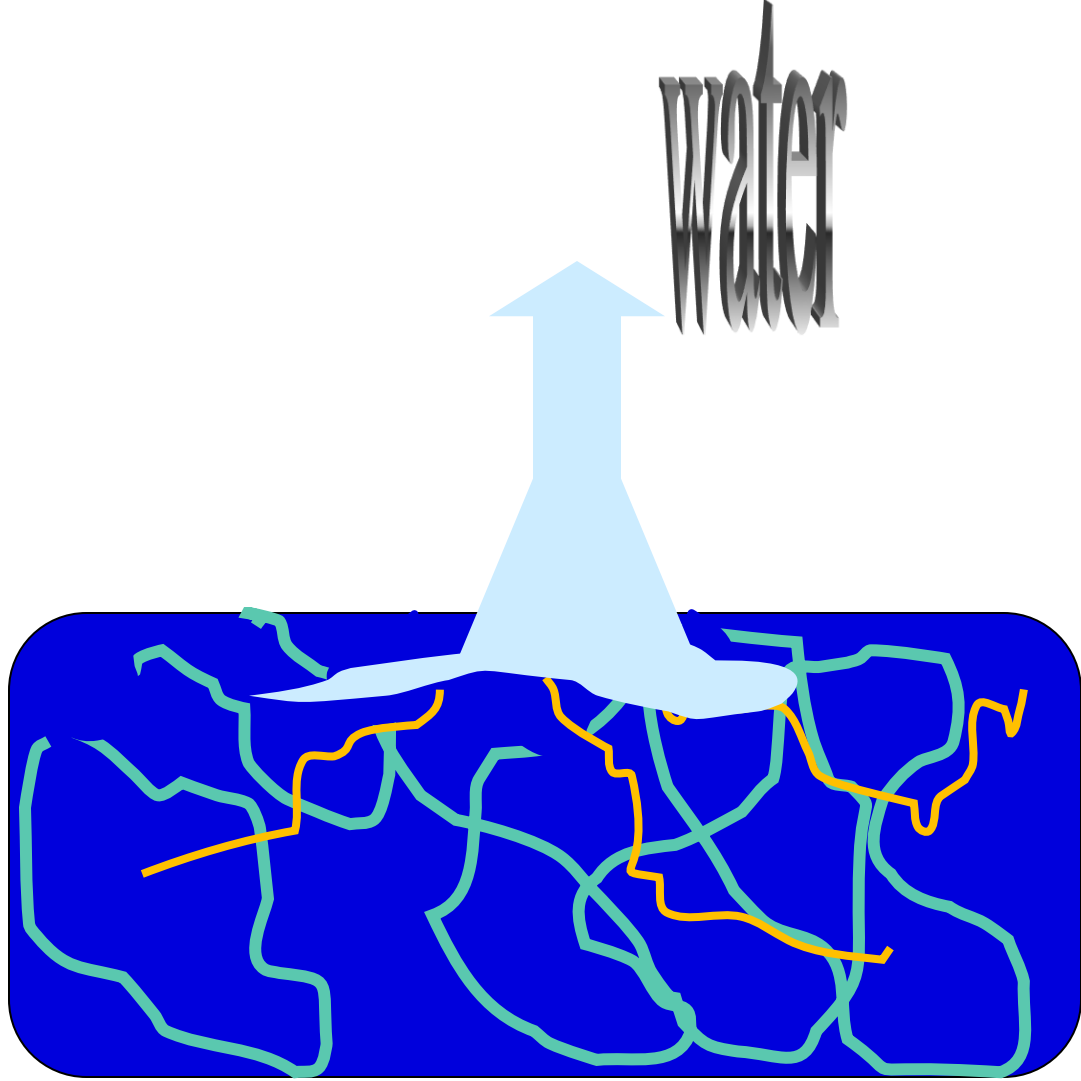
dentin

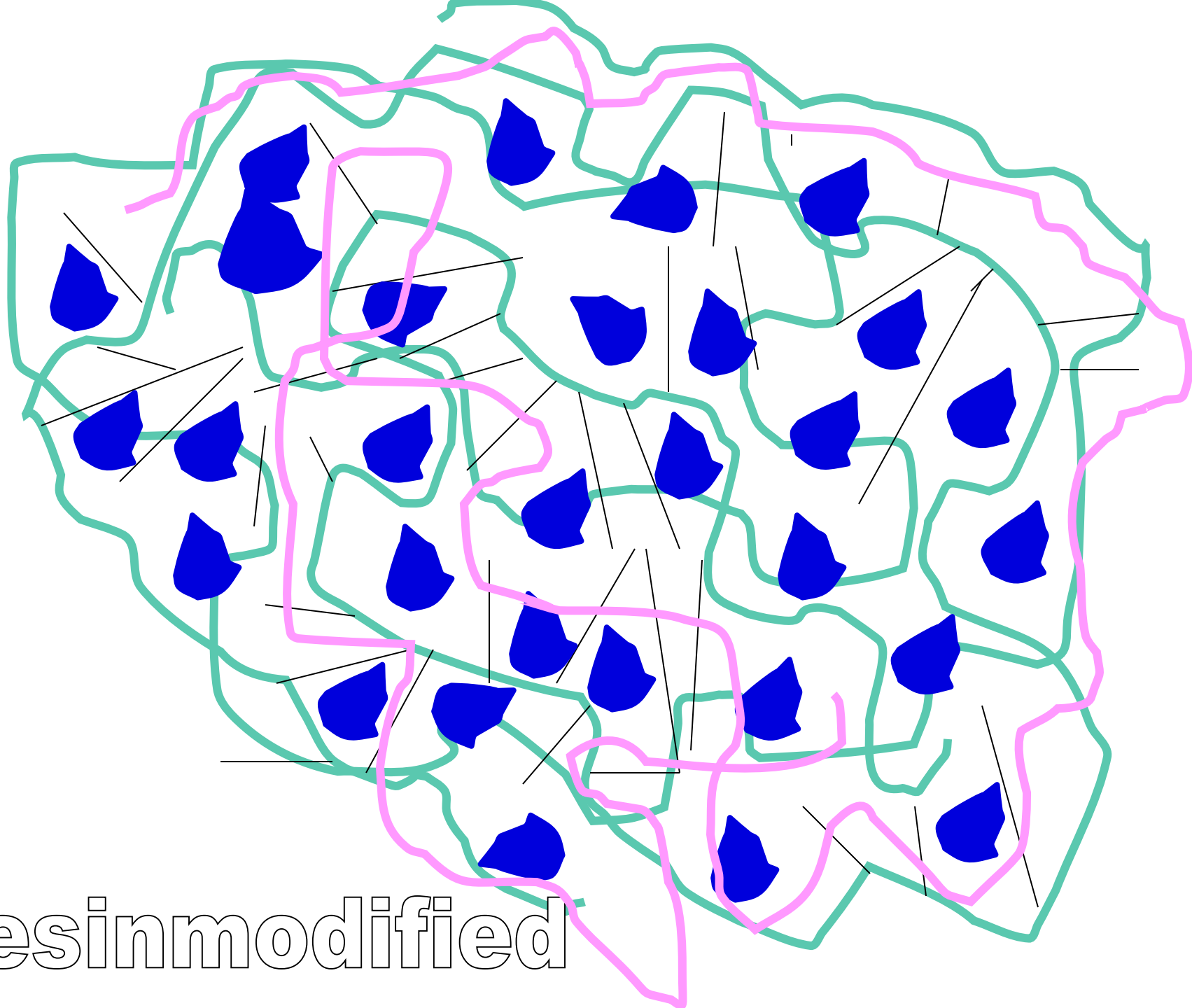




water

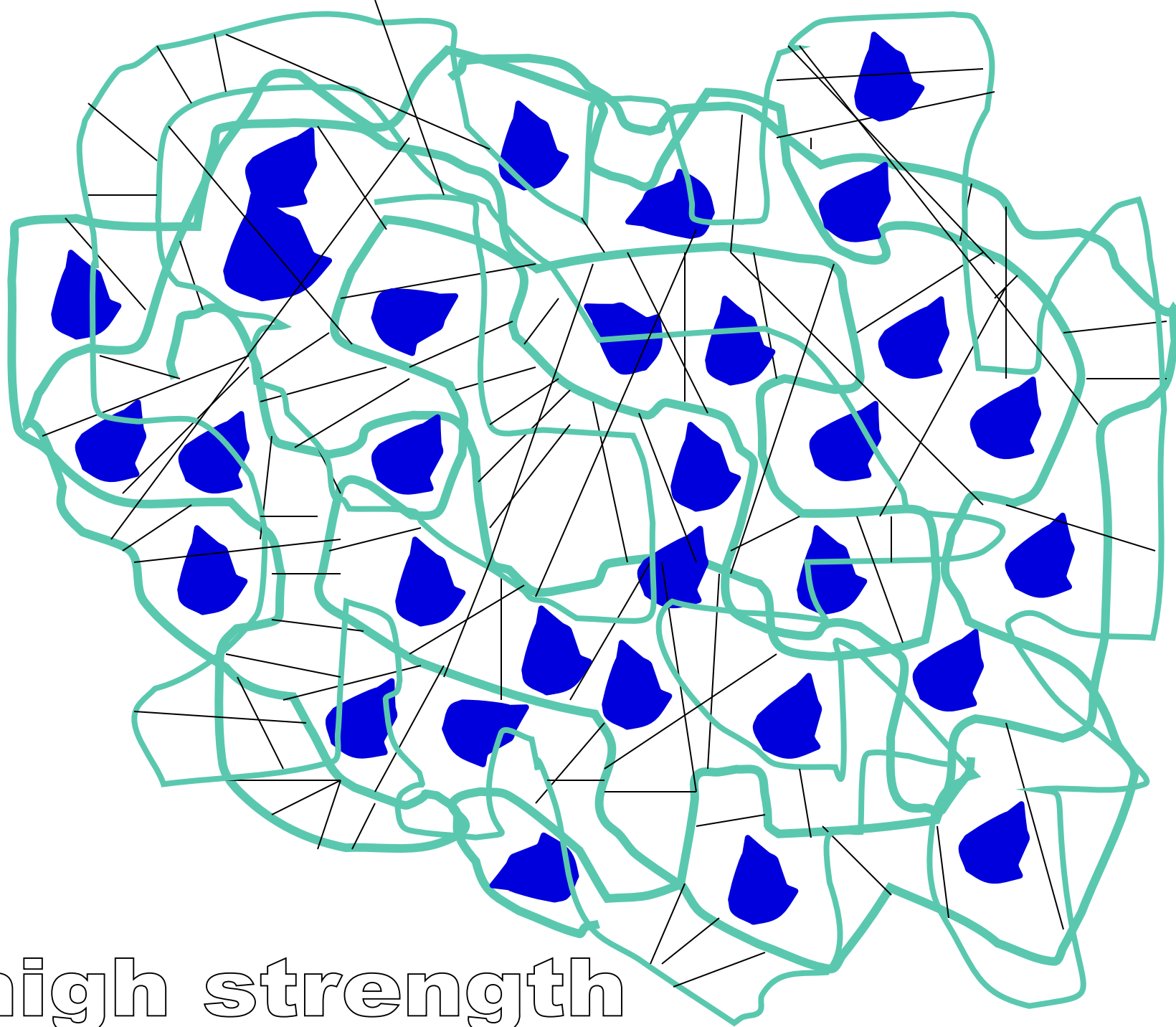






resinmodified





high strength



# Glassionomers - indications

## Fillings

Class V.

Class III.

Class I. and II. in primary dentition

Base – sandwich filling

Sealants

Surface protection

Internal mineralization

## Other indications

Endodontic sealers

Luting materials

# Glassionomers - contraindications

Heavy occlusal stress:

Class I. and II. in permanent dentition

Class IV. Restoration

Caries pulpa proxima or open dental pulp



# Mixing

Hand

Power driven – capsulated

# Hand and power driven mixing of the GIC



Forceps for activation and application



Mixing machine



# Making filling

- Preparation
- Smooth borders
- Limited on caries lesion only
- Conditioning (25% polyacrylic acid 20s')
- Washing
- Filling in one block
- Varnish after setting
- Polishing in next appointment

