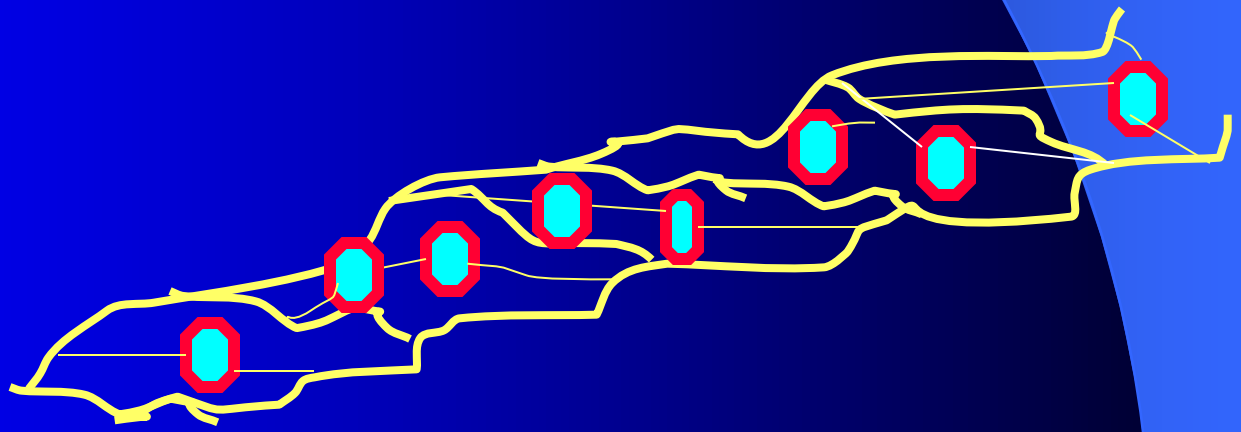
Composites

Chemically bonded combination of organic matrix and inorganic filler



Composition

- **Organic matrix is a resin**

Bowen monomer Bis GMA (result of reaction of Bisphenol A and glycidyl methacrylate)
UDMA
Oligomer - dïmethacrylate
TEGMA

Composition

Filler

Milled quartz

Aluminium silicate glass

Silica

Prepolymer

Coupling Agents

Silane

Composition

Iniciators and accelerators (activators)

Other components

Pigments

UV absorbers

Antioxidants

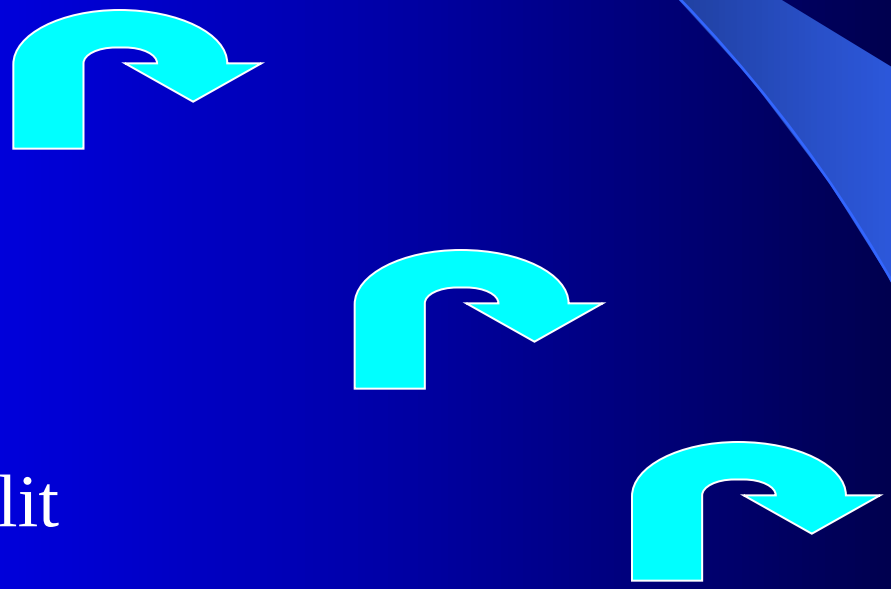
Polymerization

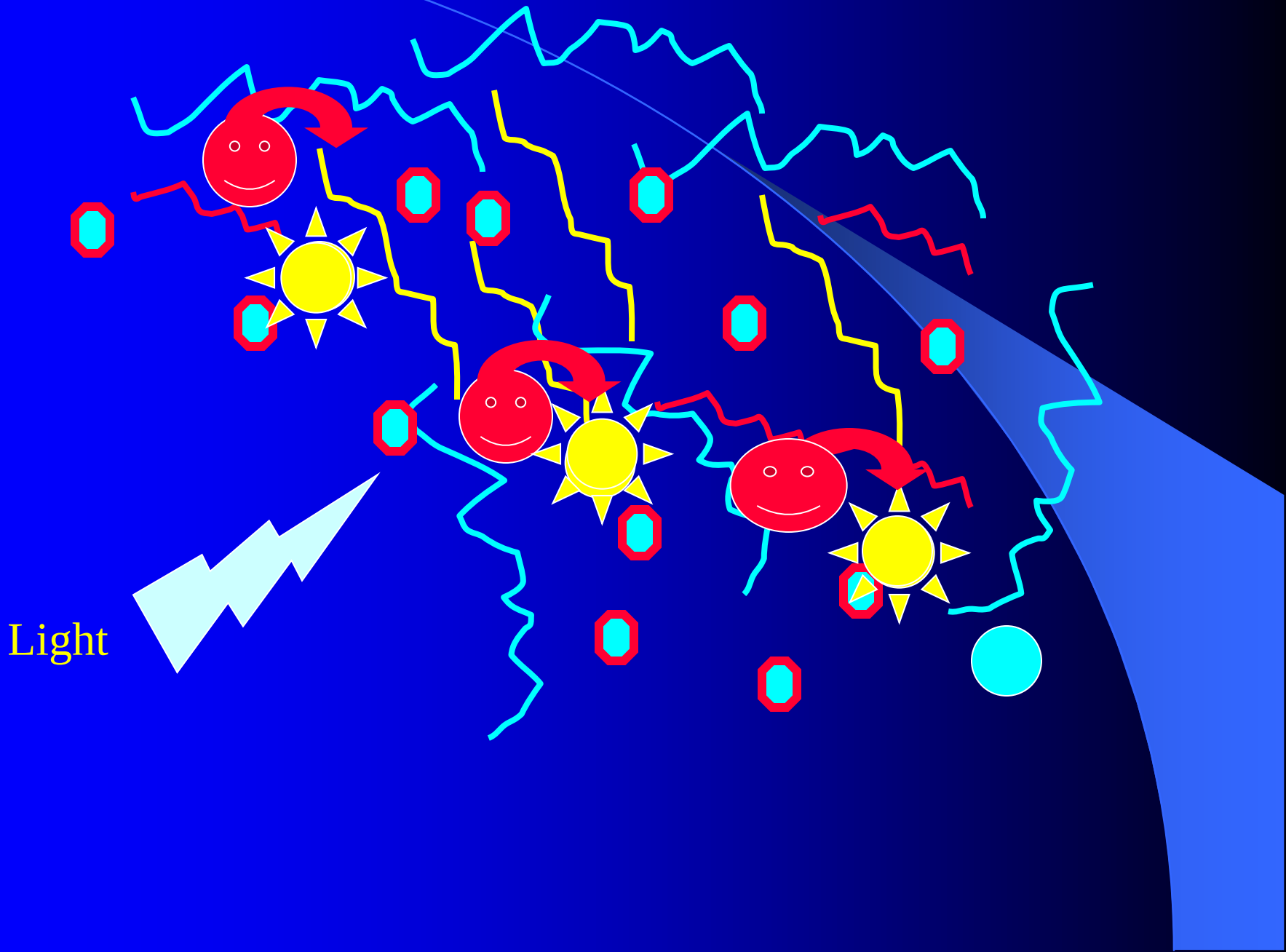
Accelerator

Iniciator

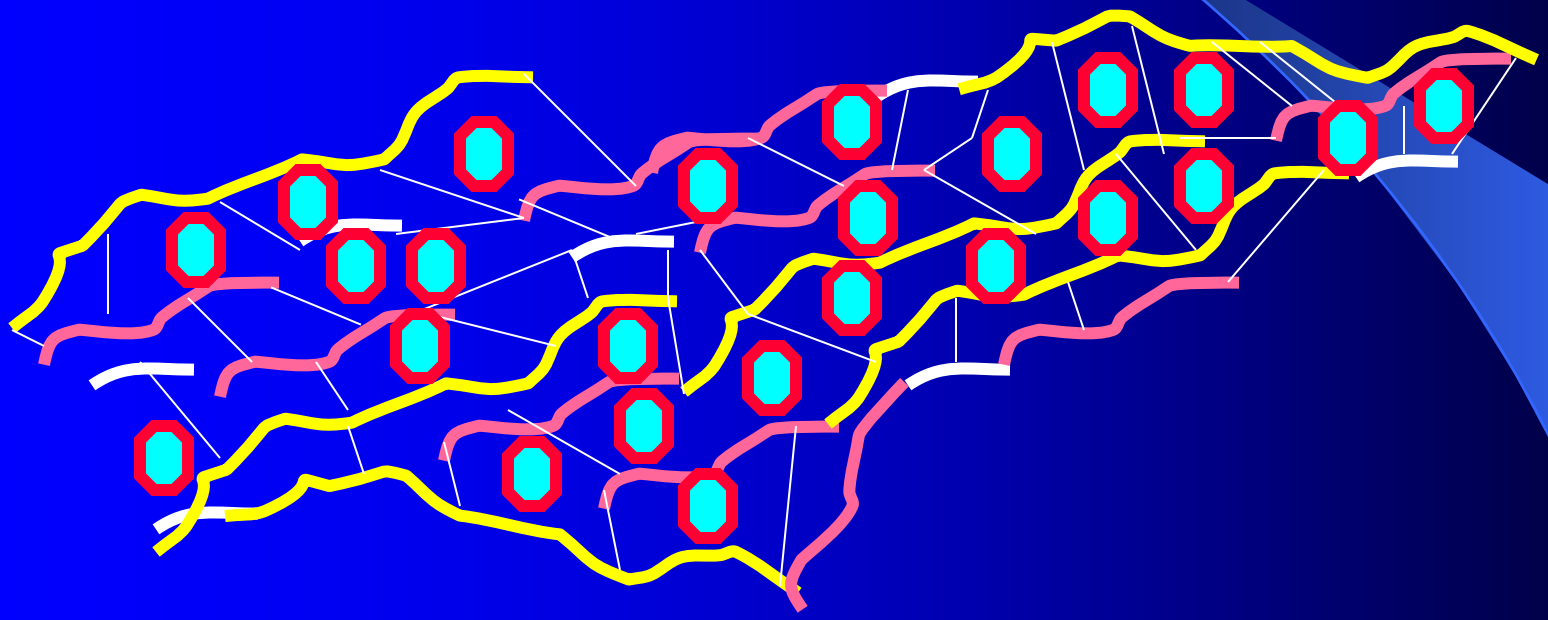
Double bonds - split

Polymer network




Light

Polymer network



Curing

- Light cured composites
- Light activated.

Light activation is accomplished with blue light (470 nm)

Initiator is camphorquinon, Phenylpropandion, Lucirin

Chemically cured composites

Iniciator is organic peroxide, accelerator amine

Composite according to mode of curing

- Chemically curing (2 components)
- Light curing (1 component)
- Dual curing (2 components)

Composites acc to size of filler

Macrofiller (macrofilled) composites

1 – 10 μm

Microfiller (microfilled) composites

0,01 – 0,04 μm

Hybrid composites (contain macro and microfiller)

Retention

Principle of retention of composite filling materials is micromechanical retention

Microscopic spaces in enamel and dentin are filled with the material.

Adhesives

- Adhesive systems using acid etching technique
- Selfetching adhesive systems

Adhesives

- Acid etching technique

Etching

Washing

Priming Bonding

Adhesives

- Selfetching adhesive systems

Priming

Bonding

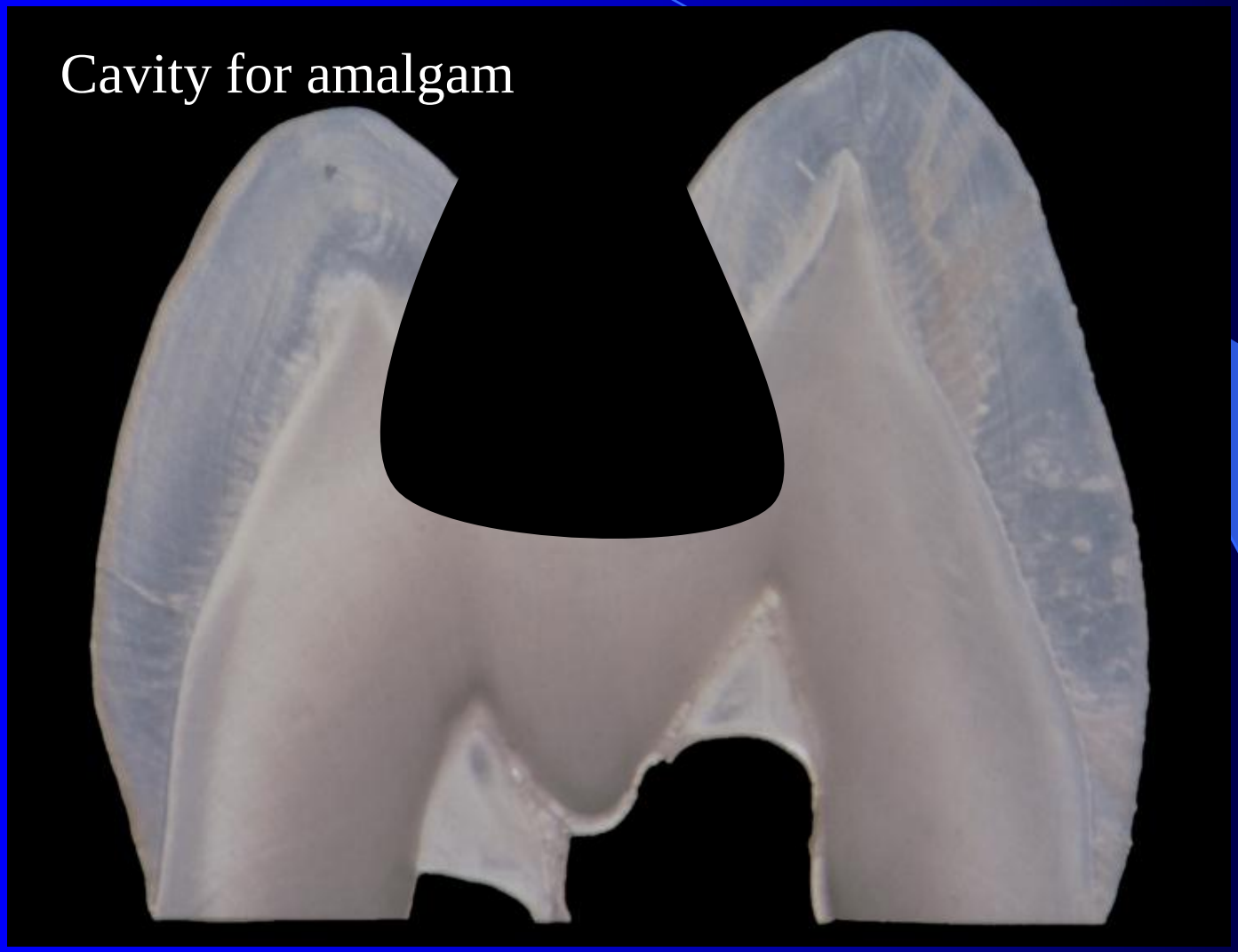
Adhesives

- Active and passive bonding

Active – rubbing with microbrush

Passive – without any rubbing

Cavity for amalgam



Cavity for composite

Retention

Principle of retention of composite filling materials is micromechanical retention

Microscopic spaces are filled with the material.

Acid etching procedure creates microscopic spaces in enamel and dentin.

28% - 37% phosphoric acid is used

30 s in enamel

10s in dentin

Acid etching gel is washed off

Enamel

- Enamel is etched after removing of aprismatic enamel which is on the surface
- The spaces between enamel rods (an inside also) are obtained after the etching procedure.

Dentin

On the surface of dentin the smear layer occures (always after preparation, consists of smashed crystalls, collageb fibers, microbs).

Acid etching removes this smear layer, dentin tubules are open and collagen betwork lost minerals - is denudated

Adhesive system

Primer

Resin that goes easily to dentin, keep collagen network open (necessary for bonding)

Bond

Unfilled (or low filled) resin of the same composition as matrix of composite

Flows into the spaces and enables the micromechanical connection

Making filling

- Preparation
- Enamel is beveled in most cases – retentive border
- Acid etching
- Washing, slightl drying
- Bonding, (appl. Of primer and bond), curing
- Placement of filling material – in portions
- Curing with light
- Finishing and poloshing

Glassionomers

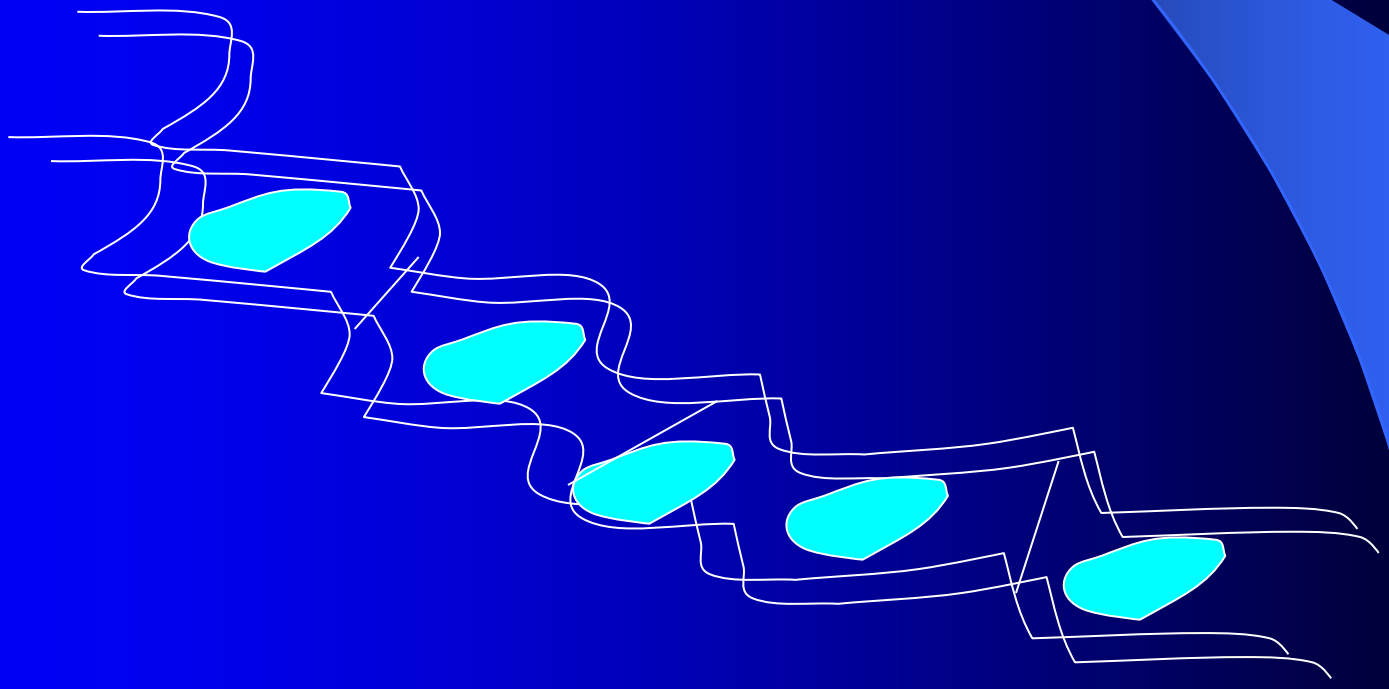
Composition

Powder: Aluminiumsilicate glass(SiO_2, Al_2O_5, CaO, N_2O,P_2O_5, F)

Liquid: Polyacid
(polyacrylic, polymaleic)
Tartaric acid,
Water

Glassionomers –principles of setting

- Aluminium – calcium polymer network



Glassionomers

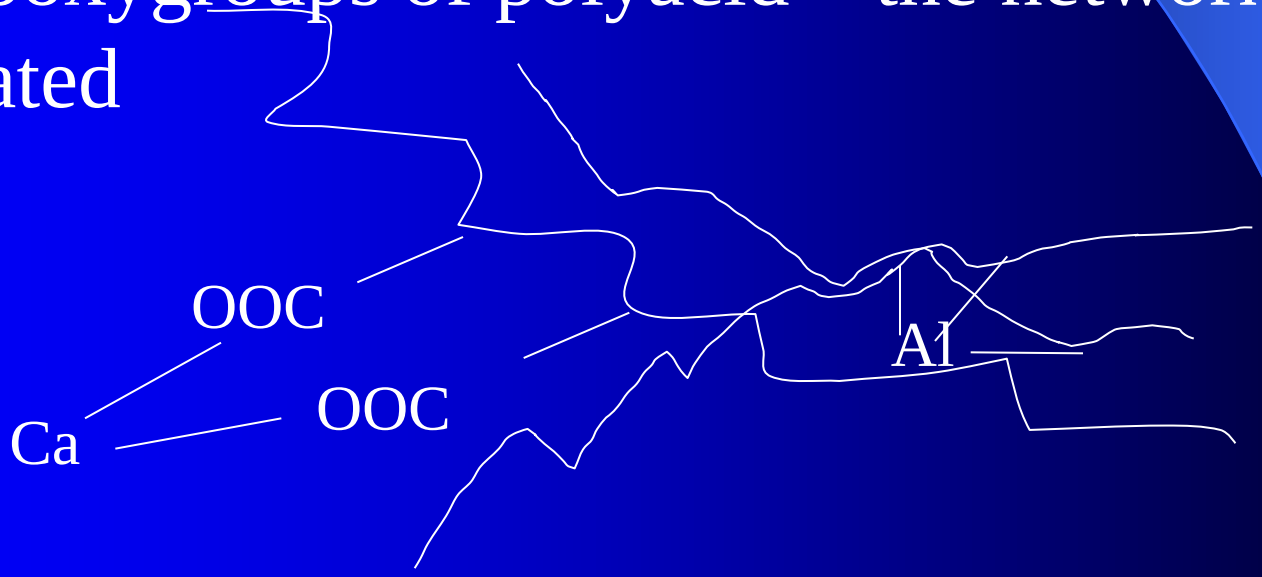
- Chemical bonding to hard dental tissues
- Thermal expansion similar to dentin
- Realeasing of fluoride ions

Mechanical not strong enough

Aesthetics acceptable

Acido – basic reaction is a principle of hardening

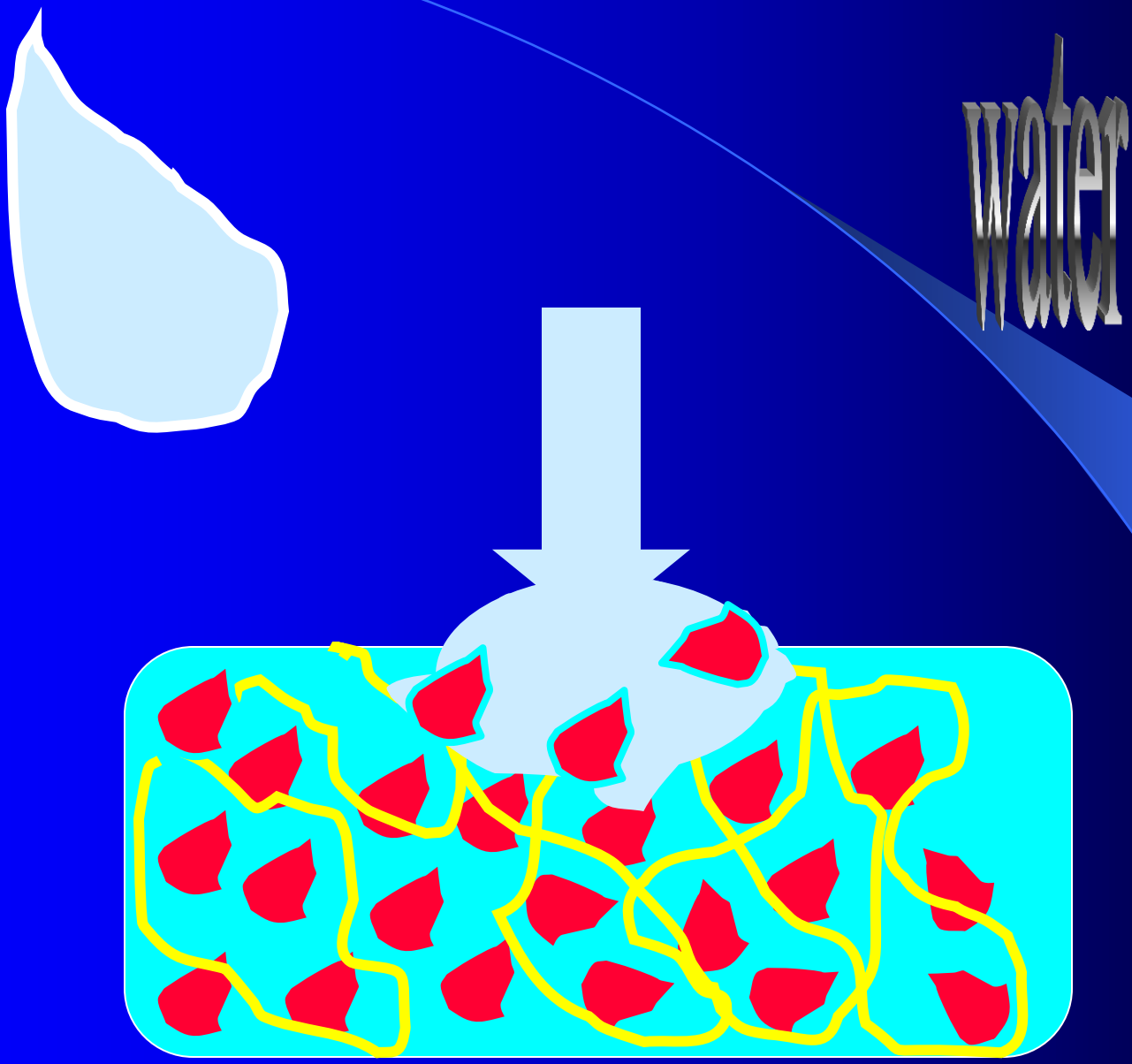
- Calcium and aluminium ions release from the glass. These ions react with carboxygroups of polyacid – the network is created

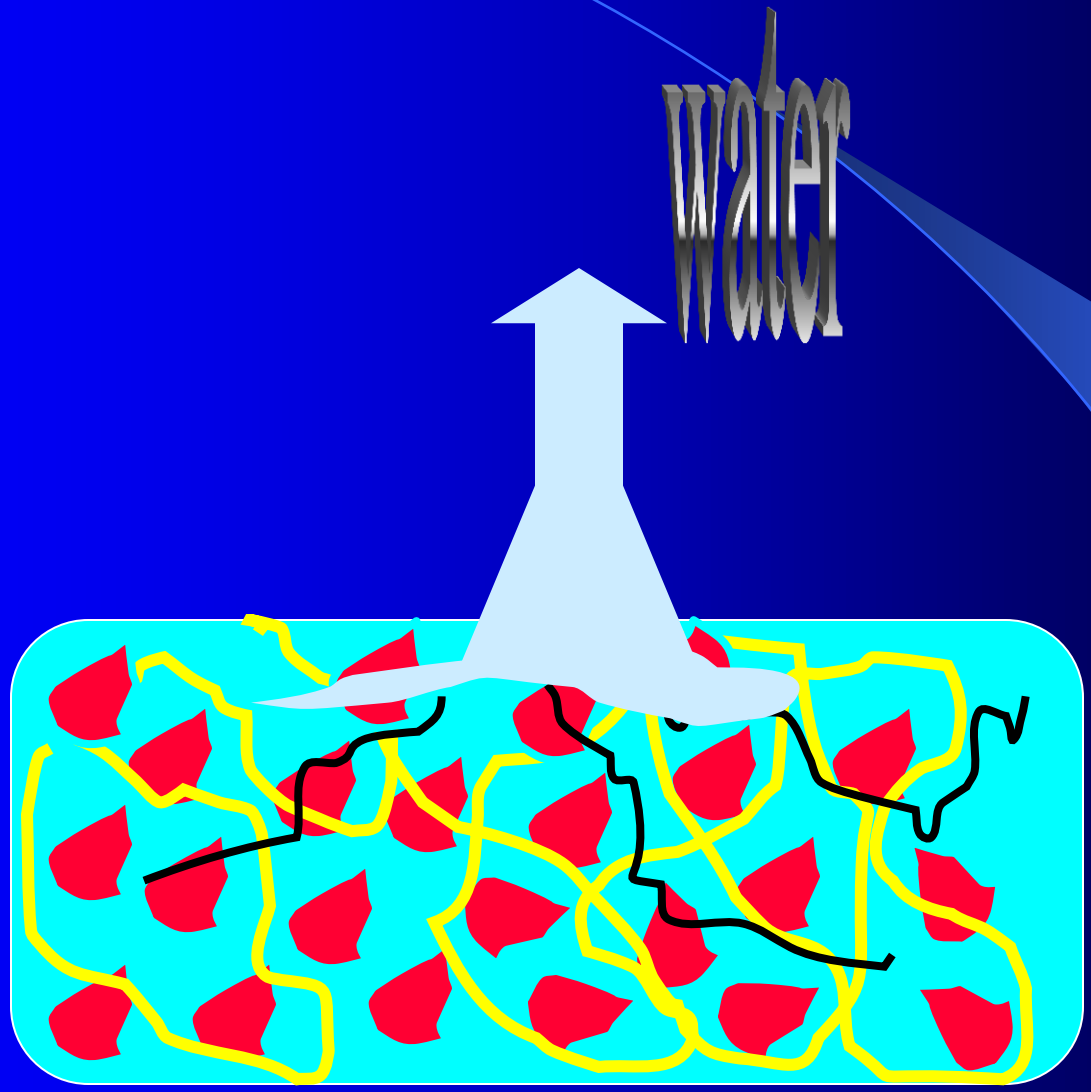


Glassionomers acc to setting reaction

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

dentin


water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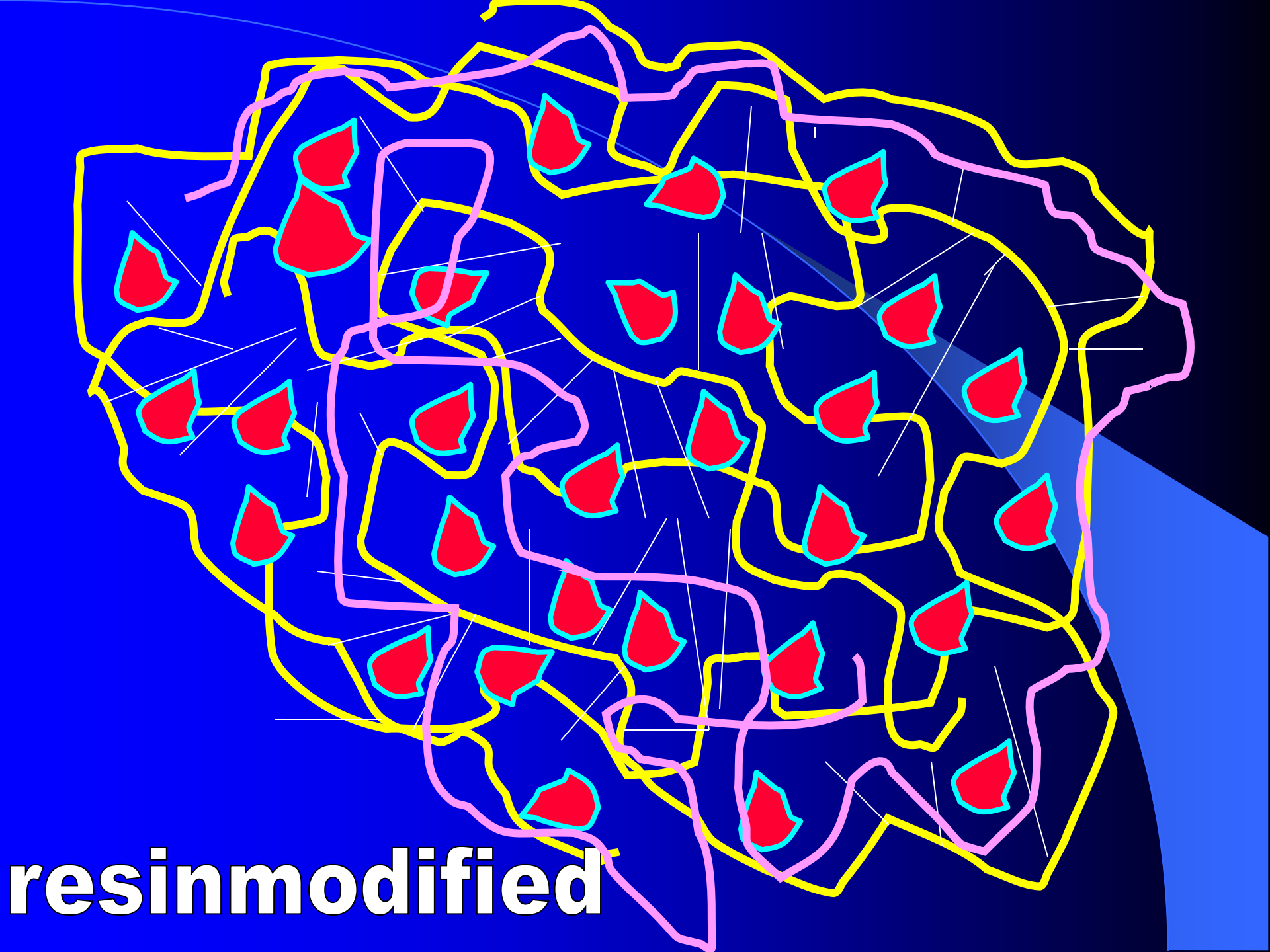
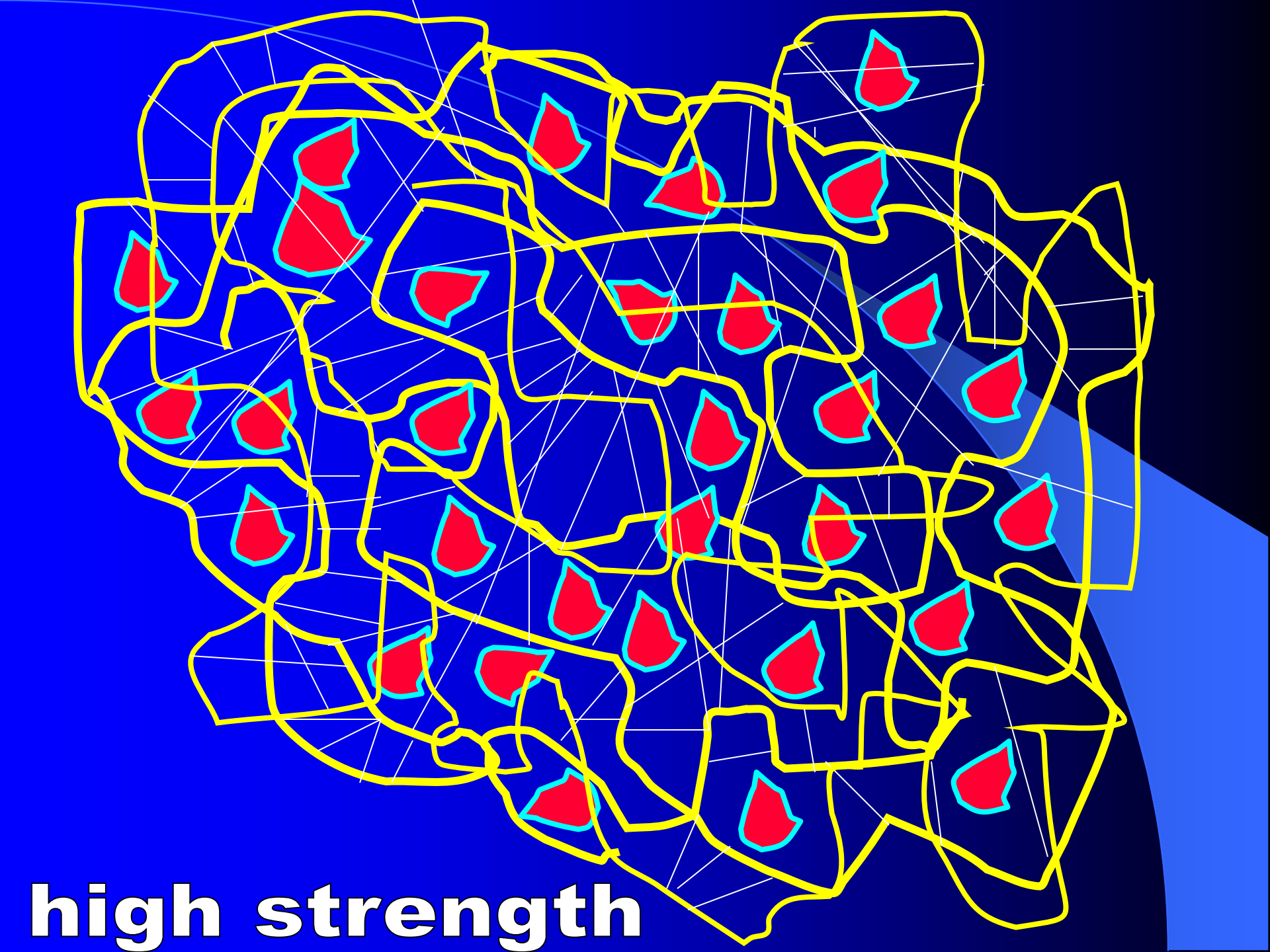

resinmodified


high strength

Glassionomers - indications

Fillings

Class V., III., I., II

Sealants

Protection of tooth surface

Mixing

Hand

Power driven - capsulated

Making filling

- Preparation
- Smoth bordes
- Cavosurface margin limited on caries lesion only
- Conditioning (conditioner is 20% polyacrylic acid) 20s.
- Washing
- Filling in one bulk