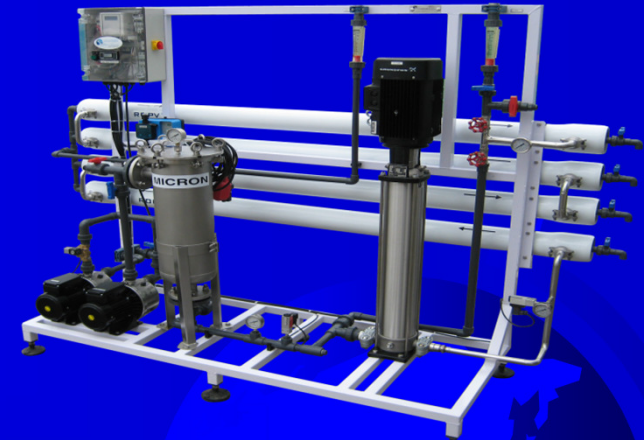


Water Treatment



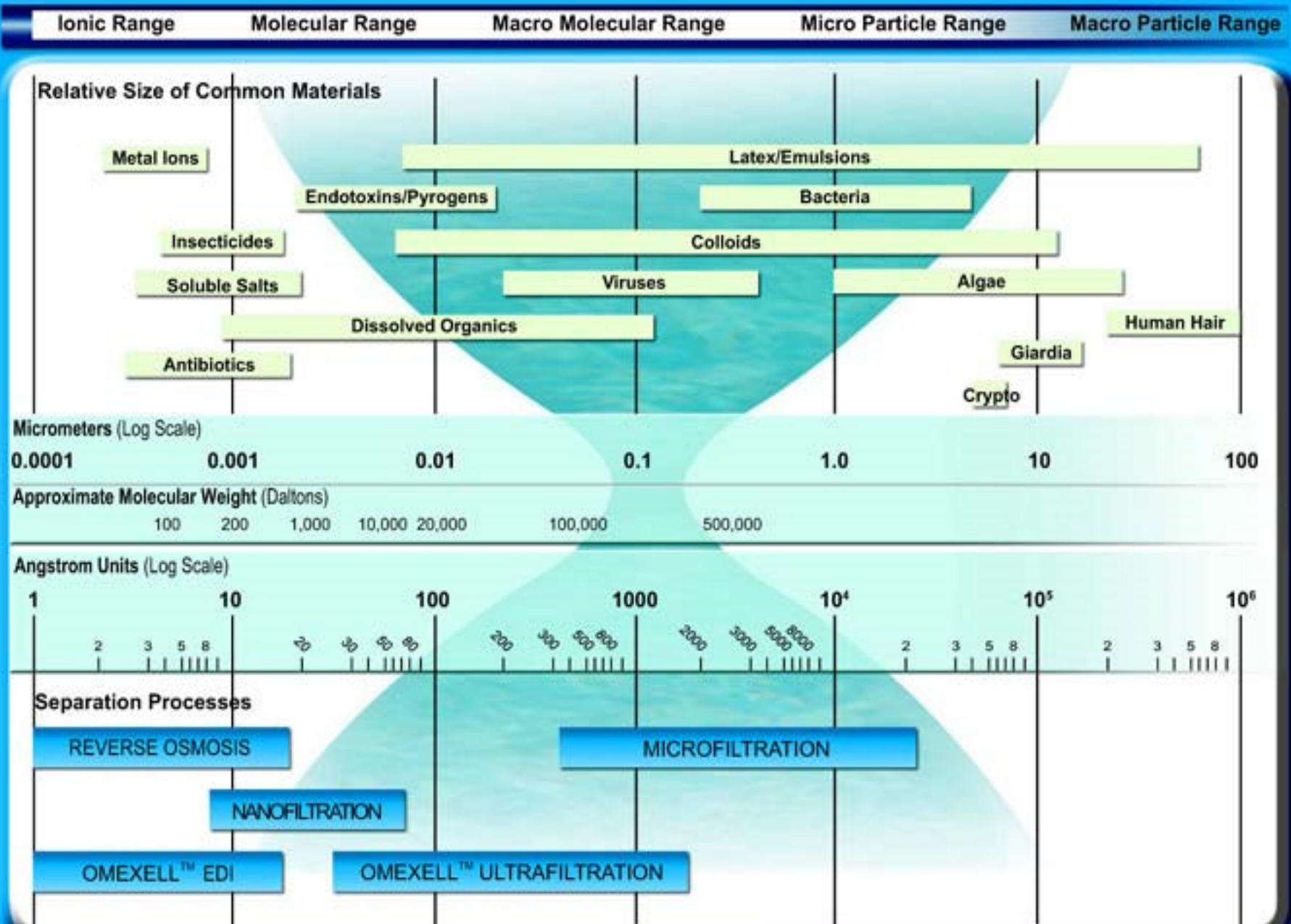


- Flocculation / Filtration / Disinfection
- Ultrafiltration
- Reverse Osmosis
- Filtration / Ultraviolet Light
- Fluoride / Nitrate Removal
- Iron Removal
- Sand / Multimedia Filtration
- Ozone



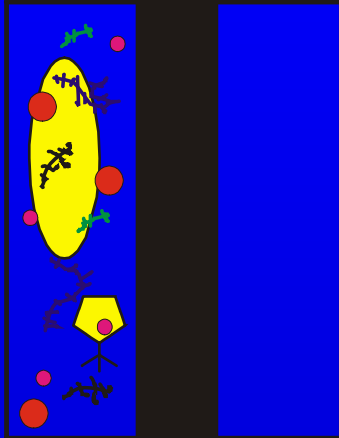
Water Treatment

MEMBRANE FILTRATION SPECTRUM

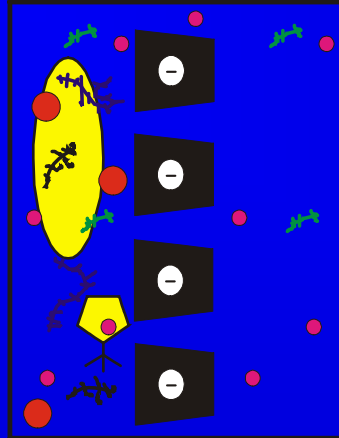


Ultrafiltration

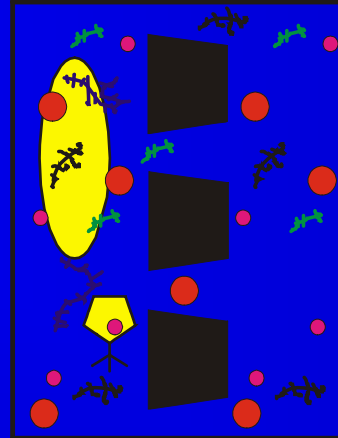
Hyperfiltration/Umkehrosiose
 $\Delta p = 10 - 100 \text{ bar}$



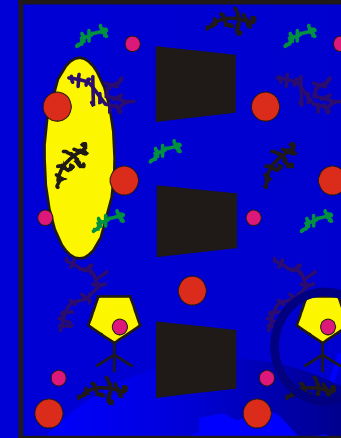
Nanofiltration
 $\Delta p = 3 - 10 \text{ bar}$








Ultrafiltration
 $\Delta p = 0,1 - 5 \text{ bar}$



Mikrofiltration
 $\Delta p = 0,1 - 5 \text{ bar}$



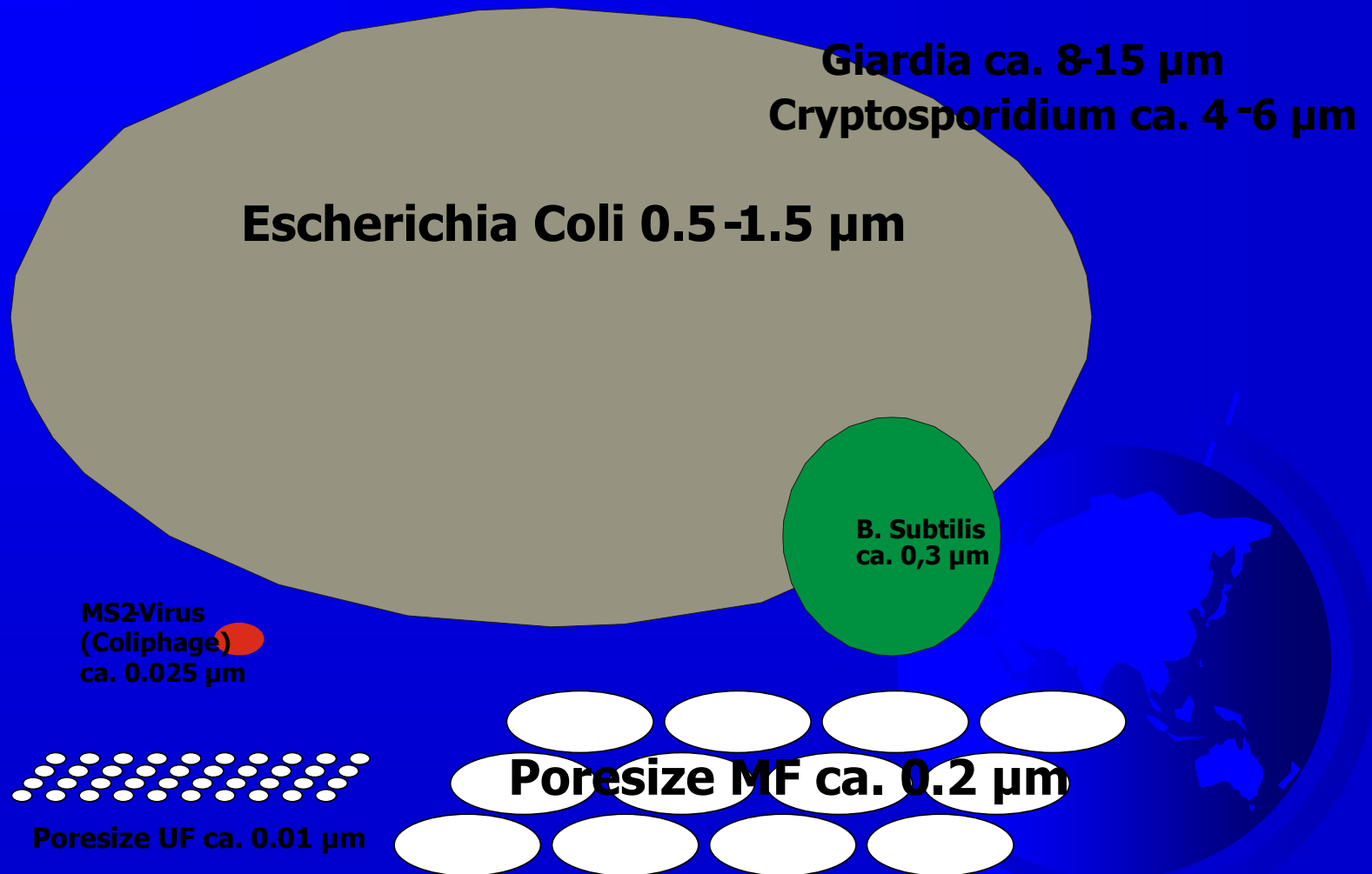
-  Hochmolekulare org. Substanzen
-  Org. Substanzen mittlerer Größe
-  Niedermolekulare org. Substanzen
-  Mehrwertige Ionen
-  Einwertige Ionen

-  Bakterien, Parasiten, anorganische Partikel
-  Viren



REJECTION CAPABILITIES

UF vs. MF



Giardia ca. 8-15 µm
Cryptosporidium ca. 4-6 µm

Escherichia Coli 0.5-1.5 µm

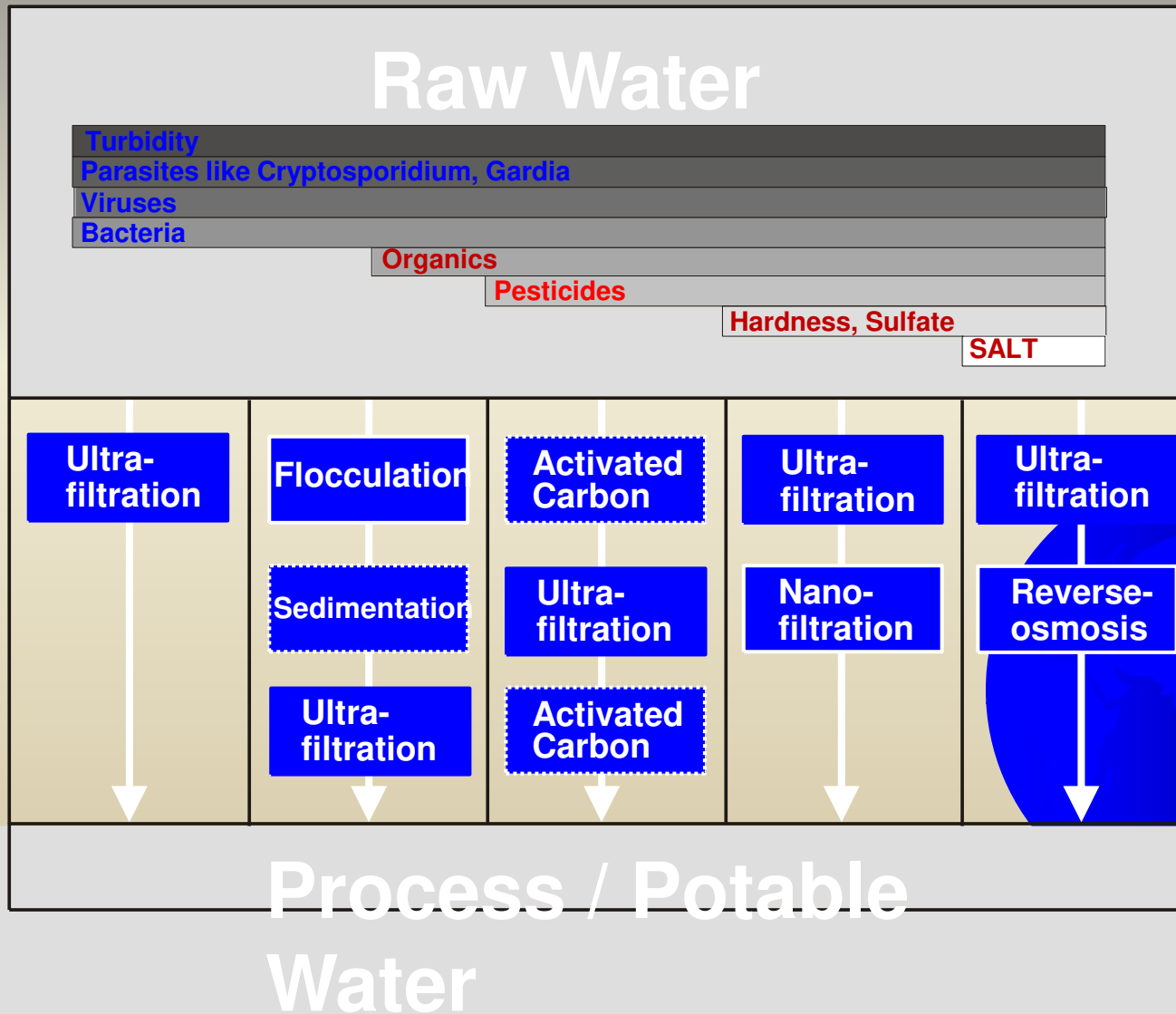
B. Subtilis
ca. 0,3 µm

MS2Virus
(Coliphage)
ca. 0.025 µm

Poresize MF ca. 0.2 µm

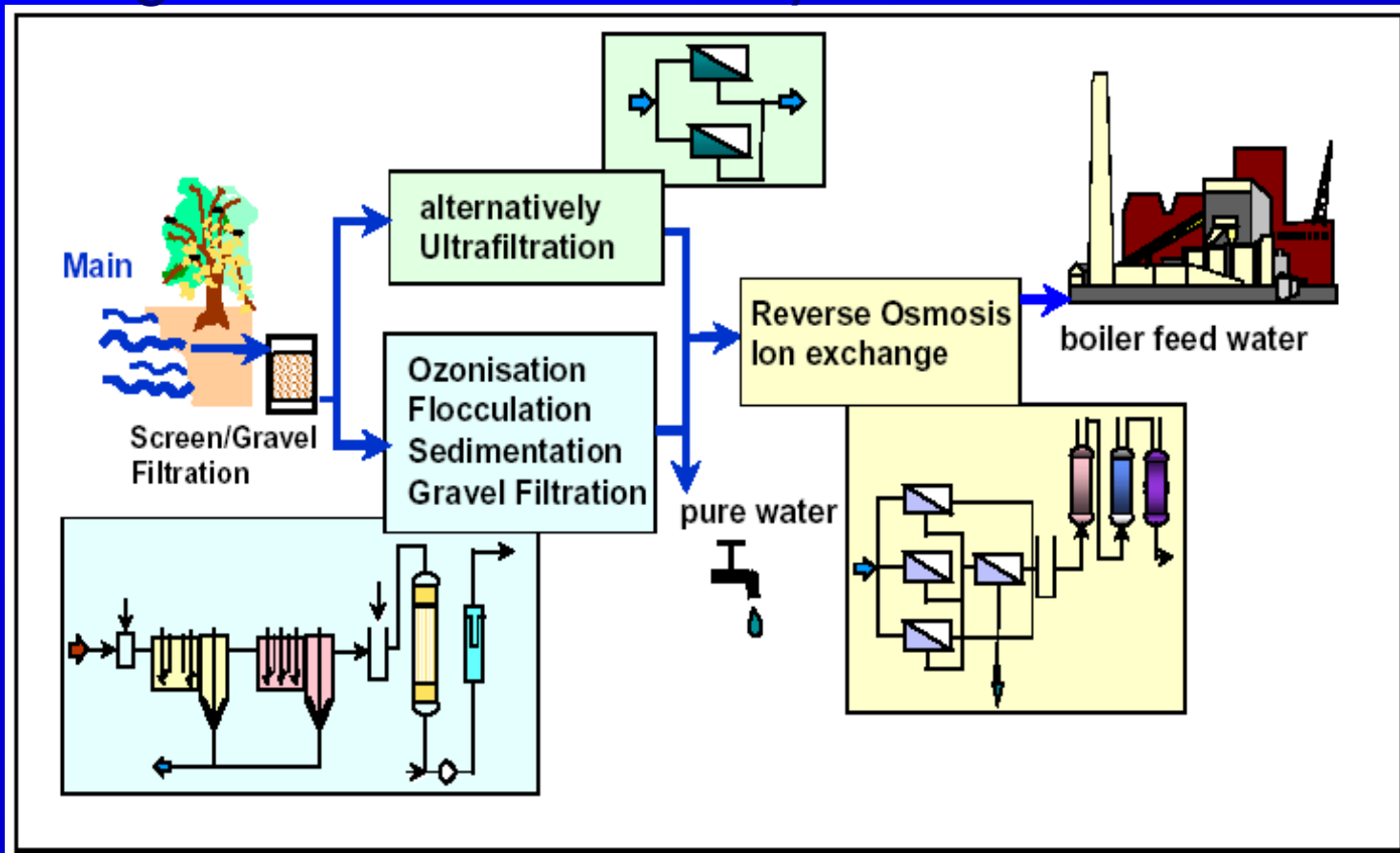
Poresize UF ca. 0.01 µm

PROCESS Options

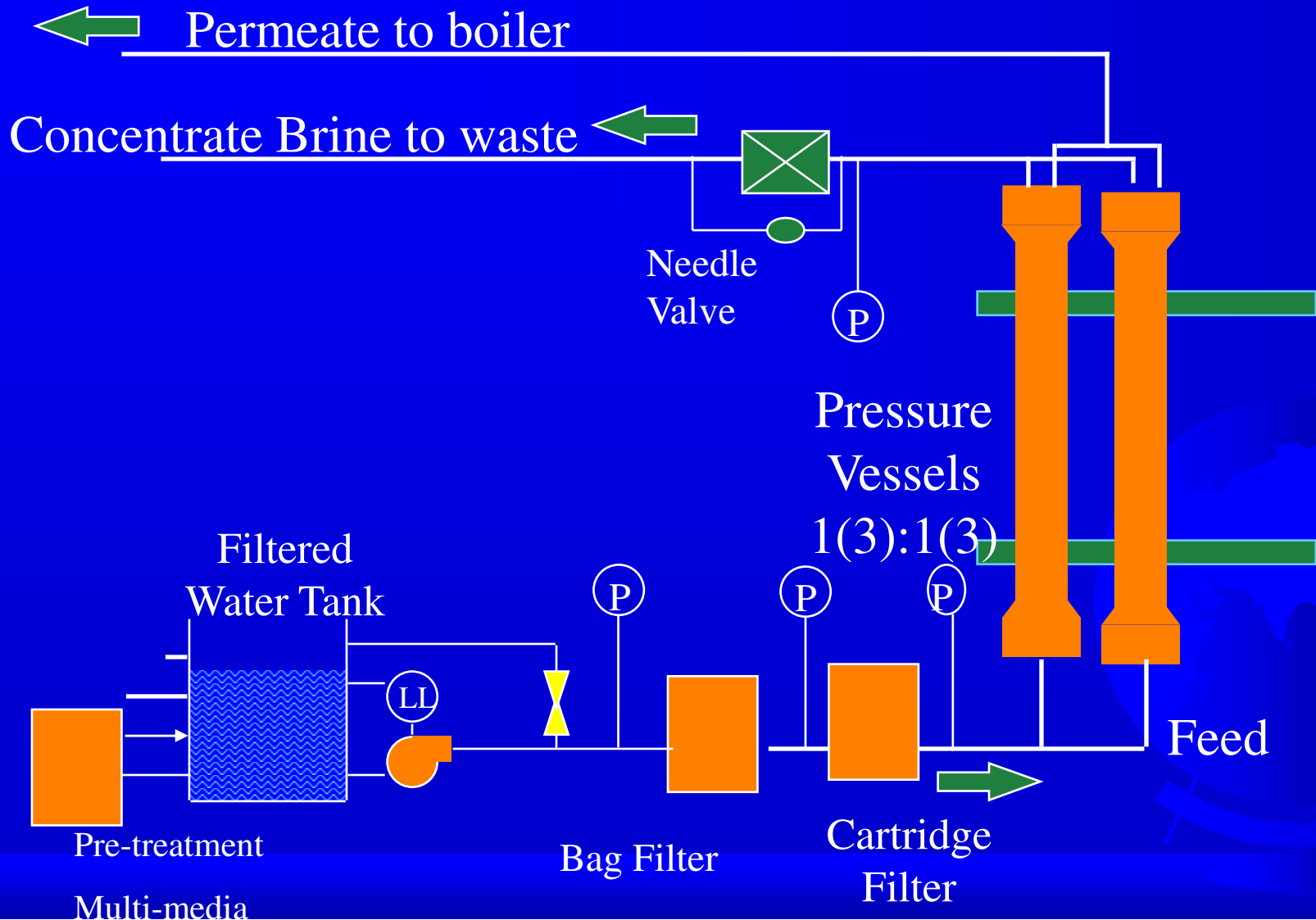


PROCESS COMBINATIONS

Treatment costs UF = 50% Treatment costs conventional
(savings for RO not included)

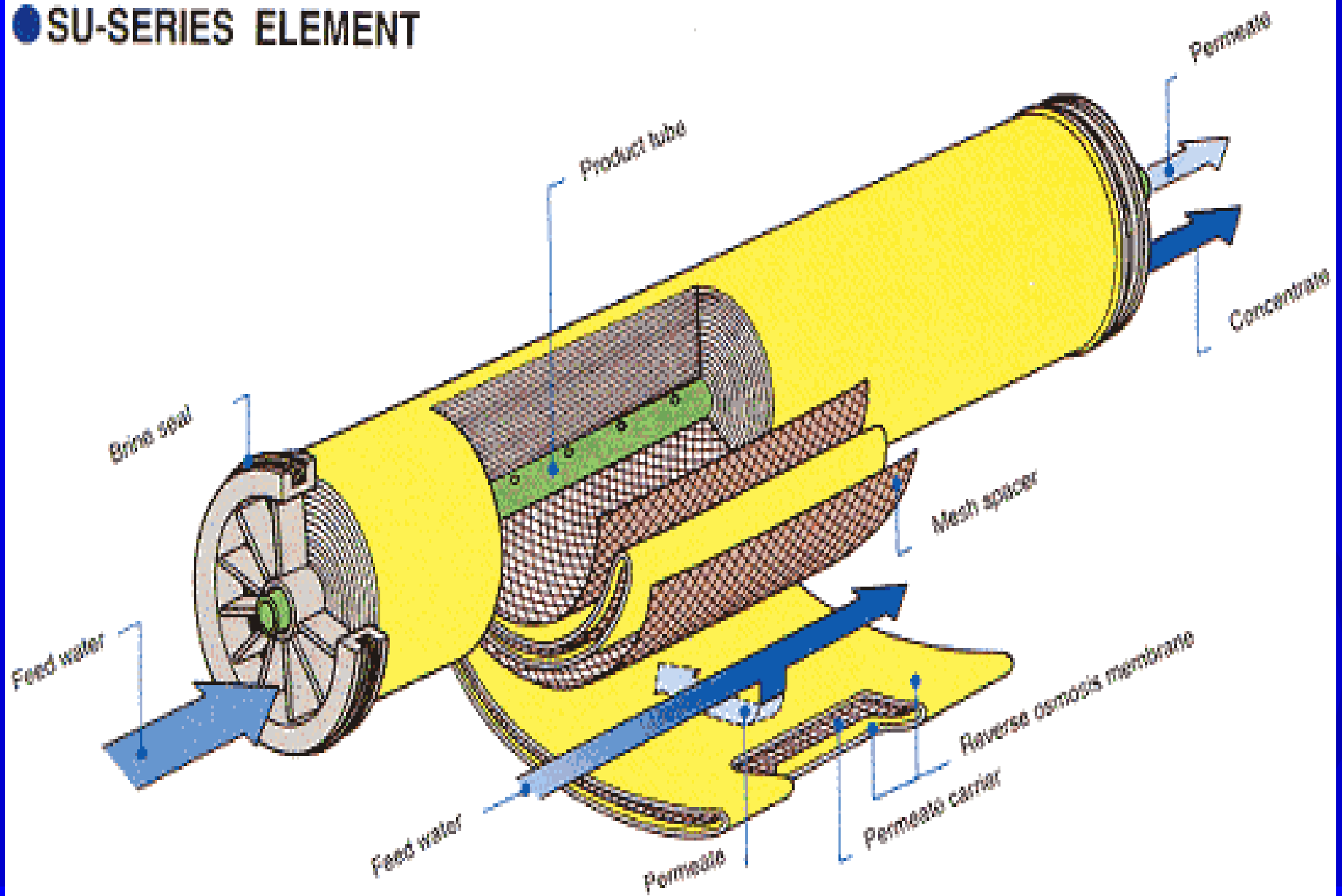


Membrane System Circuit



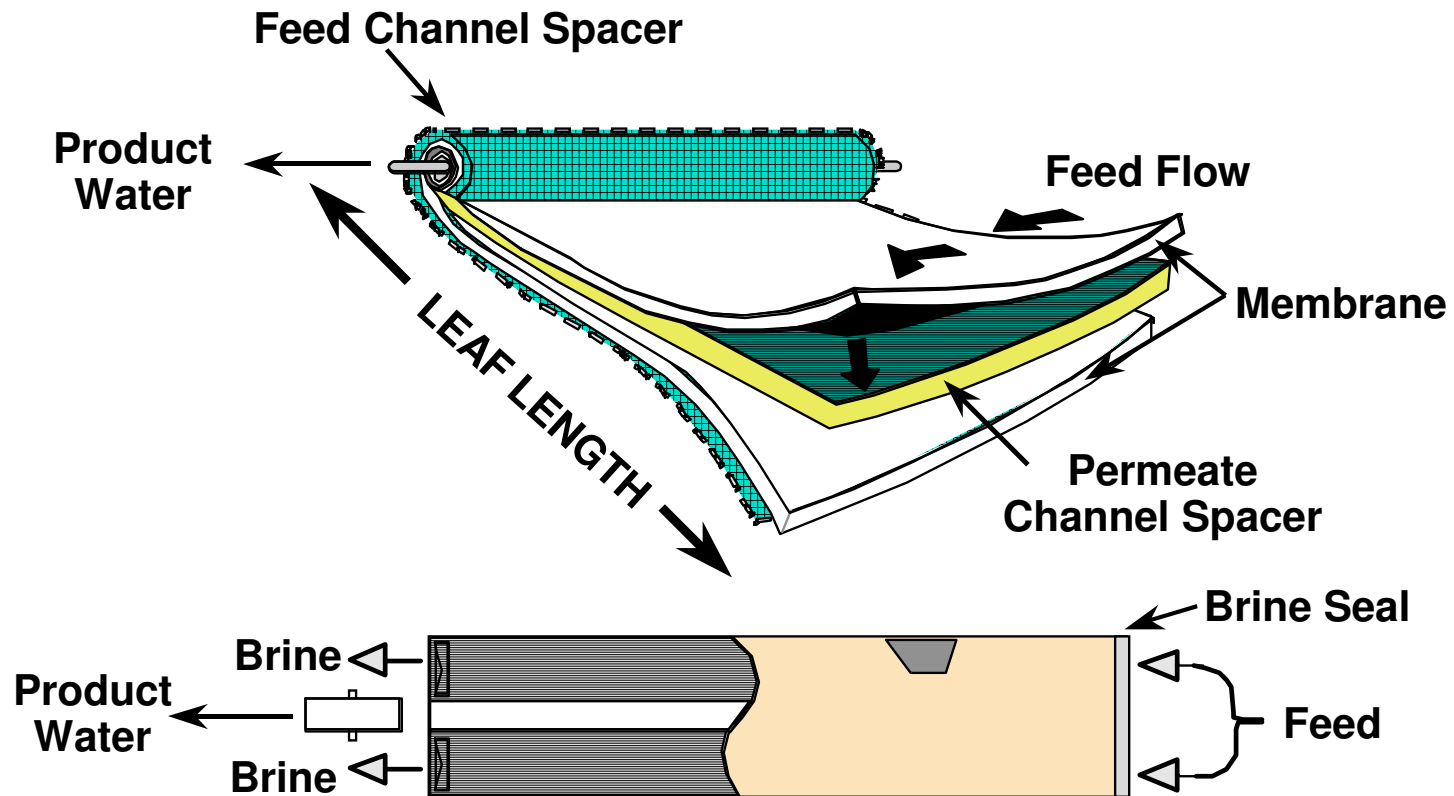
Alternate View of Membrane

● SU-SERIES ELEMENT



Membrane Design

SPIRAL WOUND REVERSE OSMOSIS ELEMENT



PRE-TREATMENT

MIXED BED ACTIVATED CARBON /
SAND FILTERS

BAG FILTERS (20 MICRON)

CARTRIDGE FILTER (1 MICRON)

ANTISCALENT



RAW DATA

Pressure Before Bag Filter

Pressure After Bag Filter ($\Delta P = 0.5$ Bar)

Pressure Before Cartridge Filter

Pressure After Cartridge Filter ($\Delta P = 0.5$ Bar)

Operating Pressure (Max. 20 bar)

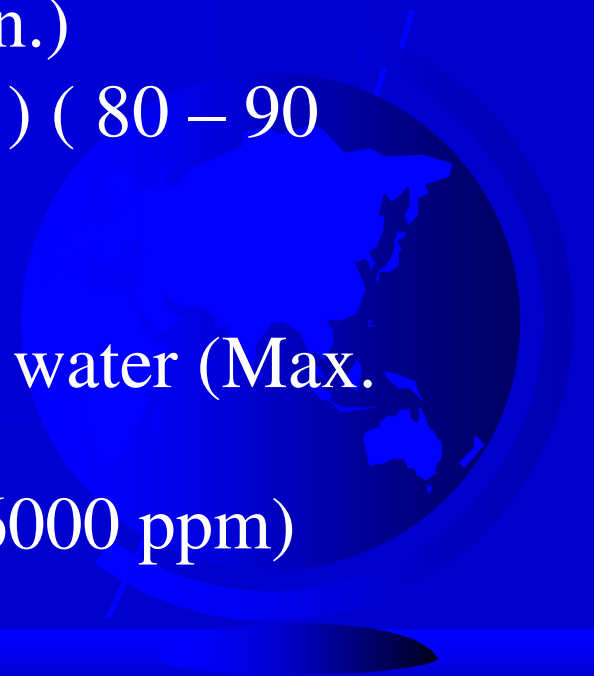
Flow Rate – Inlet (130 – 140 lt / min.)

Flow Rate Permeate (Treated Water) (80 – 90 lt/min.)

Chemical Dosing Pump - On

TDS (Total Dissolved salts) Treated water (Max. 250 ppm)

Estimated TDS Feed Water (Max. 6000 ppm)



Bag and Cartridge Filters

$\Delta P = 0.5 \text{ bar}$

Need to clean the bag filter or replace the cartridge filters



Final Product

- Drinking Water
- Boiler feed water
- Water bottling plants
- Potable water systems
- Agriculture
- Process water



Why use ANTISCALANTS ?



IONS FOUND IN WATER



Suspended Solids



MEMBRANE SCALING

CALCIUM CARBONATE

CALCIUM SULPHATE

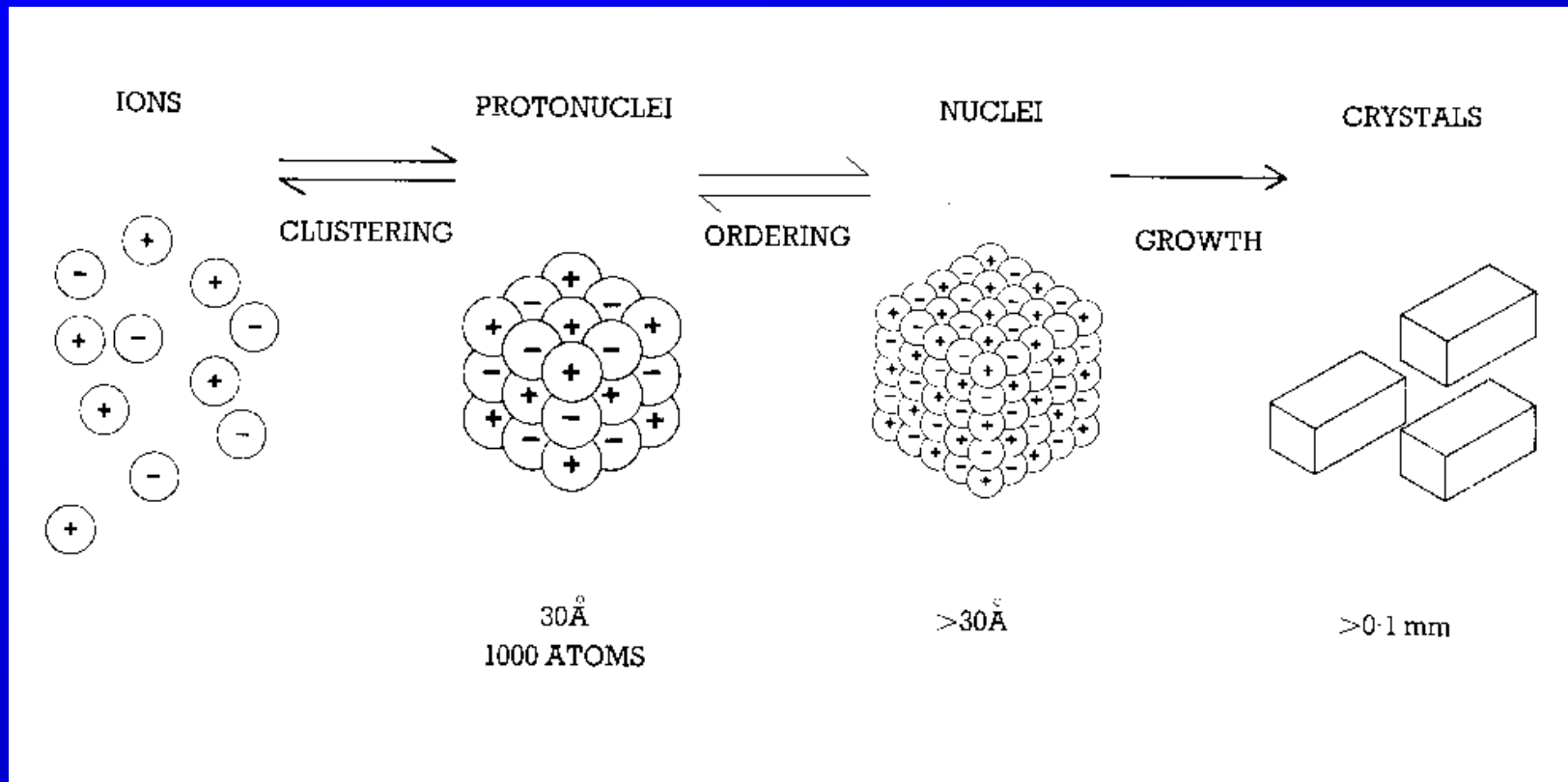
BARIUM SULPHATE

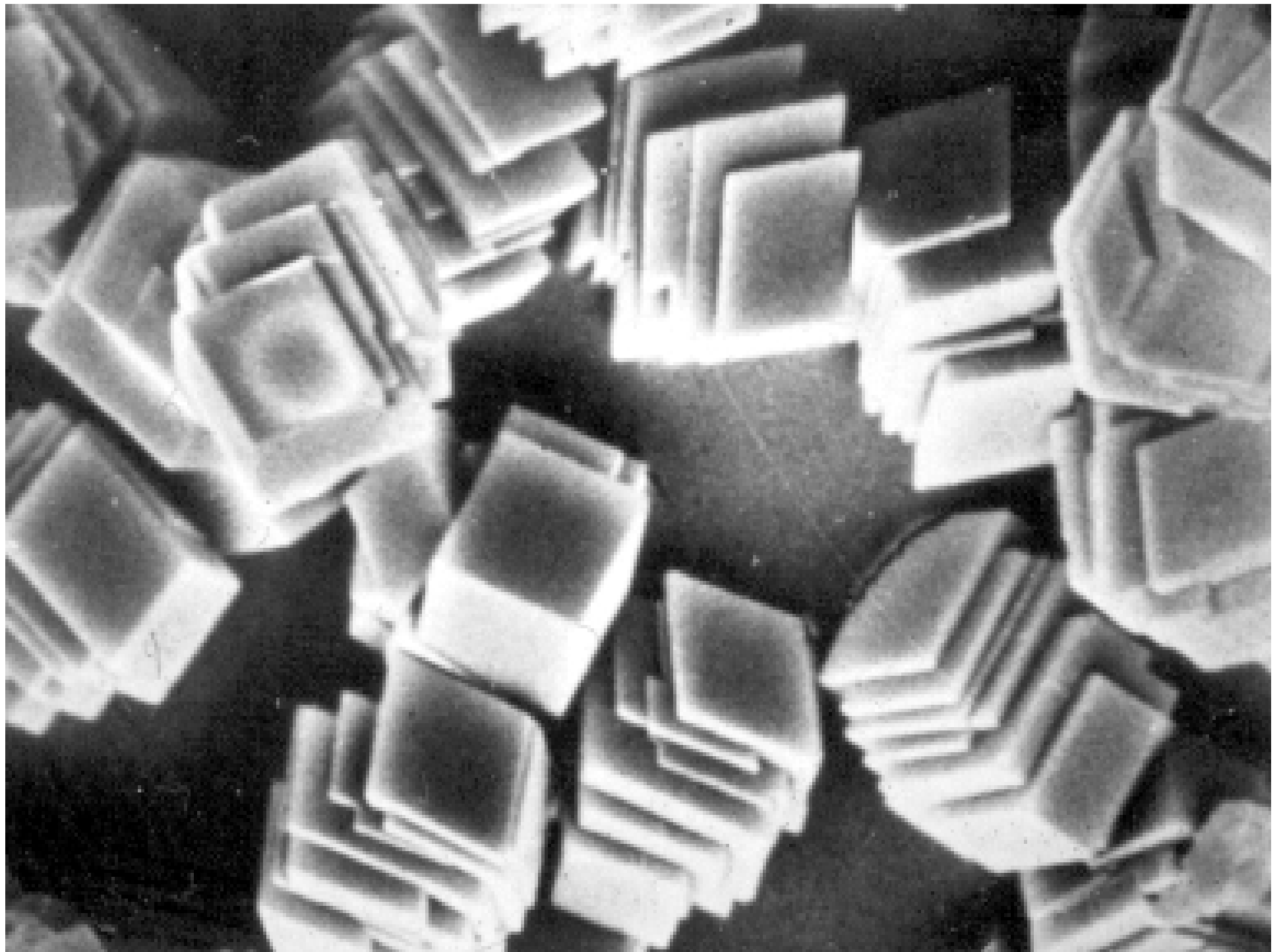
IRON

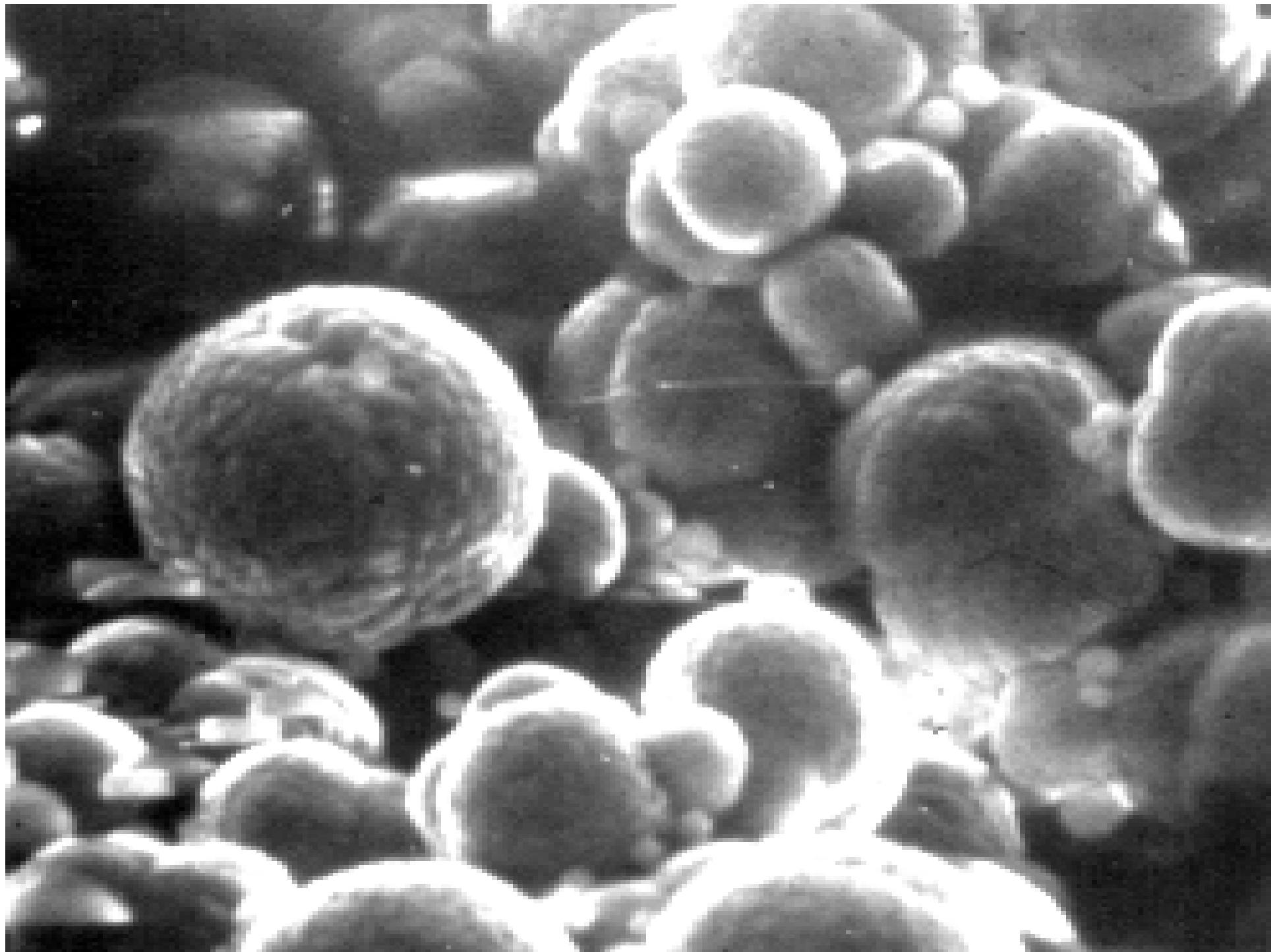
SILICA



STAGES OF CRYSTALLIZATION







WHEN TO CLEAN?

IF THE FOLLOWING PARAMETERS
CHANGE BY $>15\%$

SALT REJECTION

DIFFERENTIAL PRESSURE

REQUIRED FEED PRESSURE

PRODUCT FLUX





Deposits

- Calcium carbonate
- Calcium phosphate
- Iron

Inorganic deposits

- Iron
- Aluminium
- Silica



CLEANING AGENTS

INORGANIC SCALES

SULPHATE SCALES

METAL OXIDES

IRON

IRON & ORGANICS

ORGANICS & BIOFILM

BACTERIA, FUNGI

COLLOIDS

ACID

CHELANT

WEAK ACID

WEAK ACID

ALKALINE

ALKALINE

BIOCIDE

CHELANT



Cleaning Circuit

