

Resistivity & conductivity

higher the ionizable material → lower will be resistivity  
higher conductivity

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conductivity

## \* Reagent grade water

Use: Preparation of reagents and chemicals solutions used in clinical laboratories, requiring 'pure' water.

ISI spec

ISI has established specification for reagent grade water / clinical lab reagent water (CLRW)

CLRW

(1) Microbiological content  
colony forming unit (m)  
cfu/ml.

< 10 CFU/ml

(2) pH

NA

(3) Resistivity  $M\Omega/cm$   
at 25°C

> 10

(4) Silicate  $mg SiO_2/L$

0.05

(5) Particulate matter

Water passed through

0.2  $\mu m$  filter

(6)

(7) Organics

Water passed through

activated carbon

Preparation -

Distillation

ion exchange

RO

UV oxidation

Water is filtered before any of these process (all sediment filter)

ing

separating component from liquid mixture  
by selective evaporation and condensing

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① Distillat<sup>n</sup>:-

Def:- process of vaporizing and condensing liquid to purify or concentrate a substance or to separate volatile substance from less volatile substance

CLRV

→ Distillat<sup>n</sup> of water → involves boiling the water then condensing steam into clean container

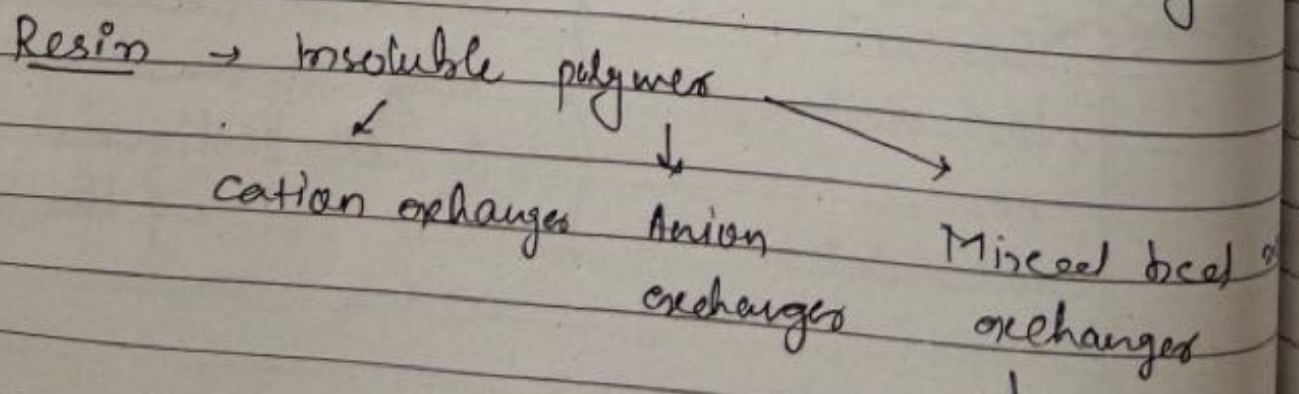
→ Problems → ① carryovers of volatile impurities  
② entrapped water droplets that contain impurities

↓  
Distilled water alone does not meet specific conductivity req. of W Type 1 water.

② Ion exchange:-

↳ process that removes ions from water to produce mineral free deionized water

• Commercial equipment → disposable cartridge or large resin containing tank

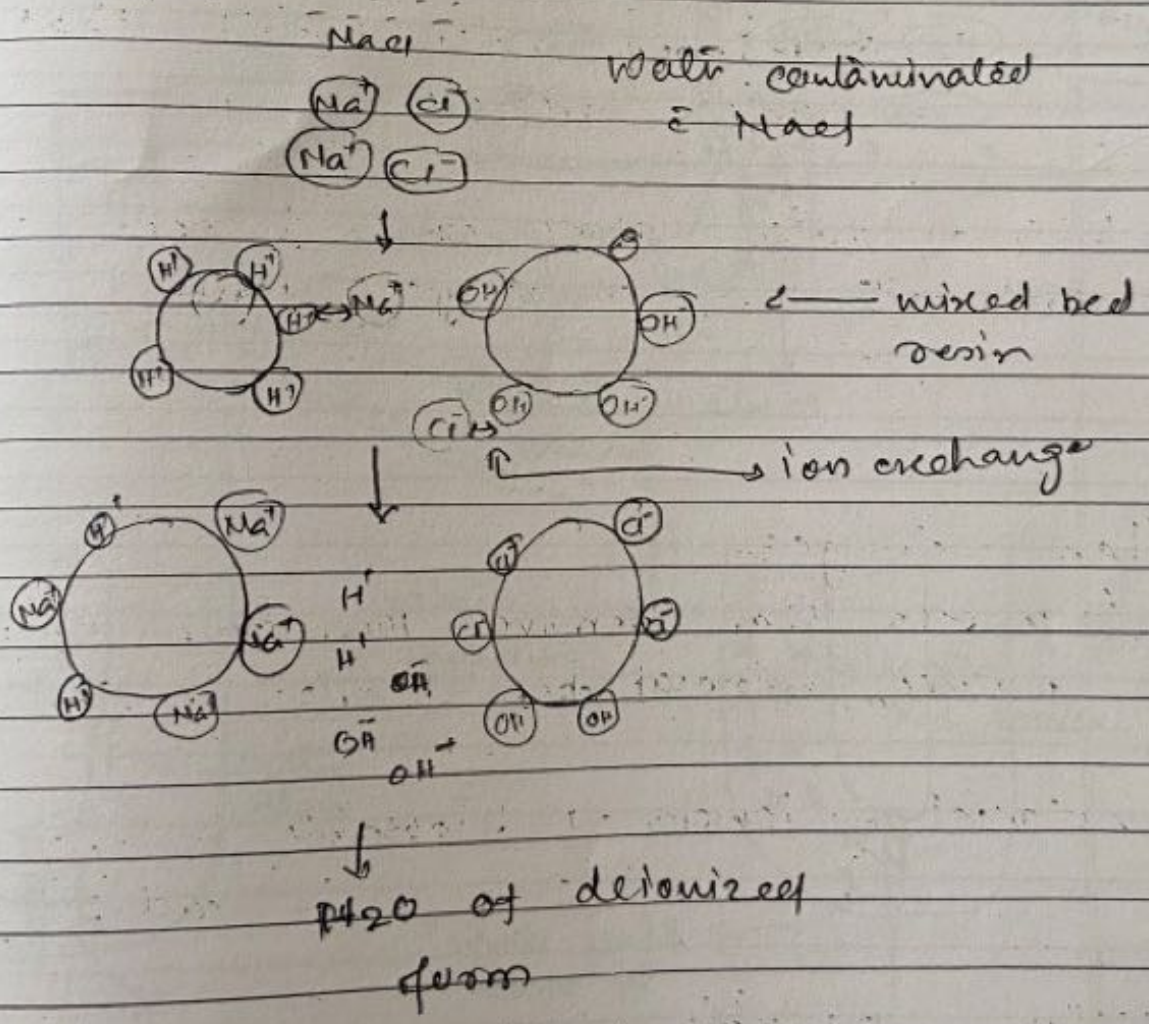


↓  
mixture of

feed water is passed through  
column of resin

↓  
exchange of  $H^+$  and  $OH^-$  for  
impurities present in ionized water

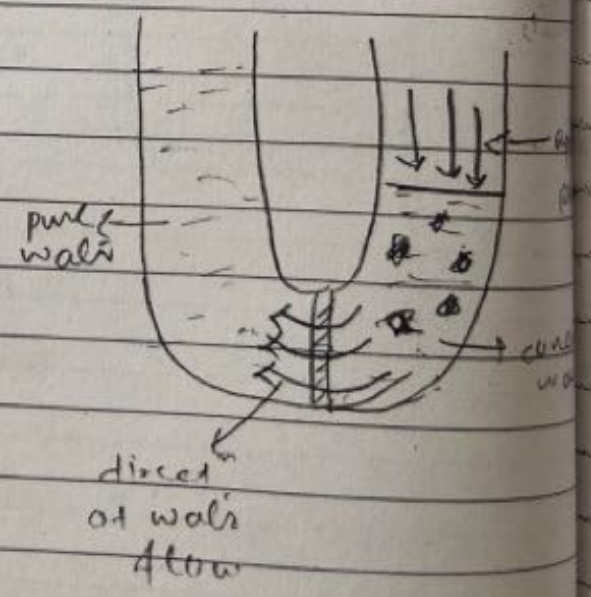
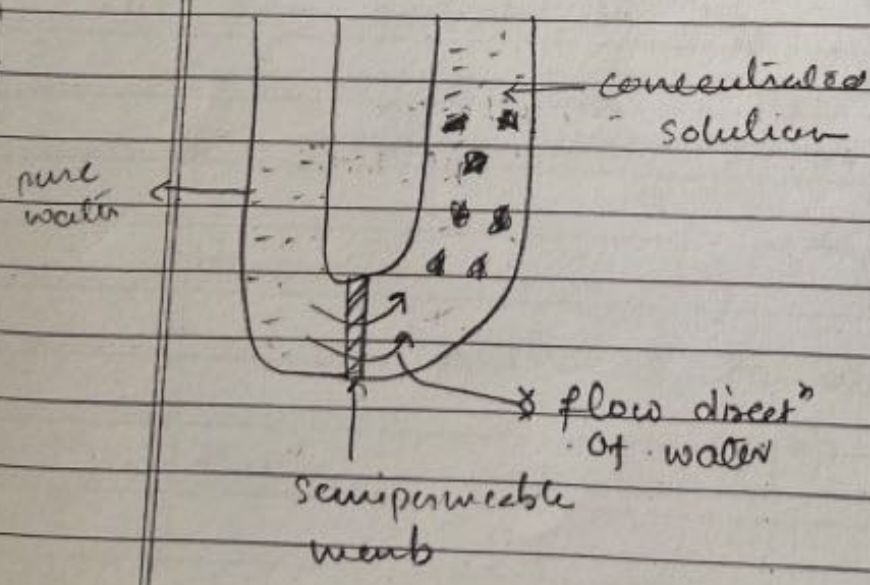
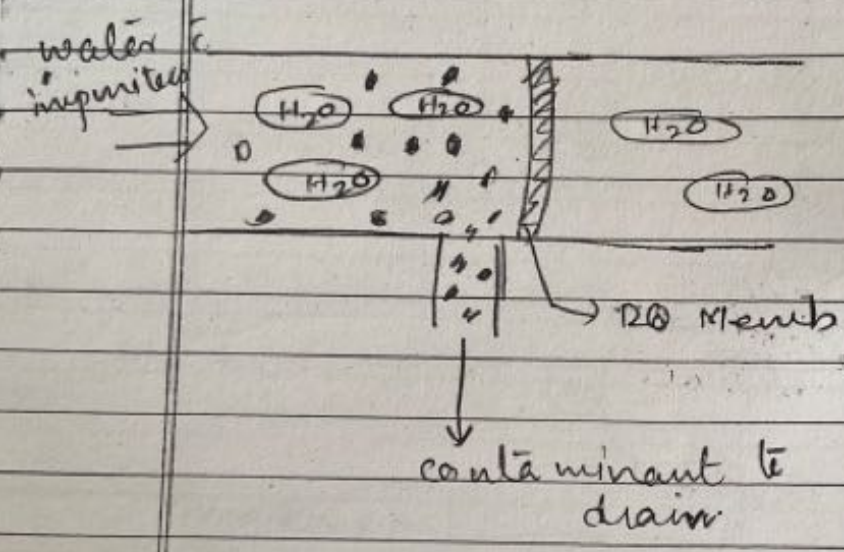
↓  
mixed bed resin produce water  
resistivity upto  $> 10 \Omega$



③ Reverse osmosis:-

water is passed through semipermeable memb & act as molecular filter.

- removes 95-99% organic compounds, bacteria and other particulates and 90-97% of all ionized and dissolved
- used as preliminary purification method.

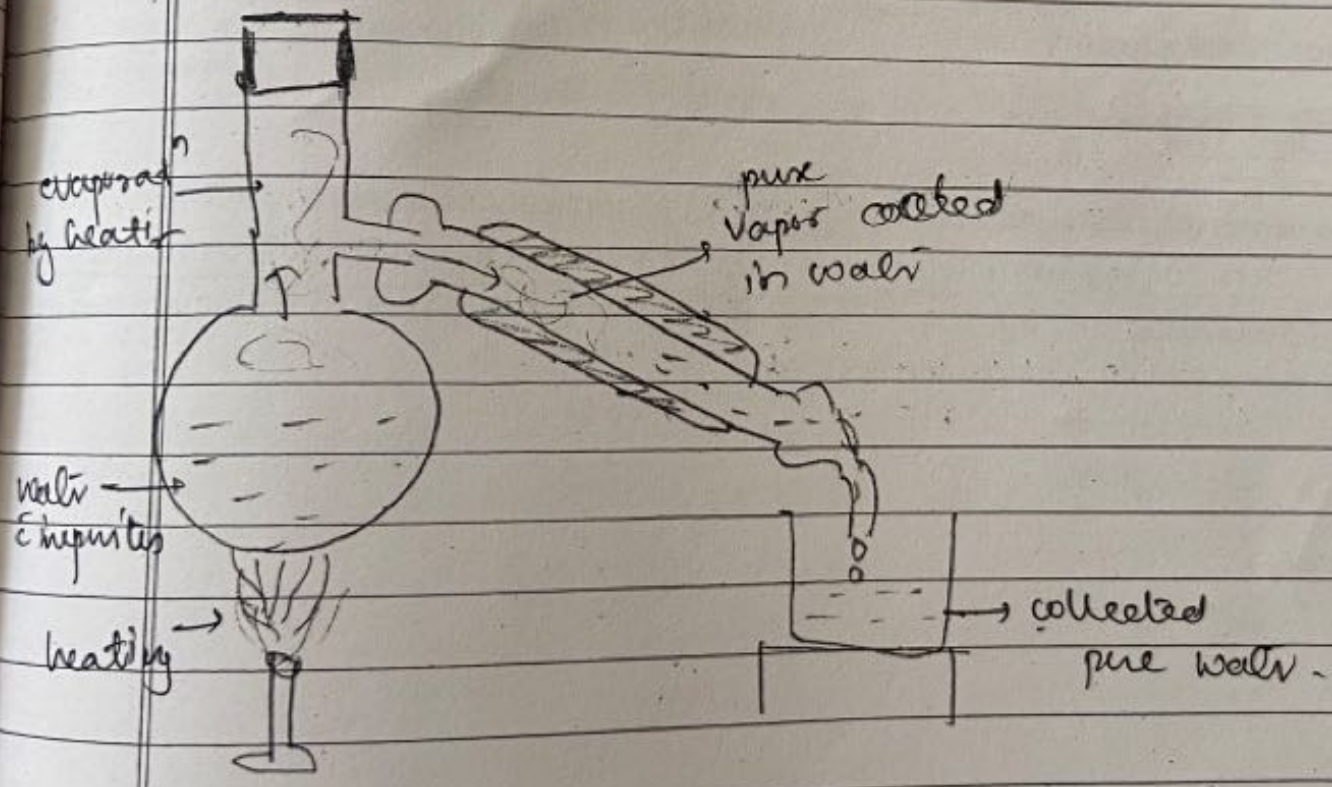


Natural osmosis

Reverse osmosis  
 ↓  
 can applying pressure  
 the flow of water

(4) UV oxidation :-  
radiation at biocidal wavelength = 254 nm.  
↓  
eliminates bacteria  
cleaves ionizing organics.  
↓  
Removed by deionization

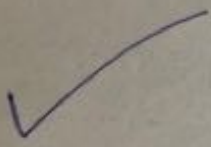
Distillation



CLSI-CLRW: Clinical and Laboratory Standards Institute - Clinical Laboratory Reagent Water  
 CLSI was formerly known as NCCLS (US National Committee for Clinical Laboratory Standards)

Contaminant	Parameter and Unit	Type 3	Type 2	Type 1	CLRW
Ions	Resistivity (MΩ-cm)	> 0.05 (50 KΩ)	> 1	> 18	> 10
Organics	Total Organic Carbon (TOC) ppb	< 200	< 50	< 10	< 50
<del>Pyrogens</del>	<del>(Eu/ML)</del>	<del>N/A</del>	<del>N/A</del>	<del>&lt; 0.03</del>	
Particles	Particles > 0.2 μm (units/mL)	N/A	N/A	< 1 (0.22 μ filtration required)	Included filtration
Colloids	Silica (ppb)	< 1000	< 100	< 10	---
Bacteria	Bacteria (cfu/mL)	< 1000	< 100	< 1	< 10

These values are best used as guidelines, as many applications require further treatment by other factors. For example, many molecular biology applications require Type 1 water that is DNase and RNase and simple washing of instruments (usually Type 3) might require water pyrogen free for critical applications (Type 1).



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Use and storage of reagent grade water

type III :- glassware washing. (final rinsing by RSW)  
 • filling autoclave & heating baths.  
 or

type II :- general laboratory testing not requiring type I water, e.g. pH solutions, buffer  
 • as feed water to type I water.

type I :- methods requiring minimum interference and maximum precision and accuracy. e.g. trace elements, enzymes, electrolytes, calibration materials preparation.

Storage :- water should be immediately used after production

↓  
 No storage specification for type I water because no possibility of high sensitivity after storage.



Harmful



Explosive



Corrosive



Dangerous for the environment



Flammable



Toxic



Oxidizing



Radioactive



Biohazard



Poison



Oxidizing



General danger



Explosive



Flammable



Electrical hazard

shutterstock

MADE IN CHINA