Decolorization by IER

Mitsubishi Chemical Co.
Separation Material Department

What are color compounds?

☐ Major Color Compounds are Anionic ($R\text{-}COO^{-}\ H^{+}$)

Origin of Component : degraded plant tissue

Chemical Structure : Polyphenol structure with COOH residue

Molecular Weight : large >10,000 ex humic acid

How to remove : Low crosslinked strong base anion exchange resin (PA308)
or high porous type (HPA25)

☐ Minor Color Compounds are Cationic ($R\text{-}NH3^{+}$)

Origin of Component : Protein degradation

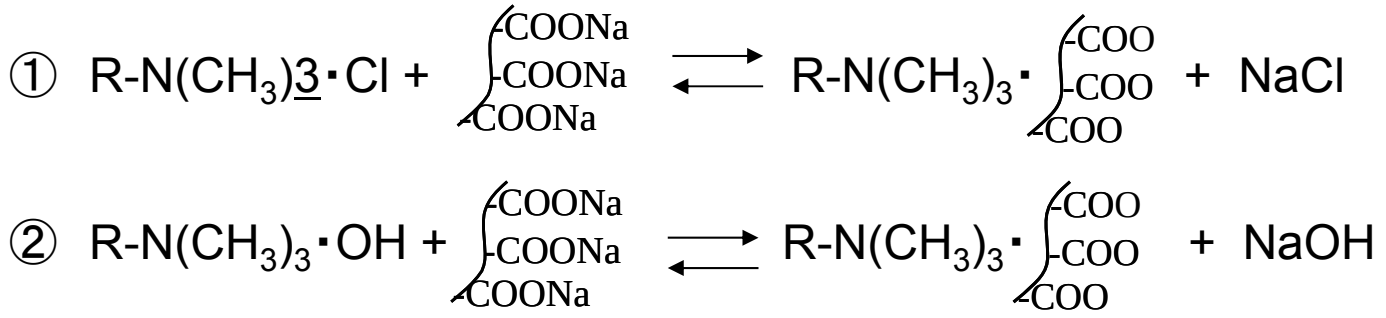
Chemical Structure : Organic compound with amine residue.
Some have COOH group (ie. degraded protein),
so it is both cationic and anionic in nature; depending on pH.

Molecular weight : large (true MW unknown)

How to remove : low to medium crosslinked strong acid cation exchange resin
either porous (PK208,212,216), or highly porous (RCP160M)

Principle of Decolorization I

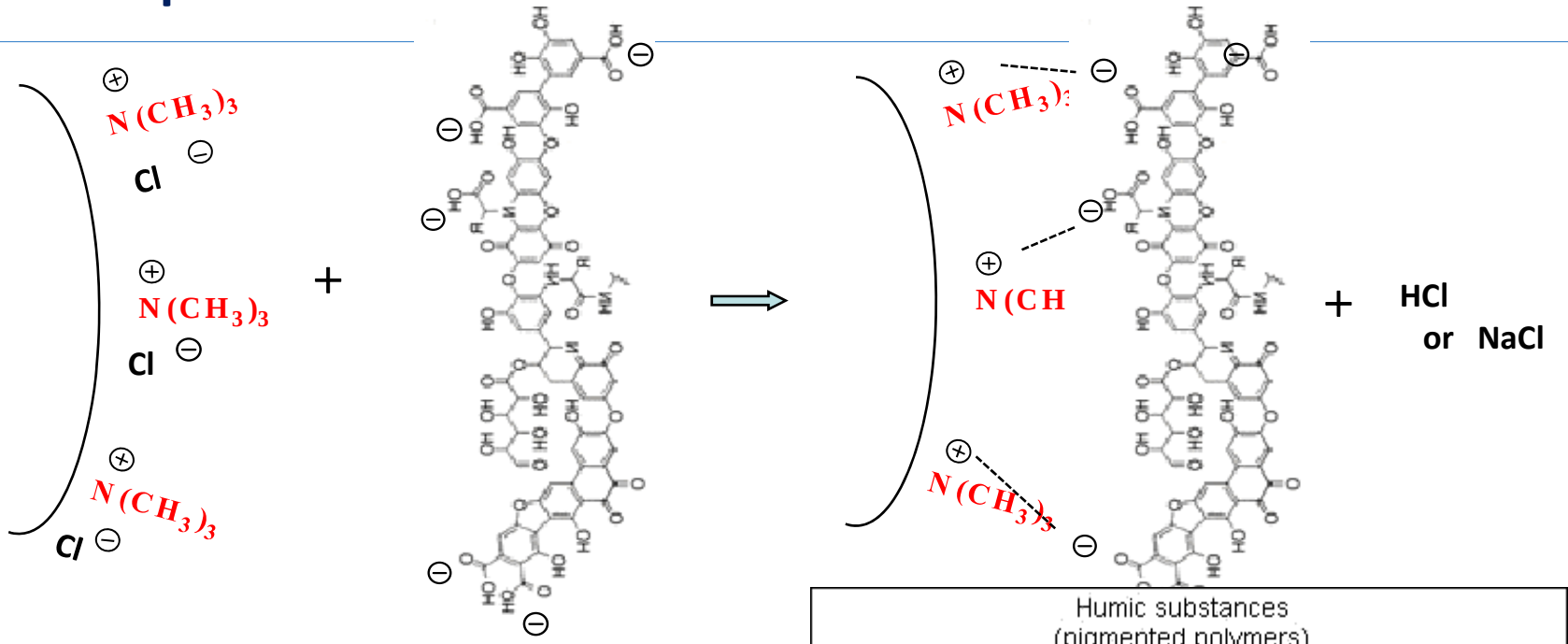
Anion pigments are removed with anion exchange resins.



① R-Cl decolorization
Strongly Basic Anion ER (Type Ⅰ) : PA308L
(Low Crosslinkage. Cl form)

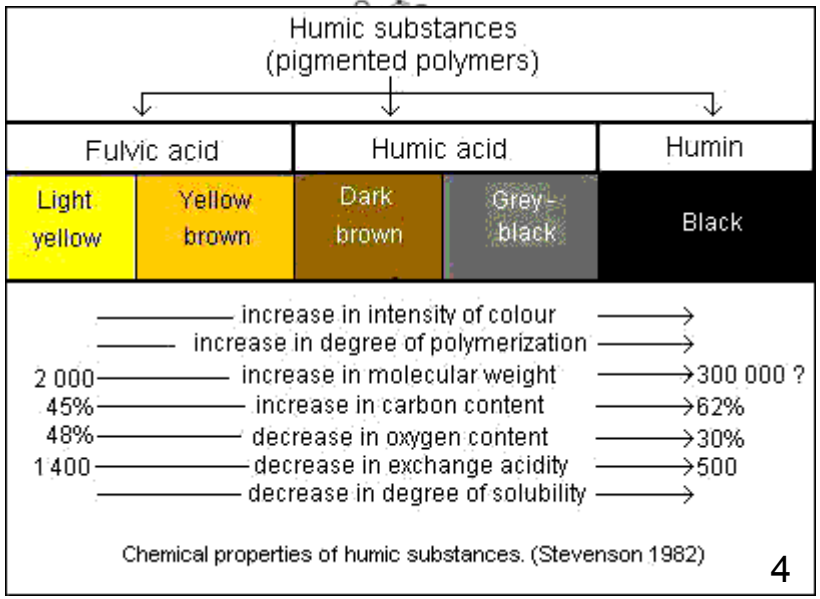
② R-OH decolorization (Reverse demineralization)
・Strongly Basic Anion ER: PA308L

Example of reaction



Anion exchage resin

Coloring compounds（ex humic acids



Principle of decolorization II

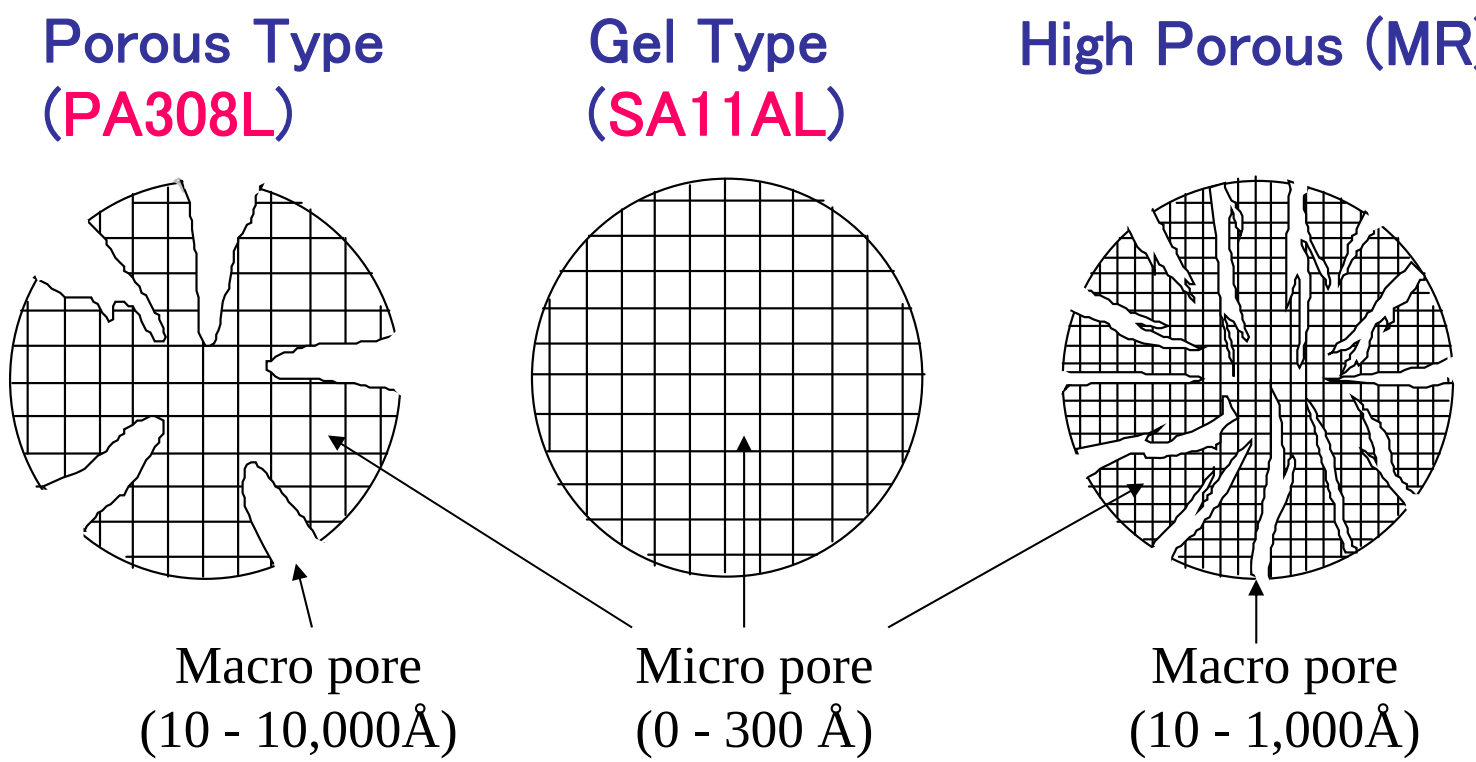
- MW of pigments are large

➔Ion exchange occurs on the surface of resins

➔Large pore resin shows high capacity.

Gel type	: SA11AL
Porous type	: PA308, PA312
High porous type	: HPA25, WA30

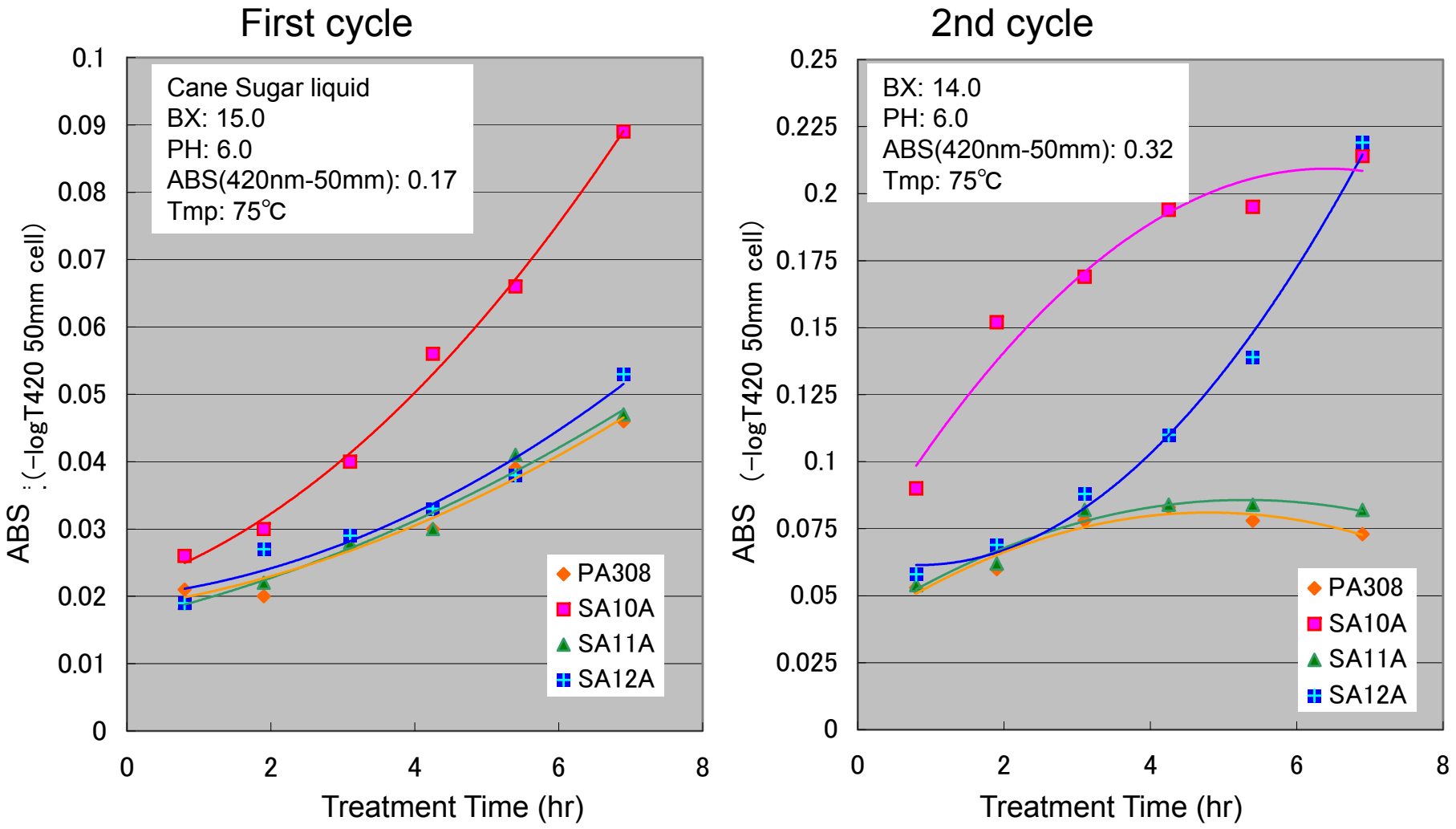
Physical Structure of I.E.R



Cross Linkage (DVB %) Porous, Gel: 2 - 16% High por.: >15%

Reaction Rate Porous > Gel > High Porous

Relation between Crosslinkage & Decolorization Efficiency



DVB %: SA10A > SA12A > PA308 ≒ SA11A

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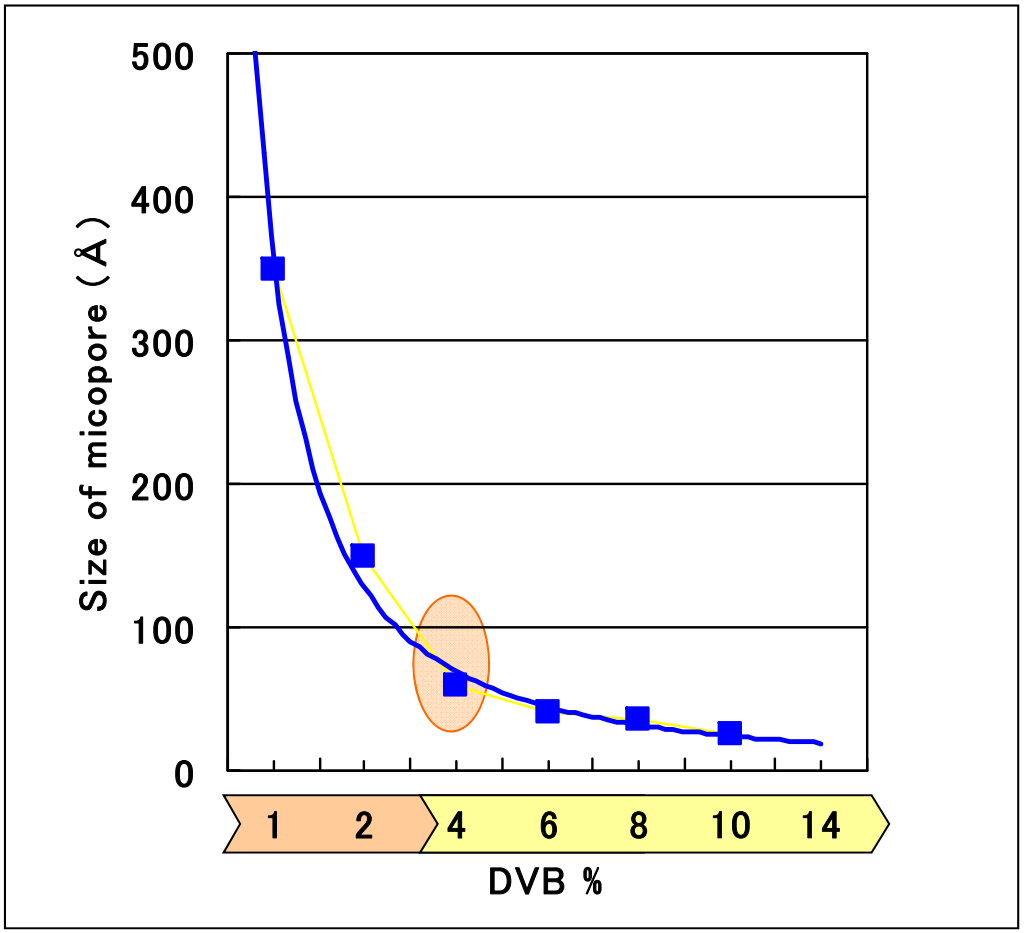
Relationship of Pore Size and DVB%



Lower DVB % Anion IER are good for decolorization

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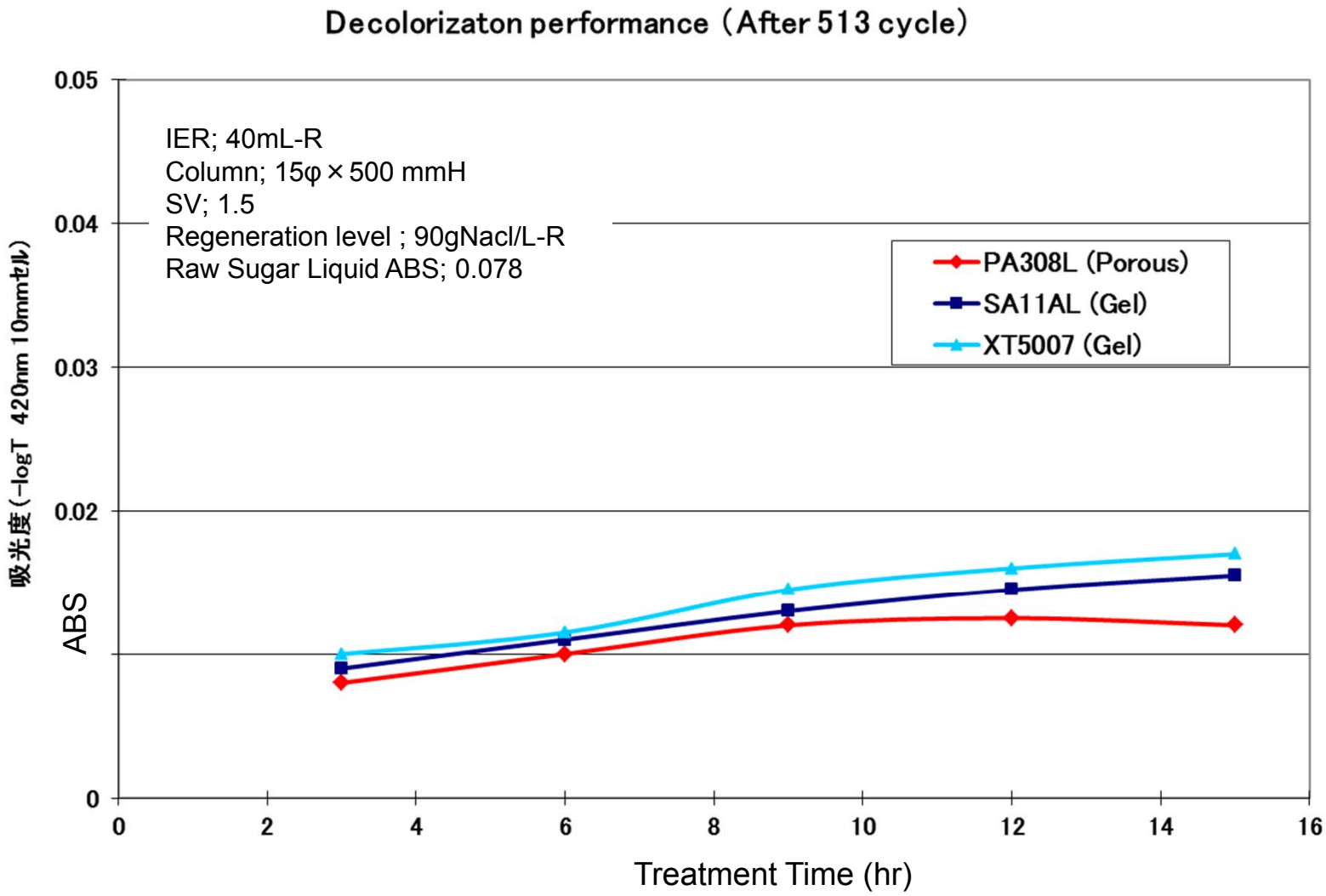
Comparison of Decolorization



XT5007: Amberlite

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