

TRILITE[®] Ion exchange resins for Chromatography separation

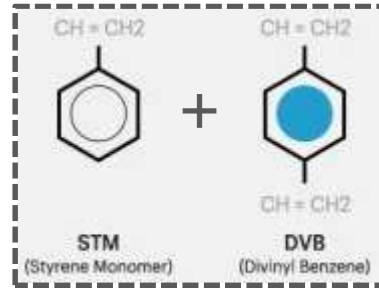


Samyang Corporation Ion exchange resin
31, Jongno 33-gil, Jongno-gu, Seoul, Korea
TEL) 82-2-740-7732~7, FAX) 82-2-740-7790
<http://samyangtrilite.com>

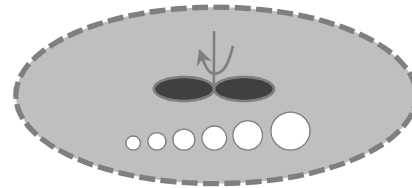


5. Cutting-edge Technology Droplet Generator

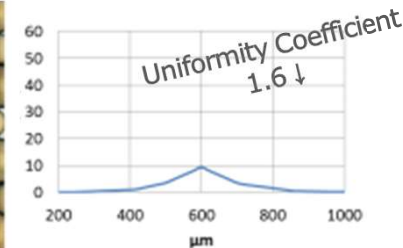
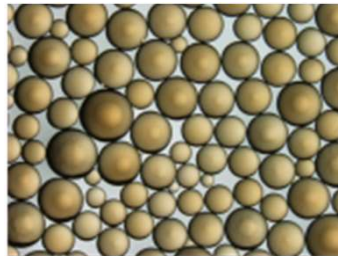
Conventional Technology
(Raw Material Adjustment)



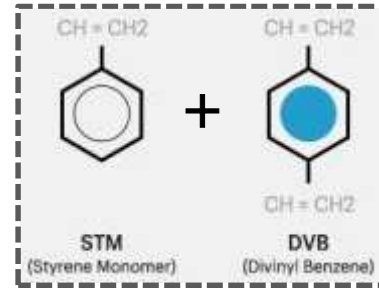
(Polymerization - Agitation)



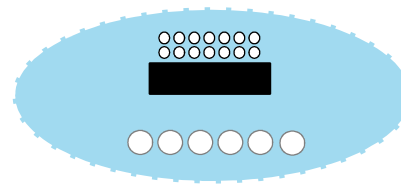
(Post-treatment - Functional Group)



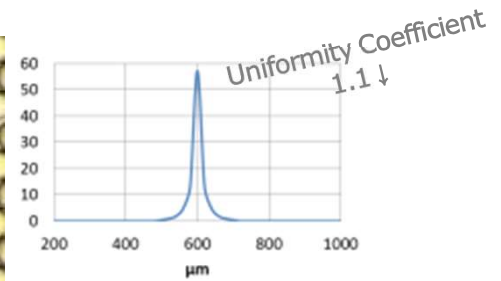
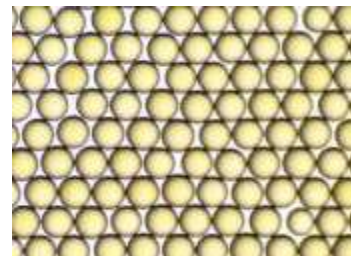
UPS(uniform particle sized) Technology
(Raw Material Adjustment)



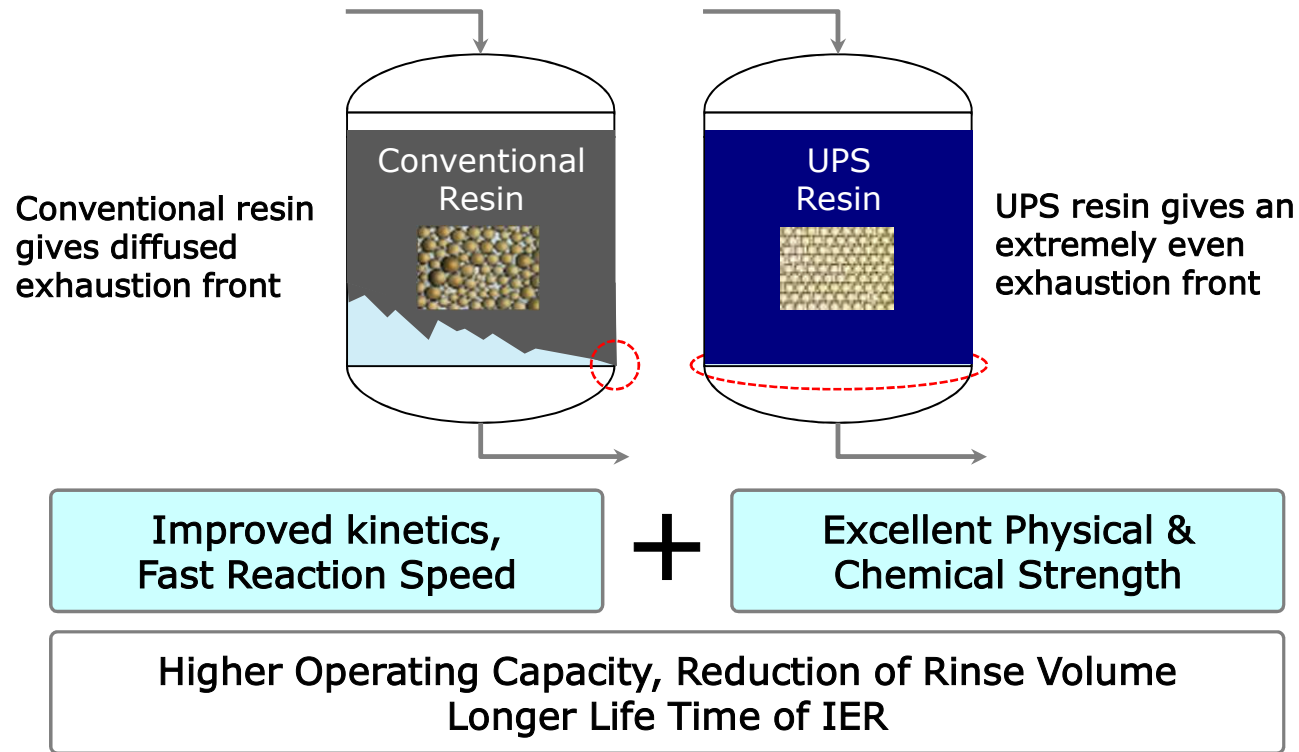
(Polymerization - Droplet Generator)



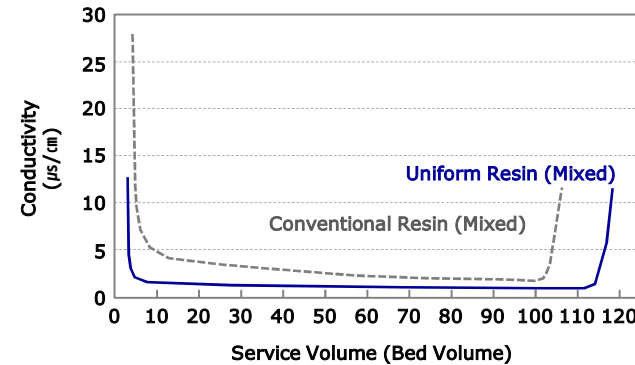
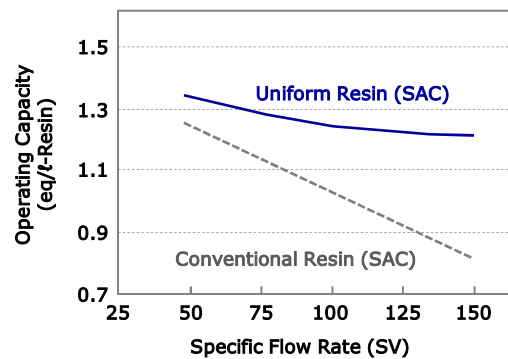
(Post-treatment - Functional Group)



6. Next Generation IER, high performance low cost 7/21

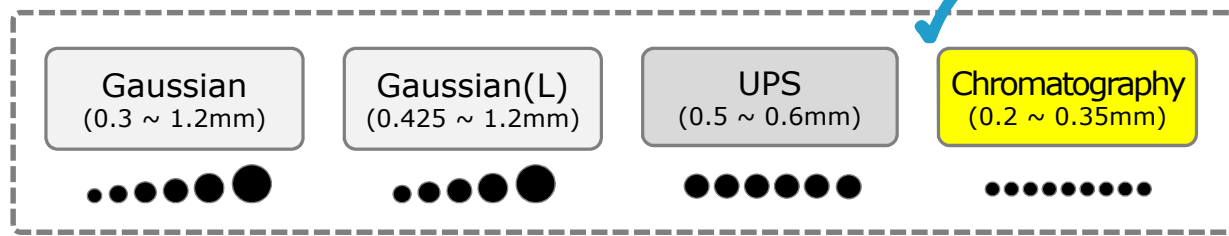


“Lower Running Cost and Capital Expenditure”

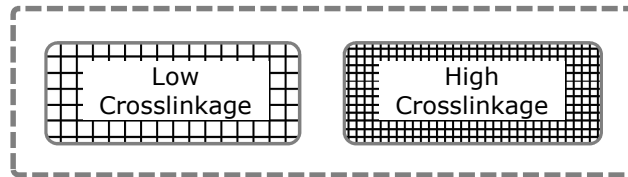


7. Product line of TRILITE

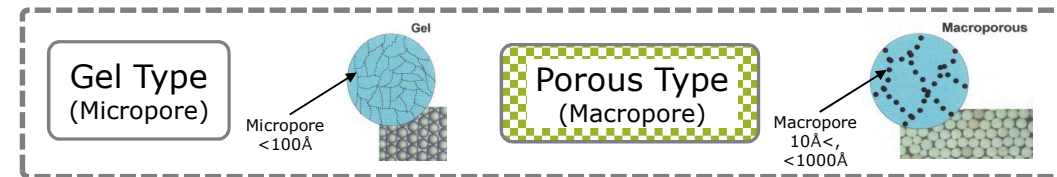
(Particle Distribution, Size)



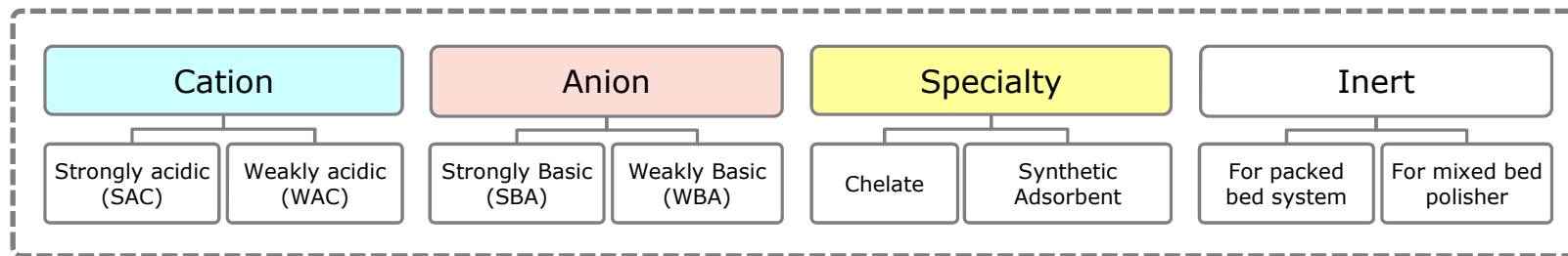
(Crosslinkage)



(Porosity)



(Functional Group)



(Post-treatment / Tailored Resin)



7. Product line of TRILITE

Water treatment

- Softening
- Demineralization
- Condensate polishing
- Nuclear power

Catalyst

Ultrapure water

✓ Chromatography

- [Fructose/glucose separation](#)
- [Amino acid separation](#)
- [Acid purification](#)

Food

- Starch sugar refining
- Sugar refining
- Nucleic acid, lysine separation

Chelating resins

- Secondary brine purification
- Wastewater treatment

Synthetic adsorbents

Ready to use mixed resins

Layered bed anion resins

Inert resins

EO/EG cycle water treatment



7. Product line of TRILITE

Chromatography



※ TEC: Total Exchange Capacity

		Chromatography cation resins				Chromatography anion resins																																	
		Type	Grade name	TEC (eq/ℓ)	Ionic form	Particle distribution	Type	Grade name	TEC (eq/ℓ)	Ionic form	Particle distribution																												
 	Gel	MCK-30	1.6 ↑	Na	210~230μm	Gel type1	MA-13J	1.35 ↑	Cl	270~330μm																													
		MCK-32	1.6 ↑	K	205~220μm		MA-13F	1.4 ↑	Cl	220~240μm																													
		MCK-35	1.6 ↑	Ca	200~220μm	Gel type2	MA-23F	1.4 ↑	Cl	220~240μm																													
		MCK-30J	1.6 ↑	Na	290~300μm		<table border="1"> <thead> <tr> <th colspan="2"></th> <th>Ionic form</th> <th>Grade Example</th> <th>Application Example</th> </tr> </thead> <tbody> <tr> <td colspan="2" rowspan="3">UPS SAC Gel Type</td> <td>Na</td> <td>MCK-30</td> <td>Glucose/Oligosaccharide</td> </tr> <tr> <td>K</td> <td>MCK-22M</td> <td>Sucrose from molasses</td> </tr> <tr> <td>Ca</td> <td>MCK-35L MCK-55</td> <td>Fructose/Glucose</td> </tr> <tr> <td rowspan="2">UPS SBA Gel Type</td> <td>Type1</td> <td rowspan="2">Cl</td> <td>MA-13J</td> <td>Biodiesel refining</td> </tr> <tr> <td>Type2</td> <td>MA-23F</td> <td>Acid purification</td> </tr> </tbody> </table>							Ionic form	Grade Example	Application Example	UPS SAC Gel Type		Na	MCK-30	Glucose/Oligosaccharide	K	MCK-22M	Sucrose from molasses	Ca	MCK-35L MCK-55	Fructose/Glucose	UPS SBA Gel Type	Type1	Cl	MA-13J	Biodiesel refining	Type2	MA-23F	Acid purification				
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MCK-30L	1.6 ↑	Na	310~345μm	<table border="1"> <thead> <tr> <th colspan="2"></th> <th>Ionic form</th> <th>Grade Example</th> <th>Application Example</th> </tr> </thead> <tbody> <tr> <td colspan="2" rowspan="3">UPS SAC Gel Type</td> <td>Na</td> <td>MCK-30</td> <td>Glucose/Oligosaccharide</td> </tr> <tr> <td>K</td> <td>MCK-22M</td> <td>Sucrose from molasses</td> </tr> <tr> <td>Ca</td> <td>MCK-35L MCK-55</td> <td>Fructose/Glucose</td> </tr> <tr> <td rowspan="2">UPS SBA Gel Type</td> <td>Type1</td> <td rowspan="2">Cl</td> <td>MA-13J</td> <td>Biodiesel refining</td> </tr> <tr> <td>Type2</td> <td>MA-23F</td> <td>Acid purification</td> </tr> </tbody> </table>												Ionic form	Grade Example	Application Example	UPS SAC Gel Type		Na	MCK-30	Glucose/Oligosaccharide	K	MCK-22M	Sucrose from molasses	Ca	MCK-35L MCK-55	Fructose/Glucose	UPS SBA Gel Type	Type1	Cl	MA-13J	Biodiesel refining	Type2	MA-23F	Acid purification		
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Functional group	Sulfonate				Type1 : TMA, trimethylamine Type2 : DMEA, dimethylethanolamine																																		



7. Product line of TRILITE

Chromatography



(TRILITE MCK series are the best choice as resins for chromatographic separation)

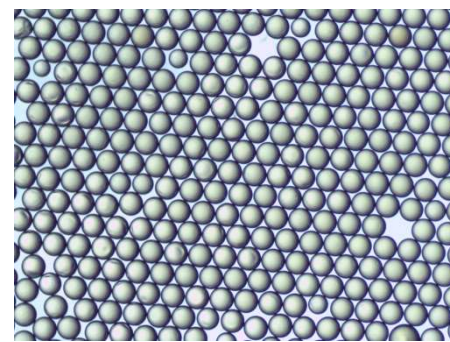
TRILITE MCK series are high quality uniform particle sized strongly acidic cation exchange resins used for chromatographic separation.

TRILITE MCK series are developed and manufactured by state-of-the-art technology, providing excellent characteristics and resin performance.

Very lower uniformity coefficient (1.05~1.10)
for chromatographic separation
→ Excellent separation efficiency

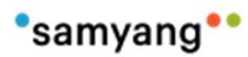


Higher physical & chemical strength
→ Longer life time



Crosslinkage	Ionic form	Average particle size			
		210~220 μ m	283~295 μ m	305~328 μ m	340~350 μ m
		●	●	●	●
5%	K			MCK-22M(305μm)	MCK-22K(346 μ m)
6%	Na	MCK-30(220μm)	MCK-30J(295 μ m)	MCK-30L(328 μ m)	MCK-30K(350 μ m)
	K	MCK-32(213 μ m)	MCK-32J(288 μ m)	MCK-32L(320 μ m)	MCK-32K(345 μ m)
	Ca	MCK-35(210 μ m)	MCK-35J(283 μ m)	MCK-35L(315μm) MCK-35M(305 μ m)	MCK-35K(340 μ m)
8%	Na	MCK-50(215 μ m)			
	K	MCK-52(215 μ m)			
	Ca	MCK-55(210μm)			

※ The data of crosslinkage and average particle size is reference



7. Product line of TRILITE

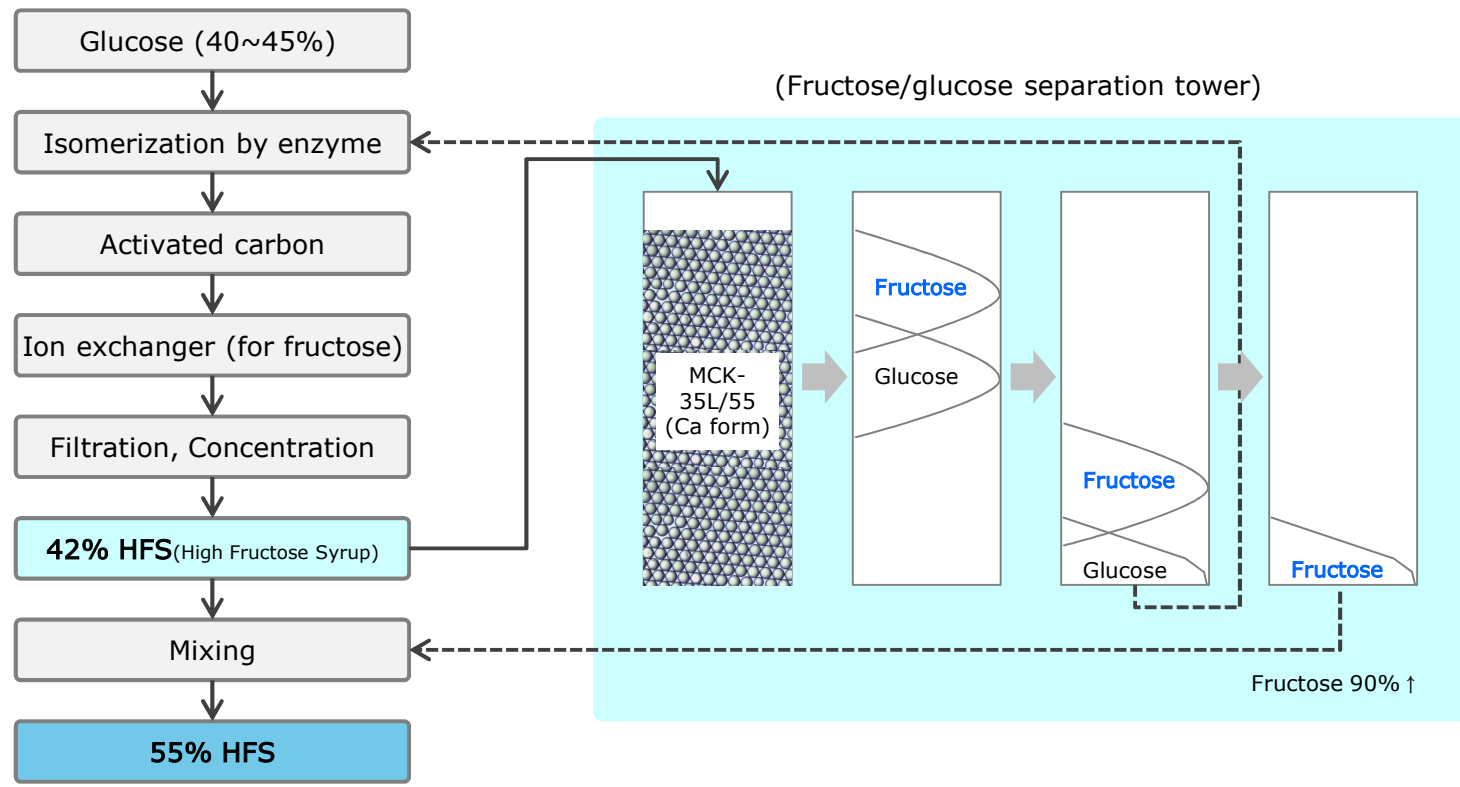
Chromatography



(Fructose/glucose separation by MCK-35L/MCK-55)

Isomerization of fructose by the use of enzyme produces glucose which features a higher sweetness (1.7 times of sugar). The starch sugar is proved to be economically efficient and is substitutable to the use of sugar. However, the enzyme reaction is a reversible reaction. The isomerization is limited up to 42% (equal to 90% of sugar sweetness) due to reaction equilibrium. Hence, it is required to increase the glucose percentage up to 55%, with the IER technology.

A typical process to treat the fructose/glucose mixture with the Ca type ion exchange resin tower is described as below. As the mixture passes through the IER layers, Fructose moves slower than glucose as it has a higher affinity with Ca ion. In this principal, glucose elutes in before the fructose. The collection of glucose is sold as a finished product, and the fructose is put to the previous process to react with isomerization enzyme.



8. Product Recommendations

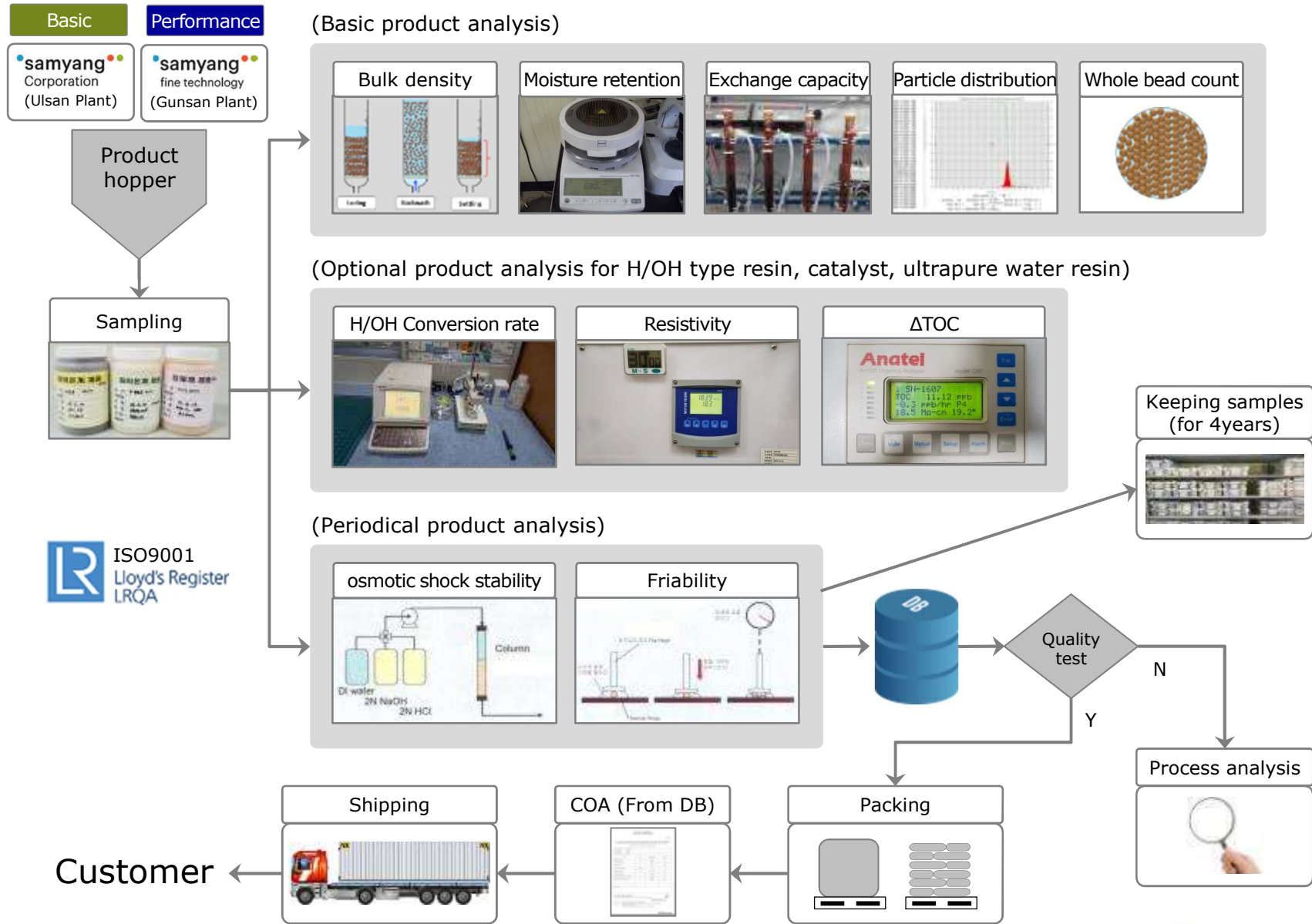
Chromatography



Grade	TRILITE MCK-35L	Dupont CR1320 (Dupont CR99 Ca/320)	Purolite PCR642CR
Type	Strong acidic cation gel type	Strong acidic cation gel type	Strong acidic cation gel type
Matrix	Polystyrene + DVB	Polystyrene + DVB	Polystyrene + DVB
Functional group	Sulfonic acid	Sulfonic acid	Sulfonic acid
Ionic form	Ca ₂ ⁺	Ca ₂ ⁺	Ca ₂ ⁺
Particle Density	1.27	1.29	1.24
Shipping weight	Approx. 840 g/l	Approx. 700 g/l	730-790 g/l
Moisture content	47 ~ 51 %	57 ~ 61 %	59 ~ 62 %
Exchange capacity	1.6 eq/L ↑	1.5 eq/L ↑	1.5 eq/L ↑
Operating temp.	120°C ↓ (Cl ⁻)	120°C ↓ (Cl ⁻)	120°C (Cl ⁻)
Mean Particle size	315±15µm	315±15µm	315±20µm
Uniformity Coefficient	1.1 ↓	-	1.2 ↓



9. Product analysis / Quality control



10. Quality assurance system



Quality standard and total quality management are both necessary for any organization to become world class. The commitment to total quality operations is a way of life in Samyang.

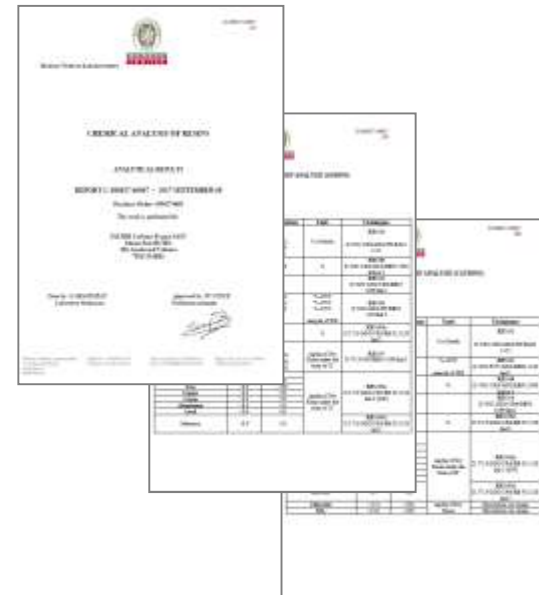
ISO9001 Certificate



HALAL Certificate



Veritas Certificate



11. Packing line, packing type



(Automatic packing line : 25ℓ PE Bag)



(Manual packing line : 1,000ℓ Bag, plastic/fiber drum)



12. Technical service



1

Ion exchange resin analysis report



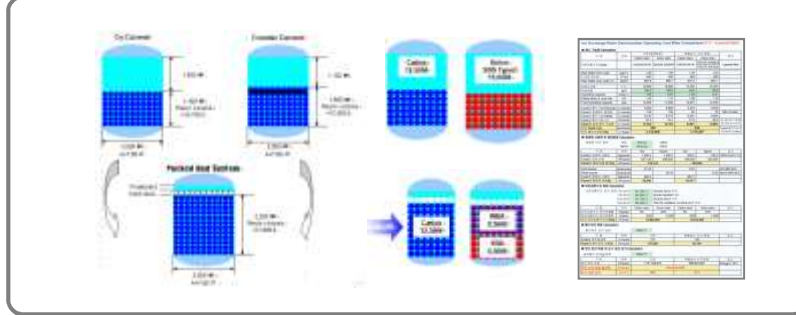
2

Ion exchange resin calculation program



3

Facilities diagnosis, retrofit proposal



4

Application process development

