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TRILITE
삼양 트리라이트
Ion Exchange Resin

TRILITE® Ion Exchange Resins for Food Applications (Sweeteners)

Samyang Corporation Ion exchange resin
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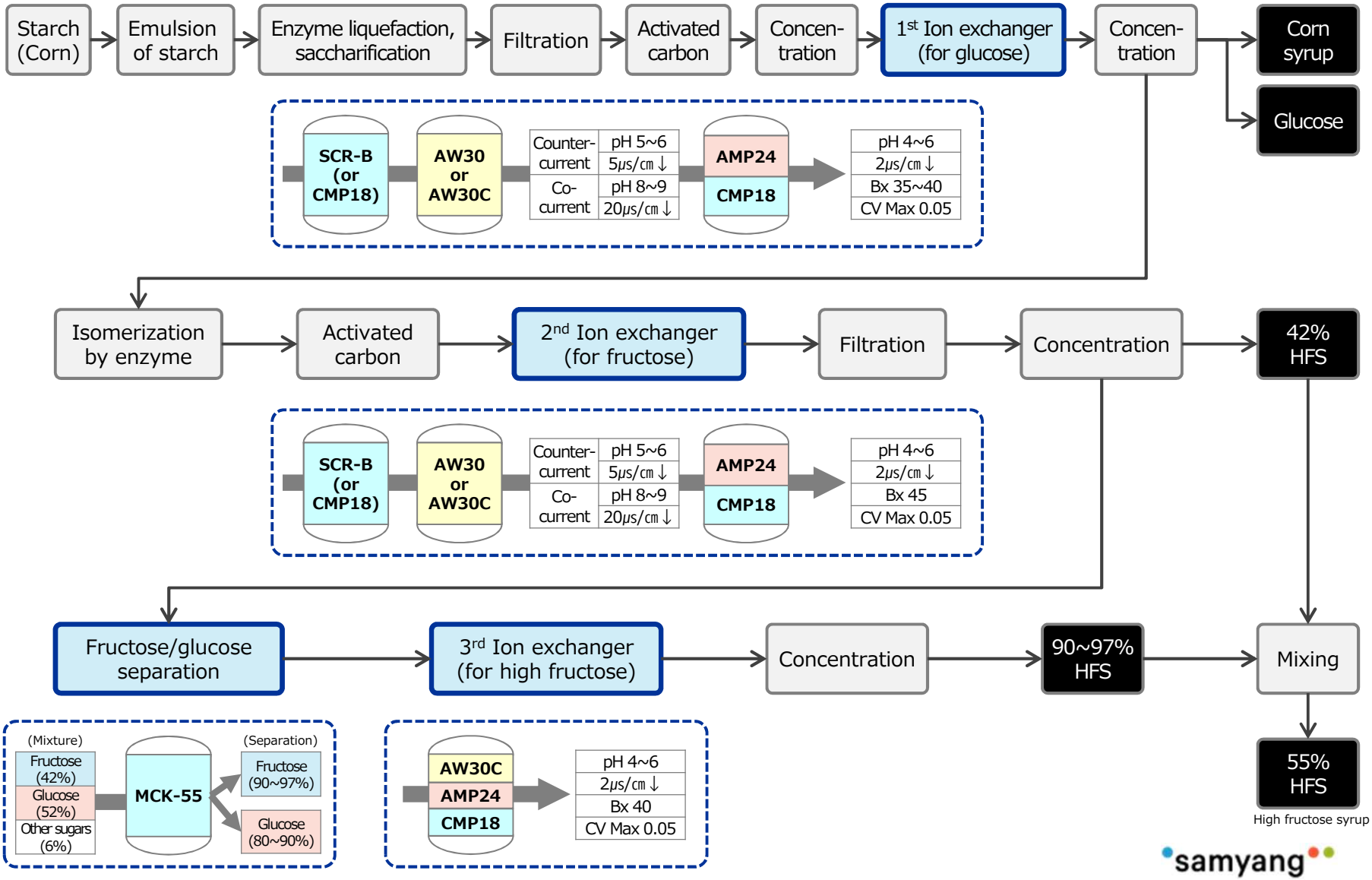
TEL) 82-2-740-7732~7, FAX) 82-2-740-7790
http://samyangtrilite.com

5. Product line of TRILITE

(Typical process of starch sugar refining and fructose/glucose separation)



5. Product line of TRILITE

※ TEC: Total Exchange Capacity

TRILITE 삼양 트리라이트 Ion Exchange Resin	Strongly acidic cation resins (SAC)				Strongly basic anion resins (SBA)			
	Type	Grade name	TEC (eq/ℓ)	Particle distribution	Type	Grade name	TEC (eq/ℓ)	Particle distribution
Gaussian	Gel	SCRB	2.0↑	(General type) 0.3~1.2㎜ (L-type) 0.425~1.2㎜	Porous type2	AMP24	1.0↑	(General type) 0.3~1.2㎜ (L-type) 0.425~1.2㎜
	Porous	CMP18	1.8↑					
UPS	Gel	MC-08	2.0↑	0.55~0.65㎜				
Functional group	Sulfonate				Type2 : DMEA, dimethylethanolamine			

TRILITE 삼양 트리라이트 Ion Exchange Resin	Weakly basic anion resins (WBA)					
	Type	Grade name	TEC (eq/ℓ)	SBA/WBA Ratio	Particle distribution	Application
Gaussian	Porous	AW30	1.5↑	25/75	(General type) 0.3~1.2㎜ (L-type) 0.425~1.2㎜	It can be used economically for the decolorization process and it is widely used in the starch sugar refining process. However, SBA ratio is a little bit high, so it should be used with caution in processes where isomerization reaction is concerned.
UPS		AW30C	1.6↑	5/95		High WBA ratio and excellent resistance to high temperature (100℃↓). It can be used in a process that the temperature of the process liquid is high or isomerization reaction is concerned(Fructose refining).
		AW80/AW90	1.6↑	20/80	0.40~0.70㎜	Low uniformity coefficient, it is recommended to be used in upflow process.
Functional group	Tertiary Amine					

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5. Product line of TRILITE

• Cation grade

Grade	TRILITE CMP18	Dowex Monosphere 88
Type	Strongly Acidic Cation Porous type	Strongly Acidic Cation Porous type
Matrix	Polystyrene + DVB	Polystyrene + DVB
Functional group	$-SO_3 \cdot H^+$ (Sulfonate)	$-SO_3 \cdot H^+$ (Sulfonate)
Ionic form	Na^+	Na^+
Shipping weight	Approx. 795 g/l	Approx. 800g/l
Moisture content	43 ~ 50 %	42 ~ 50 %
Exchange capacity	1.8 eq/L↑	1.8 eq/L↑
Operating temp.	120℃↓	120℃
Operating pH range	0 ~ 14	0 ~ 14
Maximum swelling	8 %	5 %
Mean Particle Size	300(400)~1200 ㎛	400~720 ㎛

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5. Product line of TRILITE

• Anion grade

Grade	TRILITE AW30	Dowex Monosphere 66
Type	Weakly basic anion Porous type	Weakly basic anion Porous type
Matrix	Polystyrene + DVB	Polystyrene + DVB
Functional group	tertiary amine	tertiary amine
Ionic form	Free base	Free base
Shipping weight	Approx. 700 g/l	Approx. 640g/l
Moisture content	48 ~ 58 %	42 ~ 50 %
Exchange capacity	1.5 eq/L↑	1.6 eq/L↑
Operating temp.	60℃↓	60℃
Operating pH range	0 ~ 7	0 ~ 7
Maximum swelling	20 %	5 %
Mean Particle Size	300(400)~1200 ㎛	400~720 ㎛

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5. Product line of TRILITE

• Anion grade

Grade	TRILITE AMP24	Dowex MSA-2
Type	Strongly basic anion Porous type	Strongly basic anion Porous type
Matrix	Polystyrene + DVB	Polystyrene + DVB
Functional group	quaternary amine	quaternary amine
Ionic form	Cl^-	Cl^-
Shipping weight	Approx. 655 g/l	Approx. 670g/l
Moisture content	54 ~ 64 %	42 ~ 50 %
Exchange capacity	1.0 eq/L↑	1.0 eq/L↑
Operating temp.	60℃↓(OH- : 50℃↓)	120℃ (OH- : 35℃↓)
Operating pH range	0 ~ 14	0 ~ 14
Maximum swelling	14 %	15 %
Mean Particle Size	300(400)~1200 ㎛	300~1200 ㎛

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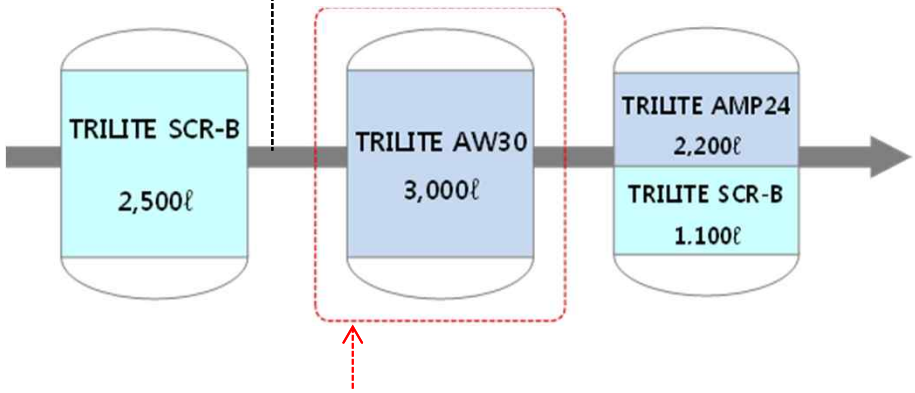
5. Product line of TRILITE

(Actual case study - TRILITE AW30 vs Dowex Monosphere 66)

• Outlet data after cation tower

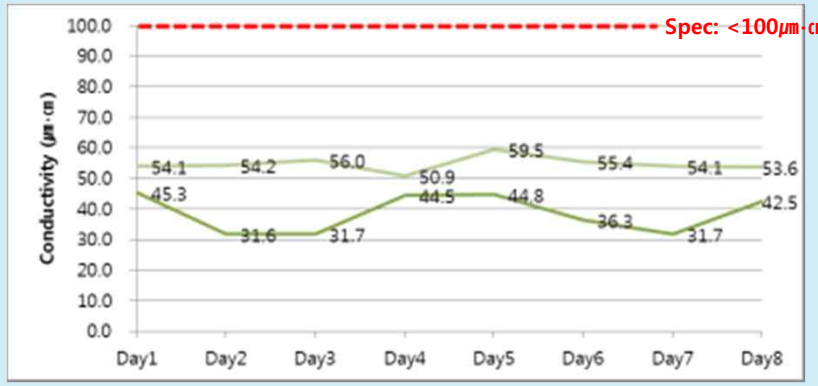
	Unit	Criteria
Service hours	hr	9~10
Conductivity	μs·cm	1,400~2,500
pH		2.1~2.5
Flow Rate	㎥/day	96
Temperature	℃	40↓



• Operating conditions

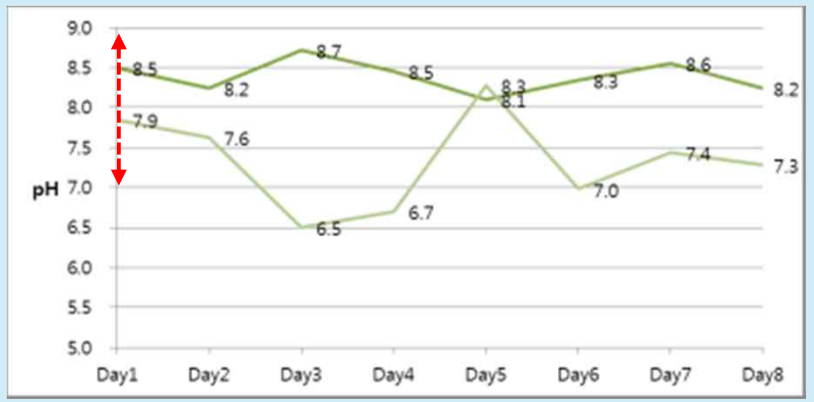
Flow Rate	SV3(approximately 9㎥/hr)
Service time	8~9hr(10㎥/hr)
Throughput per cycle	80~90㎥/Cycle
Period of regeneration	One(1) cycle/day (regeneration vol. : 80㎥/Cycle)

• Resistivity



AW30
MS 66

• pH



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5. Product line of TRILITE

※ TEC: Total Exchange Capacity

TRILITE 삼양 트리라이트 Ion Exchange Resin	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
UPS 	Gel	**MCK-30**	1.6↑	Na	210~230㎛	Gel type1	**MA-13J**	1.35↑	Cl	270~330㎛
		MCK-32	1.6↑	K	205~220㎛		MA-13F	1.4↑	Cl	220~240㎛
		MCK-35	1.6↑	Ca	200~220㎛	Gel type2	**MA-23F**	1.4↑	Cl	220~240㎛
		MCK-30J	1.6↑	Na	290~300㎛					
		MCK-32J	1.6↑	K	280~295㎛					
		MCK-35J	1.6↑	Ca	280~285㎛					
		MCK-30L	1.6↑	Na	310~345㎛					
		MCK-32L	1.6↑	K	320~340㎛					
		MCK-35L	1.6↑	Ca	300~330㎛					
		MCK-30K	1.6↑	Na	340~360㎛					
		MCK-32K	1.6↑	K	330~360㎛					
		MCK-35K	1.7↑	Ca	330~360㎛					
		MCK-35M	1.6↑	Ca	290~320㎛					
		MCK-22K	1.6↑	K	335~365㎛					
		MCK-22M	1.6↑	K	290~320㎛					
		MCK-50	1.9↑	Na	210~220㎛					
		MCK-52	2.0↑	K	205~225㎛					
		MCK-55	2.0↑	Ca	200~220㎛					
Functional group	Sulfonate					Type1 : TMA, trimethylamine Type2 : DMEA, dimethylethanolamine				

		Ionic form	Grade Example	Application Example
UPS SAC Gel Type		Na	MCK-30	Glucose/Oligosaccharide
		K	MCK-22M	Sucrose from molasses
		Ca	MCK-55	Fructose/Glucose
UPS SBA Gel Type	Type1	Cl	MA-13J	Biodiesel refining
	Type2		MA-23F	Acid purification

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5. Product line of 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.

Lower uniformity coefficient (1.05~1.10) than other resins for chromatographic separation
→ Excellent separation efficiency

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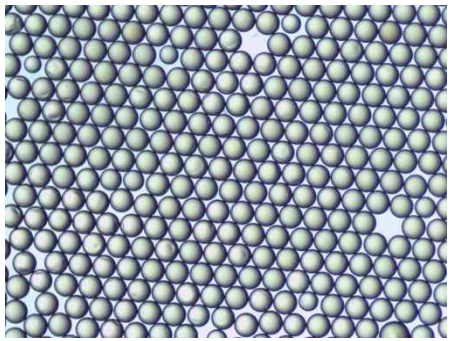
Higher physical & chemical strength
→ Longer life time



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

※ The data of crosslinkage and average particle size is reference

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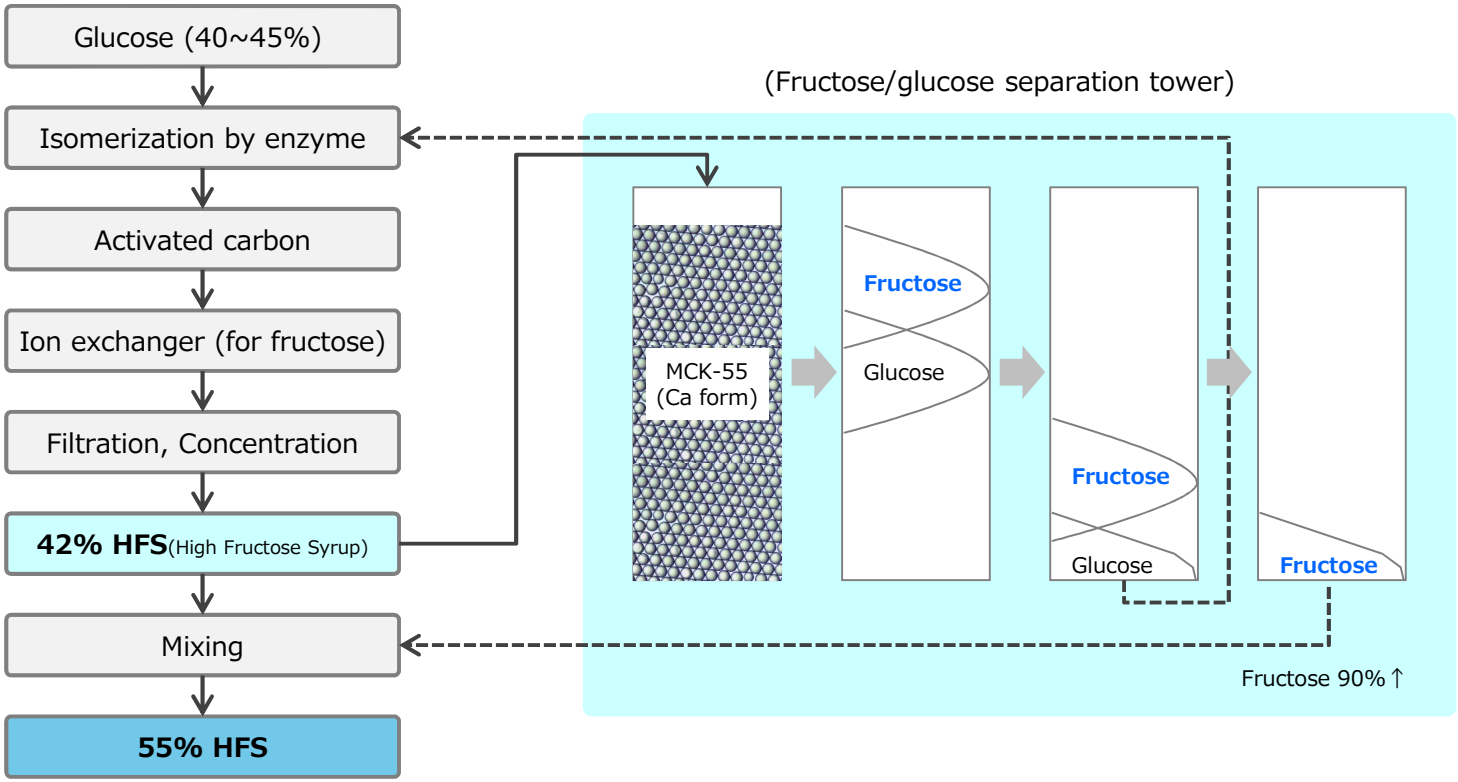
5. Product line of TRILITE

(Fructose/glucose separation by 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 fructose is sold as a finished product, and the glucose is put to the previous process to react with isomerization enzyme.



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7. Product analysis / Quality control

Basic | Performance

samyang Corporation (Ulsan Plant)

samyang fine technology (Gunsan Plant)

Product hopper

Sampling

ISO9001 Lloyd's Register LRQA

(Basic product analysis)

Bulk density | Moisture retention | Exchange capacity | Particle distribution | Whole bead count

(Optional product analysis for H/OH type resin, catalyst, ultrapure water resin)

H/OH Conversion rate | Resistivity | ΔTOC

(Periodical product analysis)

osmotic shock stability | Friability

Keeping samples (for 4years)

DB

Quality test

N

Y

Process analysis

Packing

COA (From DB)

Shipping

Customer

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8. 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

Lloyd's Register LRQA

Lloyd's Register LRQA

CERTIFICATE OF APPROVAL

This is to certify that the Quality Management System of:

Samyang Fine Technology Corporation
63, Jayumuyeok 1-gil
Gunsan-si, Jeonbuk, Korea

has been approved by Lloyd's Register Quality Assurance to the following Quality Management System Standards:

ISO 9001: 2015

The Quality Management System is applicable to:

Manufacture of ion exchange resin.

Approval Certificate No: SEC 6040809

Original Approval: 29 August 2016
Current Certificate: 29 August 2016
Certificate Expiry: 28 August 2019

Issued by: LRQA (Korea) Ltd. for and on behalf of Lloyd's Register Quality Assurance Limited

HALAL Certificate

MUI
KMF(JAKIM)

KOREA MUSLIM FEDERATION

HALAL CERTIFICATION

TO WHOM IT MAY CONCERN

Halal Committee of Korea Muslim Federation hereby certifies that the products listed below mentioned have met the Halal requirements in accordance with the Islamic law.

1. Cation Exchange Resin
2. Anion Exchange Resin

(Two Products Only)

Distributor : Samyang Corporation

Manufacturer : Samyang Corporation Ulsan plant

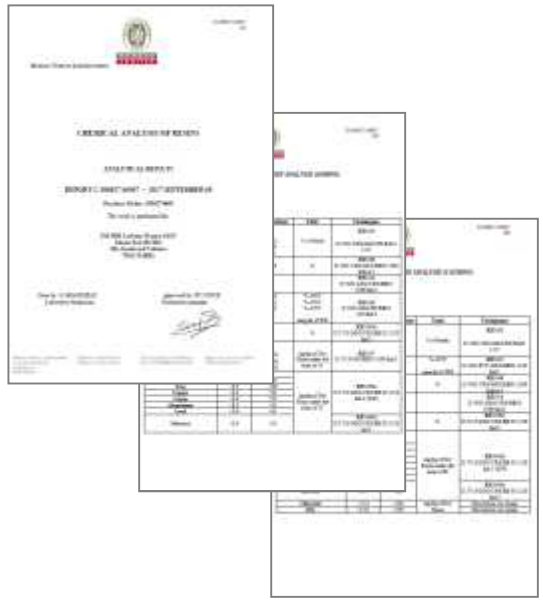
Valid until: 1 07, Jan. 2018

Yours in Islam

Chairman of the Halal Committee

Veritas Certificate

BUREAU VERITAS



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9. Packing line, packing type

(Automatic packing line : 25ℓ PE Bag)

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

25Liters
PE bag

1,000Liters
Ton bag

50Liters
Plastic drum

5 or 7ft^3
Fiber Drum

Palletizing, container loading

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10. Technical service

1

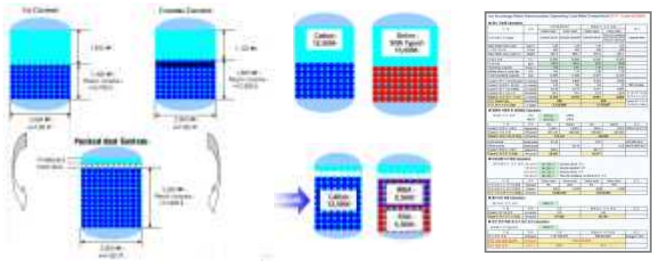
Ion exchange resin analysis report

2

Ion exchange resin calculation program

3

Facilities diagnosis, retrofit proposal



4

Application process development

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