

**DIAION<sup>®</sup>**  
**PRODUCT LINE BROCHURE**

**DIAION<sup>®</sup>**

# DIAION®

Mitsubishi Chemical Corporation has been manufacturing our DIAION® brand of ion exchange resin and SEPABEADS® of synthetic adsorbent for over 60 years. Our DIAION® and SEPABEADS® brand names are known throughout the world for excellent performance, superior physical and chemical properties and Lot-to-Lot reproducibility for industrial separations. Mitsubishi Chemical currently offers over 200 unique compositions of separation media for wide variety of applications. We are pleased to present this compilation of our standard commercial products. We encourage you to contact our world wide offices to discuss your applications.

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# DIAION®

These are the resins of cross linked polystyrene matrix having sulfonic acid groups. There are SK-grade of gel type, PK-grade of porous type and HPK25 of highly porous type. The standard shipping form is sodium salt (in some cases hydrogen form is available).

## Gel Type

## DIAION® SK Series

SK1B resin is our "flagship" premium grade, gel-type, strong acid cation resin. It has excellent properties for industrial applications and is recommended for industrial scale softening and demineralization applications. It has standard crosslinkage. In situations where the raw water contains oxidizing substances, the higher crosslinkage resins such as SK110 and SK112 are recommended to provide better performance and longer operating life. SK110 is also recommended for regenerable mixed bed applications.

SK104 has low (4%) crosslinkage. It is mainly used as a catalyst and special applications where low crosslinked density is necessary to allow penetration of large organic molecules, or where a faster reaction rate is required.

Grade Name	DIAION® SK104	DIAION® SK1B	DIAION® SK110	DIAION® SK112
Chemical Structure	$\begin{array}{c} -\text{CH}_2 - \text{CH} - \\   \\ \text{C}_6\text{H}_4 \\   \\ \text{SO}_3^- \text{Na}^+ \end{array}$			
Ionic Form As Shipped *	Na-form			
Whole Bead Count	90 min.			
Shipping Density (g/ℓ -R; approx.)	775	830	845	855
Total Exchange Capacity (meq/mL-R)	1.2 min.	2.0 min.	2.0 min.	2.1 min.
Water Content(%)	57-67	43-50	35-45	32-42
Particle Size **	on 1,180µm 5 % max. through 300µm 1 % max.			
Effective Size (mm)	0.40 min.			
Uniformity Coefficient	1.6 max.			
Operating Temperature (°C)	120 (H-form, Na-form) max.			
Crosslinkage (%)	ca. 4	ca. 8	ca. 10	ca. 12

\* Please contact us when regenerated (H<sup>+</sup> form) is required.

\*\* Please contact us when different particle size is required.

# Strongly Acidic Cation Exchange Resins

## Porous Type

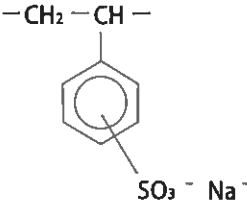
## DIAION® PK Series

The PK resin grades are based on a porous styrene DVB polymer matrix. Their porous structure provides excellent durability against osmotic shock by swelling and shrinkage. PK216 is recommended for general water treatment. PK228 is recommended for condensate demineralization (L grade is recommended for best pressure flow performance). PK grades are also recommended for special applications such as deashing, decolorization, and as a catalyst (as they have higher reaction rate in organic solvents than gel-type resins).

## Highly Porous Type

## DIAION® HPK25

HPK25 has higher porous properties than PK series, and has a measurable surface area. It is generally used for special process applications such as catalyst. It is also recommended for applications when the feed water has strong oxidizing substances such as the treatment of chromic acid rinse water.

Grade Name	DIAION® PK208	DIAION® PK212	DIAION® PK216	DIAION® PK220	DIAION® PK228	DIAION® HPK25
Chemical Structure						
Ionic Form As Shipped *	Na-form					
Whole Bead Count	95 min.					
Shipping Density (g/ℓ -R; approx.)	765	780	785	795	810	790
Total Exchange Capacity (meq/mL-R)	1.2 min.	1.5 min.	1.75 min.	1.9 min.	2.05 min.	1.7 min.
Water Content(%)	58-68	52-58	46-52	41-47	37-43	37-47
Particle Size ** on 1,180µm through 300µm	5 % max. 1 % max.					
Effective Size (mm)	0.40 min.					
Uniformity Coefficient	1.6 max.					
Operating Temperature (°C)	120 (H form, Na form) max.					
Crosslinkage (%)	ca. 4	ca. 6	ca. 8	ca. 10	ca. 14	—

\* Please contact us when regenerated (H<sup>+</sup> form) is required.

\*\* Please contact us when different particle size is required.

# DIAION®

DIAION® strong base anion exchange resins are based on crosslinked polystyrene matrix having quaternary ammonium groups (NR<sub>3</sub><sup>+</sup>). Among DIAION® product line, there are SA-grades of gel-type, PA-grades of porous-type, and HPA-grades of highly porous-type. The standard shipping form is Cl<sup>-</sup> form. (in some cases OH<sup>-</sup> form is available).

Type I resins have trimethyl ammonium groups which impart higher basicity. In the co-current regeneration mode, the treated water will have the lowest silica leakage.

Type I resins also have higher chemical stability, and can be applied at higher temperature (than Type II or acrylic based resins.)

Type II resins have dimethylethanolamine groups which impart slightly lower basicity. This provides an advantage of easier regeneration (than Type I) and slightly higher capacity.

<b>Gel Type</b>	<b>DIAION® SA10 Series (Type I) and SA20 Series (Type II)</b>
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SA10A is a Type I resin with standard crosslinkage. SA12A is also a Type I resin with slightly lower crosslinkage. These resins are popularly used for water treatment. In industry convention, they are referred to as "standard crosslinked and porous (really microporous)". SA12A porous gel anion is typically recommended for treatment of surface waters with troublesome organic content.

SA11A is Type I resin with low crosslinkage, and is mainly used for special applications such as sometimes used as a mixed bed or primary bed polisher anion.

NSA100 is gel polymer, Type I resin of high crosslinkage. It is used for special applications such as iodine isolation from brine.

SA20A is Type II resin of standard crosslinkage. It is popularly used for water treatment with its easy SA21A is Type II resin of low crosslinkage. It is used for special for applications such as purification of pharmaceuticals and food products.

Grade Name	DIAION® SA10A	DIAION® SA11A	DIAION® SA12A	DIAION® NSA100	DIAION® SA20A	DIAION® SA21A
Type	Type I				Type II	
Chemical Structure						
Ionic Form As Shipped *	Cl <sup>-</sup> form					
Whole Bead Count	90 min.					
Shipping Density (g/l-R; approx.)	670	685	670	685	715	710
Total Exchange Capacity (meq/ml-R)	1.3 min.	0.85 min.	1.3 min.	1.3 min.	1.3 min.	0.8 min.
Water Content (%)	43-47	55-65	48-55	37-44	45-52	55-65
Particle Size ** on 1,180 μm through 300 μm	5 % max. 1 % max.					
Effective Size (mm)	0.40 min.					
Uniformity Coefficient	1.6 max.					
Operating Temperature (°C)	60 (OH-form) max. 80 (Cl <sup>-</sup> form) max.				40 (OH-form) max. 60 (Cl <sup>-</sup> form) max.	

\* Please contact us when regenerated (OH<sup>-</sup> form) is required.

\*\* Please contact us when different particle size is required.

## Strongly Basic Anion Exchange Resins

<b>Porous-Type</b>	<b>DIAION® PA300 Series (Type I)</b>
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Porous-type ion exchange resins of porous polymer matrix have good resistance against swelling and shrinking, though their exchange capacity is lower than gel-type ion exchange resins of the same degree of crosslinkage.

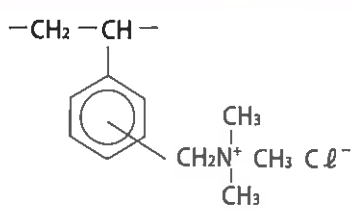
These are effective when highly purified effluents are needed, e.g. removal of silica to very low concentration.

They are suitable for treatments of waste waters with organic compounds.

PA312 and PA316 are generally used in waste water treatments, and PA308 is used for demineralization and decolorization of sugar liquors.

<b>Highly Porous-Type</b>	<b>DIAION® HPA25 (Type I)</b>
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Highly porous type resin, HPA25, has higher crosslinkage and higher porous properties than standard PA grade resins. This is typically used for treatment of large molecules in special process applications. They are mainly applied in enzyme purification as enzyme carriers for treatment of bio-pharmaceutical substances, and treatment of feed solutions of high color value.

Grade Name	DIAION® PA308	DIAION® PA312	DIAION® PA316	DIAION® HPA25
Type	Type I			
Chemical Structure				
Ionic Form As Shipped *	Cl-form			
Whole Bead Count	95 min.			
Shipping Density (g/l-R; approx.)	710	675	670	680
Total Exchange Capacity (meq/ml-R)	1.0 min.	1.2 min.	1.3 min.	0.5 min.
Water Content (%)	57-67	49-55	44-50	58-68
Particle Size **	on 1,180 μm through 300 μm		5 % max. 1 % max.	on 250 μm 5 % min.
Effective Size (mm)	0.40 min.			0.25 min.
Uniformity Coefficient	1.6 max.			
Operating Temperature (°C)	60 (OH-form) max. 80 (Cl-form) max.			
Crosslinkage (%)	ca. 4	ca. 6	ca. 8	—

\* Please contact us when regenerated (OH form) is required.

\*\* Please contact us when different particle size is required.

### Porous Type

### DIAION<sup>®</sup> PA400 Series (Type II)

Type II has better efficiency to be regenerated though it has lower basicity and chemical stability than Type I. PA418 is generally used in water treatment.

PA408 is used to demineralize and to decolorize sugar liquors.

Grade Name	DIAION <sup>®</sup> PA408	DIAION <sup>®</sup> PA412	DIAION <sup>®</sup> PA418
Type	Type II		
Chemical Structure	$  \begin{array}{c}  -\text{CH}_2-\text{CH}- \\    \\  \text{C}_6\text{H}_4 \\    \\  \text{CH}_2\text{N}^+(\text{CH}_3)_2\text{C}_2\text{H}_4\text{OH} \text{ Cl}^-  \end{array}  $		
Ionic Form As Shipped *	Cl <sup>-</sup> form		
Whole Bead Count	95 min.		
Shipping Density (g/l -R)	720	685	685
Total Exchange Capacity (meq/ml-R)	0.9 min.	1.1 min.	1.3 min.
Water Content (%)	54-64	46-52	38-44
Particle Size ** on 1,180µm through 300µm	5 % max. 1 % max.		
Effective Size (mm)	0.40 min.		
Uniformity Coefficient	1.6 max.		
Operating Temperature (°C)	40 (OH form) max. 60 (Cl form) max.		
Crosslinkage (%)	ca. 4	ca. 6	ca. 9

\* Please contact us when regenerated (OH<sup>-</sup> form) is required.

\*\* Please contact us when different particle size is required.



## Weakly Acidic Cation Exchange Resins

### Methacrylic Type

### DIAION® WK10 Series

WK10 grades (methacrylic-type) are weak acid cation exchange resins having carboxylic acid functionalities. They have a pK value of approximately 6. WK10 has high reaction rate, and WK11 has a high total exchange capacity. These grades are mainly used for special applications such as purification of pharmaceuticals, foods and organic chemicals.

WK100 and WT01S have high reaction rate and high adsorption capacity. They are mainly used for the purification of pharmaceuticals and foods. WT01S is offered in 100-300 µm particle distribution.

### Acrylic Type

### DIAION® WK40L

WK40L is weak acid cation exchange resin with carboxylic acid functionality based on porous acrylic polymer matrix. It has a pK value of approximately 5.3. The acrylic type WK40L resin has a higher total capacity than methacrylic type resins. It is mainly used for water treatment applications for removal of hardness ions in the presence of bicarbonate alkalinity.

Grade Name	DIAION® WK10	DIAION® WK11	DIAION® WK100	DIAION® WT01S	DIAION® WK40L
Chemical Structure	$  \begin{array}{c}  \text{CH}_3 \\    \\  -\text{CH}_2 - \text{C} - \\    \\  \text{COOH}  \end{array}  $				$  \begin{array}{c}  -\text{CH}_2 - \text{CH} - \\    \\  \text{COOH}  \end{array}  $
Whole Bead Count	95 min.			90 min.	95 min.
Shipping Density (g/l -R; approx.)	635	660	660	750	765
Total Exchange Capacity (meq/ml-R)	2.5 min.	2.9 min.	2.8 min.	3.0 min.	4.4 min.
Water Content (%)	53-59	45-52	45-55	45-55	41-48
Particle Size** on 1,180µm through 300µm	5 % max. 1 % max.			( 300-106µm 85 % min. )	10 % max. through 425µm 3 % max.
Effective Size (mm)	0.40 min.			0.10-0.14	0.45 min.
Uniformity Coefficient	1.6 max.				
Effective pH Range	5-14				4-14
Operating Temperature (°C)	150 max.				120 max.

\*\* Please contact us when different particle size is required.

### Acrylic Type

### DIAION® HP20, HP21

WA10 resin is based on gel-type polymer matrix. It has tertiary amine functionality with high regeneration efficiency. The acrylic polymer matrix provides good chemical stability and good resistance to organic fouling. WA10 is mainly used for pretreatment of starch hydrolysates (such as corn syrup) containing purification of dextrose, beet sugar solutions, and formaldehyde.

### Polyamine Type

### DIAION® WA20, WA21J

WA20 and WA21J do not have any neutral salt splitting capacity. They have high total exchange capacity and high regeneration efficiency. The porous styrene polymer imports high chemical stability, high mechanical strength against attrition loss, high thermal stability and high durability against organic fouling. These resins are used for the removal of strong mineral acids in standard water treatment applications. They can also be applied in special process separations such as the treatment of organic solvents. It should be noted that WA21J has a high porous structure and provides excellent mechanical strength for more rigorous industrial applications.

### Dimethylamine Type

### DIAION® WA30

WA30 resin is a weak base anion exchange resin based on high porous, styrene/ DVB polymer matrix. WA30 has tertiary amine functionality with high regeneration efficiency. The high porous styrenic matrix imparts excellent chemical stability, excellent mechanical and osmotic strength (to minimize attrition), high thermal stability and excellent durability against organic fouling. The high porous matrix of WA30 provides a high reaction rate.

WA30 is the bench mark which all macroporous weak base anion exchange resins are compared with. WA30 is used for very wide variety of applications, such as removal of organic substances of high molecular weight, pretreatment of raw waters containing organic foulants, deionization and decolorization of starch hydrolysates (such as corn syrup, dextrose, HFC's and sugar solutions) and purification of glycerine and enzymes.

Grade Name	DIAION® WA10	DIAION® WA20	DIAION® WA21J	DIAION® WA30
Chemical Structure				
Whole Bead Count	90 min.	95 min.	95 min.	95 min.
Shipping Density (g/ℓ -R; approx.)	695	660	655	635
Total Exchange Capacity (meq/mL-R)	1.2 min.	2.5 min.	2.0 min.	1.5 min.
Water Content (%)	63-69	41-47	40-52	43-55
Particle Size on 1,180µm through 300µm			5 % max. 1 % max.	
Effective Size (mm)	0.35 min.		0.40 min.	
Uniformity Coefficient			1.6 max.	
Effective pH Range			0-9	
Operating Temperature (°C)	60 max.		100 max.	

# Gel Type Uniform Particle Size Ion Exchange Resins

<b>Gel Type</b>	<b>DIAION® UBK Series</b>
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Ion exchange resins with good uniformity in particle size increase their necessity to reduce the reagents costs and spent waste waters in manufacturing pure waters. They are also used in other fields because they have little amount of large particles easy to be broken by swelling and shrinkage. Gel type ion exchange resins of uniform particle size are now launched to meet such necessity.

UBK16 has high (16%) crosslinkage. It is used for special process applications such as purification of pharmaceuticals.

Grade	Strongly Acidic Cation Exchange Resin			
Grade Name	DIAION® UBK08	DIAION® UBK10	DIAION® UBK12	DIAION® UBK16
Chemical Structure	$  \begin{array}{c}  -\text{CH}_2 - \text{CH} - \\    \\  \text{C}_6\text{H}_4 \\    \\  \text{SO}_3^- \text{Na}^+  \end{array}  $			
Ionic Form As Shipped	Na-form			
Whole Bead Count	90 min.			
Shipping Density (g/ℓ -R; approx.)	840	850	855	865
Neutral Salt Splitting Capacity (meq/mℓ -R)	2.0 min.	2.2 min.	2.3 min.	2.3 min.
Water Content (%)	43-50	35-45	33-39	27-37
Average Diameter (μm)	600 ± 50	580 ± 20	650 ± 50	600 ± 50
Uniformity Coefficient	1.2 max.			
Volume Change (H-form/Na-form, OH-form/Cl-form)	1.09	1.08	1.06	1.06
True Specific Gravity	1.29	1.32	1.34	1.38
Operating Temperature (°C)	120 (H-form, Na-form) max.			
Crosslinkage (%)	ca. 8	ca. 10	ca. 12	ca. 16

# DIAION<sup>®</sup> Gel Type Uniform Particle Size Ion Exchange Resins

**Gel Type**

**DIAION<sup>®</sup> UBA Series**

Ion exchange resins with good uniformity in particle size increase their necessity to reduce the reagents costs and spent waste waters in manufacturing pure waters. They are also used in other fields because they have little amount of large particles easy to be broken by swelling and shrinkage. Gel type ion exchange resins of uniform particle size are now launched to meet such necessity.

Grade	Strongly Basic Anion Exchange Resin		
	Type I		Type II
Grade Name	DIAION <sup>®</sup> UBA100	DIAION <sup>®</sup> UBA120	DIAION <sup>®</sup> UBA200
Chemical Structure			
Ionic Form As Shipped	Cl <sup>-</sup> -form		
Whole Bead Count	90 min.		
Shipping Density (g/l -R; approx.)	680	675	715
Neutral Salt Splitting Capacity (meq/ml -R)	1.3 min.		
Water Content (%)	43-50	48-55	45-52
Average Diameter (µm)	550 ± 50	575 ± 50	575 ± 50
Uniformity Coefficient	1.2 max.		
Volume Change (H-form/Na-form, OH-form/Cl <sup>-</sup> -form)	1.24		1.12
True Specific Gravity	1.07		1.12
Operating Temperature (°C)	60 max. (OH-form) 80 max. (Cl <sup>-</sup> -form)		40 max. (OH-form) 60 max. (Cl <sup>-</sup> -form)
Crosslinkage (%)	—		

# Cation Exchange Resins for Industrial Chromatography

## Gel Type

## DIAION® UBK500 Series

Chromatographical separation is widely industrialized in pharmaceuticals, fermentation and food fields. Ion exchange resins of small particles with uniform particle size distribution are applied for these purposes. The smaller particles with the more uniform particle size distribution, the higher yields and purities can be obtained.

DIAION® UBK500 series are typical cation exchange resins of this type.

Grade Name	DIAION® UBK530 **	DIAION® UBK550	DIAION® UBK535 **	DIAION® UBK555
Chemical Structure	$\begin{array}{c} \text{---CH}_2\text{---CH---} \\   \\ \text{C}_6\text{H}_4 \\   \\ \text{SO}_3^- \text{Na}^+ \end{array}$		$\begin{array}{c} \text{---CH}_2\text{---CH---} \\   \\ \text{C}_6\text{H}_4 \\   \\ \text{SO}_3^- \frac{1}{2}\text{Ca}^{++} \end{array}$	
Ionic Form As Shipped	Na-form		Ca-form	
Whole Bead Count	95 min.			
Shipping Density (g/l -R; approx.)	825	850	840	865
Total Exchange Capacity (meq/ml-R)	1.6 min.	1.9 min.	1.6 min.	2.0 min.
Water Content (%)	52.0-55.5	46.0-49.5	48.0-52.0	42.0-46.0
Particle Size *	200-240 μm 85% min.		190-240 μm	
			90% min.	85% min.
Ca Form (eq %)	—		98 min.	
	120 max.			

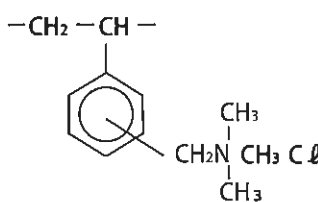
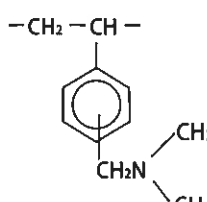
\* Please contact us when different particle size is required.

\*\* L=330 μm ,K=360 μm

# DIAION<sup>®</sup> Low-odor and Low-leachable Anion Exchange Resins

<b>Gel Type</b>	<b>DIAION<sup>®</sup> SAF11AL, SAF12A</b>
<b>Porous Type</b>	<b>DIAION<sup>®</sup> PAF308L</b>
<b>Highly Porous Type</b>	<b>DIAION<sup>®</sup> WA30C</b>

Low-odor and low-leachable anion exchange resins, with suppressed leachable of TOC and amines, are applied for manufacturing of drinking water and refining of sugar liquors.

Grade Name	DIAION <sup>®</sup> SAF11AL	DIAION <sup>®</sup> SAF12A	DIAION <sup>®</sup> PAF308L	DIAION <sup>®</sup> WA30C
<b>Chemical Structure</b>				
<b>Ionic Form As Shipped</b>	Cl <sup>-</sup> -form			free base
<b>Whole Bead Count</b>	90 min.	—	95 min.	95 min.
<b>Shipping Density (g/ℓ -R; approx.)</b>	700	675	705	650
<b>Total Exchange Capacity (meq/mL-R)</b>	0.85 min.	1.2 min.	0.9 min.	1.5 min.
<b>Water Content (%)</b>	59-64	48-55	62-72	43-55
<b>Particle Size</b> on 1,180μm through 425μm through 300μm	5 % max. 5 % max. —	5 % max. — 1 % max.	5 % max. 5 % max. —	5 % max. — 1 % max.
<b>Effective Size (mm)</b>	0.45 min.	0.40 min.	0.45 min.	0.40 min.
<b>Uniformity Coefficient</b>	1.6 max.			
<b>TMA washing property (ppb)</b> <b>COD (ppm)</b>	20 max. —			— 5 max.
<b>True specific gravity</b>	1.07	1.07	1.06	1.04
<b>Operating Temperature (°C)</b>	60 max. (OH-form) 80 max. (Cl <sup>-</sup> -form)			100
<b>Use</b>	Purification of sugar liquor	Beverage water, Ultra pure water primary system	Purification of sugar liquor	Beverage water, Ultra pure water primary system

# Chelating Resins

## Iminodiacetate Type

## DIAION® CR11

CR11 is based on a high porous styrenic matrix, and provides rapid kinetics, high operating capacity, low swell/ shrink ratio, and excellent mechanical stability. CR11 captures metal ions by chelation with its iminodiacetate functionality. CR11 has a much higher selectivity (than strongly and weakly acidic cation exchange resins) for divalent ions, especially transition metal elements like copper, iron, etc. CR11 can capture metal ions at much lower pH than strong and weak acid resins. As CR11 has higher selectivity for divalent metal ions than monovalents; it can be used for separation of divalent from monovalent ions.

## Polyamine Type

## DIAION® CR20

CR20 is a special chelating resin with polyamine functionality. CR20 captures metal ions by chelation with its polyamine functionality within its high porous styrene/ DVB matrix. CR20 has a high selectivity to heavy metal ions. It does not absorb alkali metal and alkali earth metal ions, and therefore, it can be used for heavy metal recovery from alkali metal or alkali earth metal ion solution.

## Glucamine Type

## DIAION® CRB03, CRB05

CRB03 and CRB05 are special chelating resin with glucamine groups based on a high porous styrene/DVB matrix. It has high selectivity to borate ion. It is used for borate separation from various solutions, including brines and sea water.

Grade Name	DIAION® CR11	DIAION® CR20	DIAION® CRB03	DIAION® CRB05
Chemical Structure				
Whole Bead Count	95 min.			
Shipping Density (g/ℓ -R; approx.)	730	635	665	770
Total Exchange Capacity (meq/ml-R)	—	—	0.7 min.	0.95 min.
Cu Adsorption Capacity (m-mol/ml-R)	0.5 min.	0.4 min.	—	—
Water Content (%)	55–65	50–60	45–55	43–53
Particle Size				
on 1,180µm	5 % max.	5 % max.	—	—
on 850µm	—	—	—	10 % max.
through 355µm	2 % max.	—	—	—
through 300µm	—	1 % max.	1 % max.	1 % max.
Effective Size (mm)	0.40 min.		0.35–0.55	0.35 min.
Uniformity Coefficient	1.6 max.			
Operating Temperature (°C)	80 max. (H-form) 120 max. (Na-form)	100 max. (free base)	100 max. (free base)	

# DIAION<sup>®</sup>

## Aromatic Type

## DIAION<sup>®</sup> HP20, HP21

Widely used in refining of pharmaceuticals and natural extracts, since these are suitable for adsorbing large molecules because of their relatively large pore sizes and have superior adsorption/ desorption. HP20 and HP21 are widely used in a variety of industrial applications, especially adsorption, desalting and decolorization of natural products and small proteins.

## Aromatic Type

## SEPABEADS<sup>®</sup> SP825L, SP850

SP825L and SP850 are also high porous, styrenic adsorbents. They have much larger surface area and a narrower, more uniform pore-size distribution than HP20 grades. They offer nearly two times the surface area of HP20, or twice the capacity for small molecules (< 1500mw). These grades are recommended for adsorption, desalting, and decolorization.

Grade Name	DIAION <sup>®</sup> HP20	DIAION <sup>®</sup> HP21	SEPABEADS <sup>®</sup> SP825L	SEPABEADS <sup>®</sup> SP850
Chemical Structure				
Shipping Density (g/ℓ -R; approx.)	680	685	685	695
Water Content (%)	55-65	50-60	52-62	46-52
Particle Size on 250μm	90 % min.			
Effective Size (mm)	0.25 min.			
Uniformity Coefficient	1.6 max.			
Example of Porosity				
Pore Volume (ml/g)	1.3	1.3	1.4	1.1
Specific Surface Area (m <sup>2</sup> /g)	590	640	930	930
Pore Radius (Å)	290	110	70	45
Operating Temperature (°C)	130 max.			



# Synthetic Adsorbents

## Aromatic Type

## SEPABEADS® SP70

SP70 is aromatic adsorbent which has moderate micro pore sizes. It can be adapted to the US FDA standard, CFR §173.65.

## Modified Aromatic Type

## SEPABEADS® SP207

SP207 has higher hydrophobicity and greater selectivity for non-polar molecules, which is derived from chemically bonded bromine to the aromatic rings, than standard aromatic adsorbents. It is suitable for upward flow and batch processes due to its high specific gravity, 1.2 times higher than.

## Methacrylic Type

## DIAION® HP2MG

HP2MG is a high porous, methacrylate based adsorption resin. It is synthesized only from methacrylates (monomer and crosslinker are methacrylate). It does not contain any aromatic compounds. It is considered an intermediate polarity adsorption resin. It is suitable for desalting and adsorption of organic compounds of relatively high polarity by using the more hydrophilic characteristics of the polymer matrix.

Grade Name	SEPABEADS® SP70	SEPABEADS® SP207	DIAION® HP2MG
Chemical Structure			
Shipping Density (g/ℓ -R; approx.)	685	790	720
Water Content (%)	55-65	43-53	55-65
Particle Size	on 250µm 90% min.		on 300µm 90% min.
Effective Size (mm)	0.25 min.		0.30 min.
Uniformity Coefficient	1.6 max.		
Example of Porosity			
Pore Volume (mℓ/g)	1.5	1.0	1.3
Specific Surface Area (m <sup>2</sup> /g)	870	600	570
Pore Radius (Å)	70	110	240
Operating Temperature (°C)	130 max.		—

It is well known that smaller size resins are required to obtain higher purity and better recovery in chromatographic separation of pharmaceuticals. Mitsubishi Chemical offers several types of synthetic adsorbent grades in very useful particle size distributions for industrial scale chromatography.

Mitsubishi chemical also offers analytical HPLC packing media MCI-gel® which has same chemical and physical structure as these grades. Industrial scaling up of separation process is easily attained by using our product line up.

### Aromatic Type

### DIAION® HP20SS, SEPABEADS® SP20SS

HP20SS and SP20SS are directly polymerized, small particle size version of HP20. The wide pore polymer matrix provides excellent kinetics and capacity for small biomolecules at both preparative and process scale. They offer nice balance of pressure flow characteristics and true chromatographic fractionation and have also been successfully applied in simulated moving bed (SMB) applications for a variety of small biomolecules. They often compete with bonded silica supports for preparative and industrial applications.

### Methacrylic Type

### SEPABEADS® SP2MGS

SP2MGS is a small and uniform particle size version of methacrylate type DIAION® HP2MG. SP2MGS gives higher dynamic capacity than HP2MG and shows strong retentivity and unique selectivity in normal phase chromatography.

### Modified Aromatic Type

### SEPABEADS® SP207SS

SP207SS is a small size version of modified aromatic type SEPABEADS® SP207. It is applied to reversed phase chromatography. The brominated polymeric matrix provides unique selectivity, full pH operating range and long operating life versus conventional bonded silica packing materials used in preparative and industrial applications.

Grade Name	DIAION® HP20SS	SEPABEADS® SP20SS	SEPABEADS® SP2MGS	SEPABEADS® SP207SS
Chemical Structure				
Shipping Density (g/ℓ -R; approx.)	670	660	680-740	780
Water Content (%)	55-67	55-65	61-69	43-53
Particle Size	on 150μm 15% max. 63-150μm 70% min. through 63μm 20% max.	on 75 μm 30% max. 63-75 μm 55% min. through 63μm 15% max.	on 220μm 1% max. 120-160 μm 85% min. through 90μm 1% max.	on 150μm 15% max. 63-150μm 70% min. through 63μm 20% max.
Example of Porosity				
Pore Volume (mℓ/g)	1.2		1.3	1.0
Specific Surface Area (m <sup>2</sup> /g)	560		520	590
Pore Radius (Å)	290		230	110
Operating Temperature (°C)	130 max.		—	130 max.

## Remarks in handling Ion Exchange Resins

### Handling

Wear suitable personal protective equipments to prevent exposure to eyes and skin, and handle ion exchange resins at well-ventilated places from the windward. Eye-washing facilities should be set nearby. When contacted with eyes, rinse eyes with much water and consult a doctor. When swallowed, wash stomach immediately with much water and consult a doctor depending on symptoms. Spilt ion exchange resins should be collected and the floors should be cleaned, lest they may cause some slips. Separate from high temperature machinery and materials, fireworks, flames and avoid contacts and/or mixing with oxidizing materials.

Sufficient care must be taken not to contact with oxidizing agents, e.g. nitric acid, since ion exchange resins may explode when contacted with them.

### Storage

Store in cool, dry, well-ventilated and dark places. Close tightly to prevent contamination and solvent vaporization. Separate from oxidizing materials.

Ion exchange resins deteriorate fast at high temperatures and containing water may freeze and break ion exchange resins under 0 °C.

### Disposal

Disposal of unused ion exchange resins should be done by reclamation and/or incineration according to the instructions at the notice of handling and storage. Incineration should be implemented by incinerators that have proper facilities to treat SO<sub>x</sub>, NO<sub>x</sub>, CO and other gases. The used ion exchange resins that adsorb heavy metals must be disposed subject to the direction of the Wastes Disposal and Public Cleaning Law.

## Preparation before Use

After filling brand new ion exchange resins into towers, backwashing and conditionings are recommended in order to eliminate the remaining elution impurities.

The backwashing and conditioning conditions vary depending on the designs and the reagents that can be applied.

There are two ways in conditioning; one is reciprocal washings with dilute acid water, e.g. 2N-HCl, and with dilute alkali water, e.g. 1N-NaOH, and the other is reciprocal flows of regenerating reagents and rinse water. The conditioning method and the number of such repetition are decided on the required quality of the treated water and other factors. The number of the repletion is, in general, recommended to be high to minimize the elution when such elution has a large influence.

Consult the designer/engineer of your packed columns before the actual operations.

Please contact us about ultrapure water or beverage water applications. We can provide with special preparations for such purposes.

- Please contact us when you require the other ion exchange resins and synthetic adsorbents not specified in this catalog. Some could be prepared on your requests.
- The contents in this catalog might be changed without previous notice.



# DIAION®

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