

## Technical Data

# D201 Strong-Base Type I Anion Exchange Resin

### PRODUCT DESCRIPTION

**D201** is a premium quality strongly basic Type I, macroporous anion exchange resin with an isoporous structure that contributes to its high capacity. **D201** will provide for optimum performance in deionization and as an organic trap.

**D201** is a unique strong base type 1 anion exchange resin which has been developed for the removal of colloids especially colloidal silica. The pore size distribution has been optimized to ensure highest capacities for colloidal silica and hydrous metal oxides, including iron oxides, thus providing an added dimension in treating water to levels of absolute purity. The regenerability is excellent and **D201** may be regenerated time after time without large resin losses. This is because **D201** has an especially high mechanical strength for this type of product. **D201** finds use in the semiconductor, medical and pharmaceutical fields.

### Typical Physical & Chemical Characteristics

Polymer Matrix Structure	Polystyrene cross-linked with Divinylbenzene
Physical Form and Appearance	Spherical Opaque Beads
Whole Bead Count	95% min.
Functional Groups	Type I Quaternary Ammonium
Ionic Form, as shipped	Cl <sup>-</sup>
Shipping Weight (approx.)	650 - 730 g/l
Particle Size Range	0.315 mm—1.25mm ≥95%
Moisture Retention, Cl <sup>-</sup> form	50 – 60%
Reversible Swelling Cl <sup>-</sup> →OH <sup>-</sup>	20% max.
Specific Gravity, moist Cl <sup>-</sup> Form	1.06—1.10
Total Exchange Capacity, Cl <sup>-</sup> form, wet, volumetric dry, weight	1.20 eq/l min. 3.7 eq/kg min.
Operating Temperature, Cl <sup>-</sup> Form	90°C max.
Operating Temperature, OH <sup>-</sup> Form	60°C max.
pH Range, Stability	0-14
pH Range, Operating,	0-8

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## REGENERATION

The colloidal materials adsorbed by **D201** are, because of their nature, more difficult to remove than anions typically loaded during standard ion exchange reactions. Often they are colloids composed of both silica (insoluble in dilute acids) and transition metals (insoluble in dilute alkali).

Hence it is necessary to treat with both acid and alkali to solubilise and remove these colloids. Long contact time is recommended, particularly with caustic regeneration, as recommended above.

Depending on the nature of the colloids, it may be necessary to regenerate with hot sodium hydroxide (50°C)

## PRINCIPAL APPLICATIONS

Colloidal silica may pass through the demineralisation train, and unlike ionised silica, is consequently concentrated and deposited in the boiler.

Where the boiler is of high pressure type, the colloidal silica increases the risk of corrosion and it is necessary to use a pressure lower than the design pressure of the boiler, thus increasing the blow down. A more economic approach is to incorporate a unit containing **D201** at the end of the demineralisation chain

## PRINCIPLE OF OPERATION

In general, because of the significant difference in pore diameter, macroporous resins are more resistant to fouling by organic matter, and other contaminants than gel resins. However there are no conventional resins capable of remove colloids efficiently.

**D201** has been developed especially for the elimination of colloids: the pores are much larger than those of a conventional macroporous resin. Hence the colloids are reversibly adsorbed together with organic matter, which renders the resin less sensitive to organic fouling. Studies have shown that macroporous resins with a narrow pore distribution have a greater resistance to osmotic shock : the pore diameter range of **D201** is therefore concentrated in the range of 30,000 to 160,000 angstroms. Consequently the mechanical resistance of **D201** is perfectly acceptable for a resin endowed with this pore size range optimised for colloids removal. In fact, the pore size has been chosen to obtain best adsorption possible for the majority of colloids typically found in the water to be treated. Unlike other resins of this type, **D201** has a single distribution peak centred with majority of pores in the narrow range of 60-80,000 Angstroms.

The pressure drop or headloss across a properly classified bed of ion exchange resin depends on the particle distribution, bed depth, and voids volume of the exchange material, as well as on the viscosity (and hence on the temperature) of the the influent solution. Factors affecting any of these parameters, for example the presence of particulate matter filtered out by the bed, abnormal compaction of the resin bed, or the incomplete classification of the resin spheres will have an adverse effect and result in increased headloss.

Depending on the quality of the influent water, the application and the design of the plant, service flow rates may vary from 8-32 bed volumes/hour.

During upflow backwash, the resin bed should be expanded in volume by between 50% and 70%.

This operation will free it from any particulate matter, clear the bed of bubbles and voids, and reclassify the resin particles ensuring minimum resistance to flow. Bed expansion increases with flow rate and decreases with temperature,

### Standard Operating Conditions

Operation	Rate	Solution	Minutes	Amount
Service	8 - 40 BV/h	Decationized water	per design	per design
Backwash	5 - 7.5 m/h	Decationized water 10°- 40°C	5 - 20	1.5 - 3 BV
Regeneration	2 - 4 BV/h	4 - 6% NaOH	30 - 60	64 - 160 g/l
Rinse, (slow)	2 - 7 BV/h	Decationized water	30 approx.	2 - 4 BV
Rinse, (fast)	8 - 40 BV/h	Decationized water	20 approx.	3 - 6 BV
Backwash Expansion 50% to 75%				
Design Rising Space 100%				



**Skin contact:** Wash off with soap and water. If skin irritation persists, call a physician.

**Eye contact:** Rinse with plenty of water. If eye irritation persists, consult a specialist.

## 5. FIRE-FIGHTING MEASURES

**Flash point** not applicable

**Ignition temperature** ca.500.0 °C

**Suitable extinguishing media:** Use the following extinguishing media when fighting fires involving this material:

water spray

carbon dioxide (CO<sub>2</sub>)

foam

dry chemical

**Specific hazards during fire fighting:** Toxic fumes are generated when material is exposed to fire or fire conditions. Cool closed containers exposed to fire with water spray.

**Special protective equipment for fire-fighters:** In the event of fire, wear self-contained breathing apparatus.

**Further information:** Remain upwind.

Avoid breathing smoke.

## 6. ACCIDENTAL RELEASE MEASURES

### Personal precautions

Appropriate protective equipment must be worn when handling a spill of this material. See SECTION 8, Exposure Controls/Personal Protection, for recommendations.

If exposed to material during clean-up operations, see SECTION 4, First Aid Measures, for actions to follow.

### Methods for cleaning up

Keep spectators away.

Floor may be slippery; use care to avoid falling.

Transfer spilled material to suitable containers for recovery or disposal.

## 7. Handling and storage

### Handling

NOTE: This product as supplied is a whole bead resin and may produce slight eye irritation. However, the ground form of this resin should be treated as a severe eye irritant. Worker exposure to ground resins can be controlled with local exhaust ventilation at the point of dust generation, or use of suitable personal protective equipment (dust/mist air-purifying respirator and safety goggles). Avoid repeated freeze-thaw cycles; beads may fracture. If frozen, thaw at room

temperature. Properly designed equipment is vital if these resins are to be used in conjunction with strong oxidizing agents such as nitric acid to prevent a rapid build-up of pressure and possible explosion. Consult a source knowledgeable in the handling of these materials before proceeding.

### Storage

#### Further information:

**CAUTION:** Do not pack column with dry ion exchange resins. Dry beads expand when wetted; this expansion can cause glass column to shatter.

## 8. EXPOSURE CONTROLS / PERSONAL PROTECTION

### Exposure limit(s)

Exposure limits are listed below, if they exist.

**Eye protection:** Use safety glasses with side shields (ANSI Z87.1 or approved equivalent).

**Hand protection:** Cotton or canvas gloves.

**Respiratory protection:** No personal respiratory protective equipment normally required.

**Protective measures:** Facilities storing or utilizing this material should be equipped with an eyewash facility.

**Engineering measures:** None required under normal operating conditions.

## 9. PHYSICAL AND CHEMICAL PROPERTIES

### Appearance

<b>Form</b>	Beads
<b>Colour</b>	clear golden spherical beads
<b>pH</b>	neutral
<b>Boiling point/range</b>	No data available
<b>Melting point/range</b>	No data available
<b>Flash point</b>	not applicable
<b>Ignition temperature</b>	ca.500 °C
<b>Vapour pressure</b>	17.0 mmHg at 20 °C Water
<b>Water solubility</b>	practically insoluble
<b>Relative density</b>	1.06—1.10
<b>Viscosity, dynamic</b>	not applicable
<b>Viscosity, dynamic</b>	not applicable
<b>Evaporation rate</b>	<1.00
<b>Percent volatility</b>	50 -60 % water

**NOTE:** The physical data presented above are typical values and should not be construed as a specification.

## 10. STABILITY AND REACTIVITY

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<b>Hazardous reactions</b>	Stable under normal conditions.
<b>Materials to avoid</b>	Avoid contact with the following: Strong Oxidizers nitric acid
<b>Hazardous decomposition products</b>	Thermal decomposition may yield the following: monomer vapors,

## 11. TOXICOLOGICAL INFORMATION

No data are available for this material. The information shown is based on profiles of compositionally similar materials.

<b>Acute oral toxicity</b>	LD50rat > 5,000 mg/kg
<b>Acute dermal toxicity</b>	LD50rabbit > 5,000 mg/kg

## 12. ECOLOGICAL INFORMATION

### Chemical Fate

**Biochemical Oxygen Demand (BOD)** No data available

## 13. DISPOSAL CONSIDERATIONS

### Disposal

**Waste Classification:** When a decision is made to discard this material as supplied, it does not meet RCRA's characteristic definition of ignitability, corrosivity, or reactivity, and is not listed in 40 CFR 261.33. The toxicity characteristic (TC), however, has not been evaluated by the Toxicity Characteristic Leaching Procedure (TCLP).

Unused material may be incinerated or landfilled in facilities meeting local, state, and federal regulations.

**Contaminated packaging:** Empty containers should be taken to local recyclers for disposal. Refer to applicable federal, state, and local regulations.

## 14. TRANSPORT INFORMATION

### DOT

Not regulated for transport

### IMO/IMDG

Not regulated (Not dangerous for transport)

Transportation classifications may vary by container volume and may be influenced by regional or country variations in regulations

## 15. REGULATORY INFORMATION

### Workplace Classification

This product is considered non-hazardous under the OSHA Hazard Communication Standard (29CFR1910.1200).

This product is not a 'controlled product' under the Canadian Workplace Hazardous Materials Information System (WHMIS).

**SARA TITLE III: Section 311/312 Categorizations (40CFR370):** This product is not a hazardous chemical under 29CFR 1910.1200, and therefore is not covered by Title III of SARA.

**SARA TITLE III: Section 313 Information (40CFR372)**

This product does not contain a chemical which is listed in Section 313 at or above de minimis concentrations.

**CERCLA Information (40CFR302.4)**

Releases of this material to air, land, or water are not reportable to the National Response Center under the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) or to state and local emergency planning committees under the Superfund Amendments and Reauthorization Act (SARA) Title III Section 304.

**US. Toxic Substances Control Act (TSCA)** All components of this product are in compliance with the inventory listing requirements of the U.S. Toxic Substances Control Act (TSCA) Chemical Substance Inventory.

**Pennsylvania**

Any material listed as "Not Hazardous" in the CAS REG NO. column of SECTION 2, Composition/Information On Ingredients, of this MSDS is a trade secret under the provisions of the Pennsylvania Worker and Community Right-to-Know Act.

16. OTHER INFORMATION

**Hazard Rating**

	<b>Health</b>	<b>Fire</b>	<b>Reactivity</b>
<b>HMIS</b>	1	1	0

**Legend**

ACGIH	American Conference of Governmental Industrial Hygienists
BAC	Butyl acetate
OSHA	Occupational Safety and Health Administration
PEL	Permissible Exposure Limit
STEL	Short Term Exposure Limit (STEL):
TLV	Threshold Limit Value
TWA	Time Weighted Average (TWA):
	Bar denotes a revision from prior MSDS.

The information provided in this Safety Data Sheet is correct to the best of our knowledge, information and belief at the date of its publication. The information



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given is designed only as guidance for safe handling, use, processing, storage, transportation, disposal and release and is not to be considered a warranty or quality specification. The information relates only to the specific material designated and may not be valid for such material used in combination with any other materials or in any process, unless specified in the text.