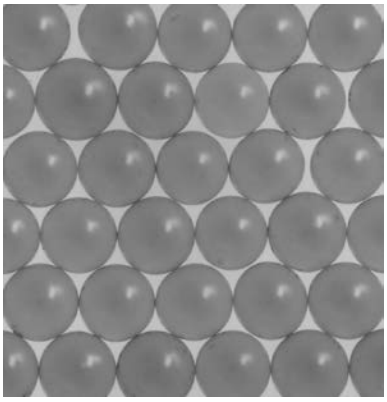
Ion Exchange Resin Analysis Kit

Dow Ion Exchange Resins
DIRECTOR℠ Service

Dow Ion Exchange Resin, DIRECTOR℠ Services

Ion Exchange Resin Analysis Kit



Dow Ion Exchange Resins and Adsorbents* can be tested for a nominal fee to determine suitability for continued operations or to troubleshoot problems in your resin system. In addition to test results, you will receive a complete report with a description of the tests performed and the implications of the test results on your operation.

Information needed to begin testing

In order to begin testing, Dow laboratory personnel need to have proper information on the types of resin being sent and the types of testing to be performed. The resin names and descriptions on sample bottle labels identify the types of resins submitted and your completed System Information Sheet (pages 5-6) will help us understand your system.

Contact names and addresses, purchase order number or credit card number and completed System Information Sheet (in the form, below) must be completed before testing will be initiated. Any technical information you can provide on this Form is important so that test results can be properly interpreted.

Availability of results

Results are generally available within 4 weeks after your samples, resin and application information, and purchase order are received at our Laboratory site.

Contact your Dow representative

If you have any questions regarding ion exchange resin testing, contact your Dow representative. If you cannot identify your Dow Representative, please contact us via the Contact Us section of the website.

Sampling and shipping procedures

Please see the recommended resin sampling procedure.

In order to obtain representative results, all resins sent for testing should be taken from a core sample from the resin bed. The core samples should be shipped in one-liter (one-quart) plastic bottles placed in plastic bags for secondary leak containment. The solutions should be at neutral pH for safe shipping. MAKE SURE THE SAMPLES DO NOT CONTAIN FREE CAUSTIC OR ACID AND THAT NO GLASS CONTAINER IS USED.

Labeling is critical. Bottles should be labeled as shown in the example below.

Resin Name	
Resin Type	
Vessel / Line Number	
Resin sampled after regeneration	Yes – No
Date sample was taken	

Warning for handling ion exchange resin:

- Avoid contact with eye
- In case of contact, rinse with plenty of water and seek medical advice
- Resins in regenerated form may leach acid or basic solution when in contact with water
- Wash hands after sampling
- Ship resin in neutral solution
- Ship in plastic bottle

*Includes AMBERLITE™, AMBERJET™, AMBERSEP™, DOWEX™ Ion Exchange Resins

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Available Testing Services For Ion Exchange Resins

The recommended tests depend on the particular resin and application. Please see the price sheets for pricing.

Resin Analysis Services for the Water Industry – Price Sheet

Resin Analysis Services for the Industrial Processing Industry – Price Sheet

Water Based Applications

	Demineralization		Condensate Polishing		UPW		General		
	Strong Acid Cation	Strong Base Anion	Strong Acid Cation	Strong Base Anion	Strong Acid Cation	Strong Base Anion	Weak Base Anion	Weak Acid Cation	Mixed Bed
Total Exchange Capacity (TEC)	●	●	●	●	●	●	●	●	●
Moisture Retention Capacity (MRC)	●	●	●	●	●	●	●	●	●
Microscopic Bead Examination (MBE)	●	●	●	●	●	●	●	●	●
Salt Splitting Cap. (SSC) or Strong Base Cap.		●		●		●	●		●
Weak Base Capacity (WBC)		●		●		●	●		●
Total Exchange Capacity (TEC), as received	$	$	●	●	●	●	$	$	
Quantitative Organic Fouling		●							
Iron Fouling	●								
Cation/Anion Ratio					●	●			●
Particle Size Distribution	$	$	$	●	●	●	$	$	$
SO_4^{2-} MTC-Kinetics Test				●					
World Wide UPW - Resistivity rinse test - TOC rinse test - UPW kinetics					●	●			
Whole Bead	●	●	●	●	●	●	●	●	●
Site Analysis - %OH, $\%CO_3$, %Cl, $\%SO_4^{2-}$				●		●			
Metals, ppm level			●	●					

Industrial Process Applications

	Strong Acid Cation	Weak Acid Cation	Strong Base Anion	Weak Base Anion	Chelating Resin	Adsorbents
Total Cation Exchange Capacity (TEC)	●	●			●	
Total Anion Exchange Capacity (TEC)			●	●	●	
Moisture Retention Capacity (MRC)	●	●	●	●	●	●
Microscopic Bead Examination (MBE)	●	●	●	●	●	●
Total Exchange Capacity (TEC), as received	●	●	●	●		
Particle Size Distribution	$	$	$	$	$	$
Whole Bead	●	●	●	●	●	●
Site Analysis - %OH, $\%CO_3$, %Cl, $\%SO_4^{2-}$			●			
Elementals, %	●	●	●	●	●	●
Porosimetry - BET surface area - Total pore volume - Average pore diameter						●

● = standard test for the particular type of resin

$ = not a standard test, but can be done for an extra charge

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The tests are described in further detail below.

Total Exchange Capacity (TEC)
Measurement of the total number of ion exchange sites per volume of resin. Fully regenerated resin is titrated to obtain milliequivalents of capacity per milliliter of resin. For cation resins, this is reported in the Na^+ form. For strong base anion resins, it is reported in the Cl^- form. The TEC of weak base anion resins are reported in the free base form.

Strong Base (Salt-Splitting) Capacity (SSC)
Measurement of the strong base (quaternary amine) sites on the resin. Salt splitting sites are necessary to remove weak acid species such as bicarbonate and silica. This is reported in the Cl^- form for strong base anion resins and in the free base form for weak base anion resins.

Weak Base Capacity (WBC)
Measurement of the weak base (tertiary amine) sites on an anion resin. Weak base sites are used to remove free mineral acidity (acidic chlorides, sulfates, and nitrates) with a high degree of regeneration efficiency. This property is reported for strong base anion resins in the Cl^- form and for weak base anion resins in the free base form.

Water Retention Capacity (WRC)
Measurement of the inherent moisture content of the ion exchange resin. A fully hydrated resin sample is centrifuged to remove free water. The resulting sample is weighed before and after drying to determine the water content. Elevated water content indicates degradation of the polymer chain, while depressed water content typically results from accumulation of foulants on the beads. This test is performed on cation resins in the Na^+ form, strong base anion resins in the Cl^- form, and weak base anion resins in the free base form.

Total Exchange Capacity as received (TEC as received)
A measurement of the number of ion exchange sites in the regenerated (H^+ or OH^-) form. This result can be compared against the total exchange capacity to determine the efficiency or regeneration.

Microscopic Bead Examination
A sample of the resin is placed under a microscope for determination of the physical integrity of the resin and contamination of the bed. Photographs are taken and included in the report.

Organic Fouling
Measurement of the degree of organic accumulation on the anion resin. A sample of resin is subjected to alkaline brine solution and the extract solution is analyzed for total organic carbon (TOC) levels.

Resin Fouling
Inorganic contaminants such as iron, calcium and silica can be identified using atomic absorption (AA) or x-ray fluorescence (XRF).

Resin Kinetic Response
Measurement of a resin's ability to quickly remove ions from solution. As resins age, the rate of exchange may not be fast enough to remove all ions before flow reaches the bottom of the bed, thus exhibiting poor operating performance while maintaining a high Total Exchange Capacity.

Ionic Rinse Volume
Measurement of the rinse volume is made against conductivity following regeneration of the resin sample. The ionic rinse characteristics give an indication of the general condition of the resin.

Particle Size Distribution
A sample of the resin is tested with a light blocking device which has been calibrated to determine the particle size distribution of ion exchange resins. The particle size distribution is reported to show the mean size and quantify the effects of bead breakage.

Resin Cleaning Tests
Evaluation of the resin using the standard testing will usually indicate if a resin would benefit from cleaning (e.g., to remove organics, Fe or silica). After cleaning, the resin is retested to evaluate the degree of success and a recommendation made.

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Dow Ion Exchange Resins

Analysis Request Form for the Americas/Pacific

Customer Information

Send Results To:	Send Invoice To:
Name:	Name:
Company:	Company:
Plant Name:	Address:
Address:	
Phone:	Phone:
Fax:	Fax:
E-mail:	E-mail:

Purchase Order Number:

Credit Card Number: Expiration Date:

Select Credit Card Type:
☐ VISA ☐ MasterCard ☐ American Express

(The credit card option is available only in the USA and Canada)

Note: For all Analysis Requests originating outside the USA and Canada, a P.O. number is required.

Rush Analysis Requested:
☐ *(Additional Fees Will Apply)*

Sample Descriptions:

Application ex: Softener, demin., C.P.	Train & Vessel ex: Train #1 SAC	Resin Type ex: Strong acid cation	Resin Name ex: DOWEX™ HCR-S	Resin age (years)	Before/after regeneration	Special Tests ex: $CaSO_4$, Fe

Contact names and addresses, purchase order number or credit card information, and sample descriptions must be complete before testing will be initiated. (Note: Analysis results may be delayed if this information is not provided.) Standard analysis and report will be available within four weeks. Please complete this form and mail it, along with the properly packaged resin samples, to the address below. For questions, please call 1-800-447-4369.

The Dow Chemical Company
Larkin Laboratory
Attn: Ion Exchange Lab #124
1801 Larkin Center Drive
Midland, MI 48674
USA

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Technical Information

Feedwater Analysis:

Ca	mg/L or	ppm $CaCO_3$	Mg	mg/L or	ppm $CaCO_3$	Na/K	mg/L or	ppm $CaCO_3$
Cl	mg/L or	ppm $CaCO_3$	SO_4	mg/L or	ppm $CaCO_3$	NO_3	mg/L or	ppm $CaCO_3$
HCO_3	mg/L or	ppm $CaCO_3$	SiO_2	mg/L or	ppm $CaCO_3$	Temp °F Flowrate, GPM (this train)	T.O.C. Flowrate, GPM (total system)	

System description (each train):

Number of trains in system:

Bed Number	1	2	3	4	5	6
Bed Diameter (inches)						
Depth of Resin in Bed (inches)						
Resin Type						
Regenerant Used						
Regenerate Dosage						
lb/ft^3						
at %						
Regeneration Mode						
Co-Current						
Counter-Current						
Regenerant Temp (°F)						
Run Length (gallons)						

If problem(s), please describe effect(s) on plant performance:

- ☐ Short Cycle Length
- ☐ Poor Water Quality:
  - ☐ High Sodium
  - ☐ High Silica
- ☐ Long Rinse Down
- ☐ High Pressure Drop
- ☐ Other:
- ☐ pH Problem:
  - ☐ High
  - ☐ Low
  - ☐ After SBA
  - ☐ After MB's

Did the problem appear:

- ☐ Slowly
- ☐ Suddenly

Any other comments:

Contact Dow Water & Process Solutions:

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Latin America:	(+55) 11-5188-9222
Europe:	+800-3-694-6367
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http://www.dowwaterandprocess.com

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