The analysis and characterisation of ion exchange resins

We offer these basic measurements and determination of the following parameters:

Ion exchange capacity (IEC), Total wet Volume capacity (TVC) and dry weight capacity (DWC)

Total wet volume capacity (TVC) commonly known as ion exchange capacity (IEC) indicates the current capacity of the ion exchange resins and its ability to remove ions from aqueous solution. The method allows determining the total number of functional groups of the resin related to its volume. In the case of cation exchangers is a volume in H^+ (or Na^+) form, in the case of anion exchangers is the volume in the Cl^- (or OH^-) form. The result of the measuring is "equivalent of the capacity per liter of sample" [eq/l].

By measuring the capacity of the dry sample (DWC) it is obtained the value of ion exchange capacity related to the weight of dry (non-swollen) resin, reported in [eq/kg].

Thanks comparing the values obtained by measuring with the resin technical data sheet values it can be determined the percentage of lost capacity of ion exchange resin, caused by the gradual degradation during operation. The report includes the complete appraisal of the state of resin and operational recommendations.

Salt splitting capacity (SSC), Weak capacity (WC)

Salt splitting capacity (sometimes called „basicity") is a value that indicates the amount of strongly basic quaternary ammonium groups. In the water treatment the SSC is necessary to remove the weakly dissociated acids (dissolved CO_2, SiO_2, H_3BO_3 etc.). The result is [eq/l].

The proportion of weakly basic groups in the sample reflects the WC, also indicated in [eq/l].

Particle size distribution

Laser measurement of particle sizes in the swollen state. Measurements show true granularity of material that is compared to the manufacturer's data sheet values. The distribution shows the degree of mechanical damage of the particles, number of fragments or contamination by other materials. Measurement results are presented in graphical and tabular form (volume percentage representation of particle diameters).

Macro photography and microscope image

It is taken a sample resin photo using a camera with a macro lens and the image from the microscope. By these images is evaluated the physical integrity of the resin and the bed contamination. The macro image and the microscope image are included in the report.

If interested, you can request **useful (operating) capacity**, **swelling of the resin**, **analysis of the regeneration eluate** from ion exchangers, etc. It is also possible to determine the type of resin (anion or cation exchanger, weakly or strongly basic, gel, macroporous, chelating, etc.).

Methods of analysis of ion exchangers based on the following standards:

• Czech guidelines (ČSN 64 0901-7, ČSN 64 0920-4, ČSN 64 0930-1); Instructions of ICT Prague

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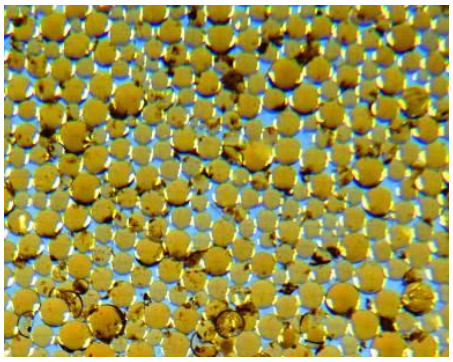
Result of the analysis

Results of the analysis are stated in a report that includes:

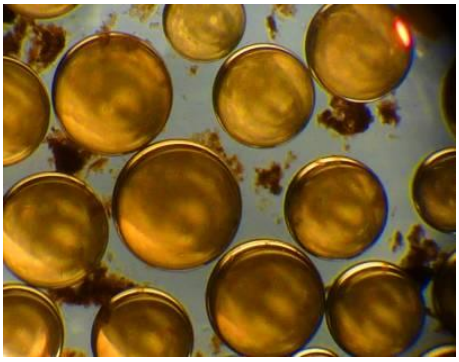
- measured values, characteristics, tables, graphs
- appraisal, description and discussion of the general state of the resin
- comments and operational recommendations

Example

Resin/sample name	Vessel	Test condition	Resin type	TVC eq/l	WC eq/l	SSC eq/l	DWC eq/kg	Ionic test form
Ionex XY	2	regular	MP	1,08	1,08	0	3,8	FB
Ionex XY	New resin reference		MP	1,3	-	-	-	FB

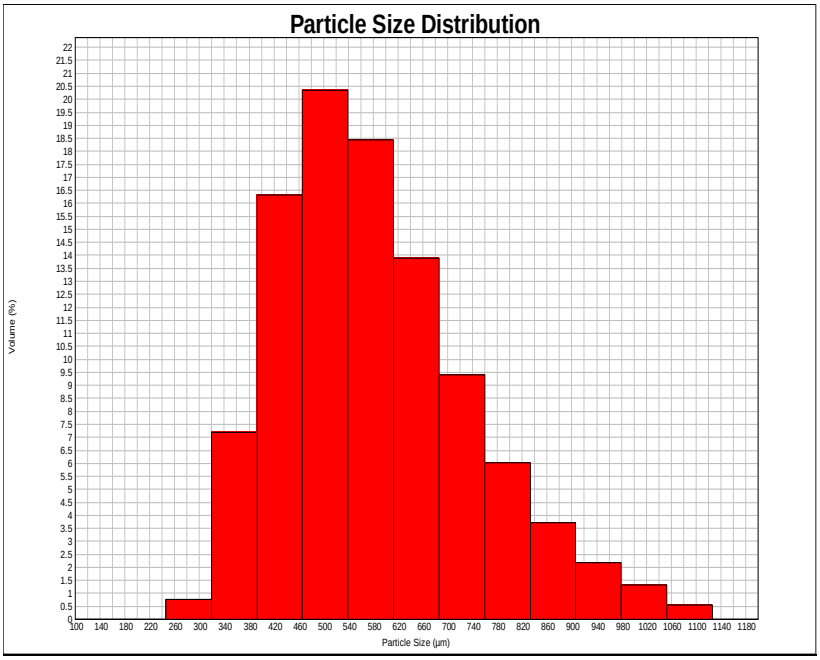


Macro photo



Microscope image

Size (µm)	Volume In %
100.000	0.00
180.000	0.00
260.000	0.01
340.000	0.89
420.000	5.86
500.000	12.89
580.000	17.56
660.000	18.14
740.000	15.92
820.000	12.42
900.000	8.55
980.000	5.81
1060.000	1.96
1140.000	0.00
1220.000	0.00
1300.000	



Particle size distribution (of chosen diameters)

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