PRODUCT INFORMATION
LEWATIT® DW 630

Lewatit® DW 630 is a strongly basic macroporous anion exchange resin (type I) with beads of uniform size (monodisperse) based on polystyrene. The resin has been thouroughly washed with sulfuric acid and water to assure potable water purity grade.

Lewatit® DW 630 will not significantly exchange any major water constituents (Cl^-, HCO_3^-, NO_3^-) because it is loaded with sulfate, which has the highest selectivity among these anions. Therefore the water composition will not be changed except the removal of target imputies.

On account of its fast kinetics, high total capacity, good chemical stability, osmotic properties and porosity **Lewatit® DW 630** is especially applicable for:

- » removal of natural sulfate and carbonate complexes of uranium from potable-water to rest concentrations safely below 10 ppb
- » removal of natural organic matter (NOM) such as humic acids, fulvic acids, building blocks, carboxylic acids from potable water

According to the German "Liste der Aufbereitungsstoffe und Desinfektionsverfahren gemäß § 11 Trinkwasserverordnung", published by the German Environmental Protection Agency (UBA), strongly basic resins are positively listed and therefore specially approved for the removal of uranium from potable water. **Lewatit® DW 630** is in compliance with the European Resolution ResAP (2004)3 (superseding the former Resolution AP (97)1) with regard to chemicals used for its fabrication as well as the Total Organic Carbon (TOC) release according the AFNOR test T 90-601.

When using **Lewatit® DW 630** to treat drinking water and the aqueous solutions listed above, special care should be given to the initical sterilisation of the technical installation, hygenic storage and filling in of the ion exchange resin as well as the start up procedure. Please refer to the recommended start-up conditions in this data sheet.

Any regeneration of the resin has to assure sufficiant hygenic conditions as well as a sufficient high level of regeneration. Note that insufficient regeneration may cause higher leakage levels of trace impurities in the next cycle as well as shortened cycle times.

The special properties of this product can only be fully utilized if the technology and process used correspond to the current state-of-the -art. Further advice in this matter can be obtained from Lanxess, Business Unit Ion Exchange Resins.

General Description

Ionic form as shipped	sulfate
Functional group *	quaternary amine, type I
Matrix*	crosslinked polystyrene
Structure	macroporous
Appearance	beige, opaque

* can also be referred to as styren-divinylbenzene-copolymer with trialkyl-amin-groups

Physical and Chemical Properties

		metric units			
Uniformity Coefficient*		max.		1.1	
Mean bead size*		mm	0.64	(+/-	0.06)
Bulk density	(+/- 5 %)	g/l		640	
Density		approx. g/ml		1.10	
Water retention		wt. %	58	-	64
Total capacity*		min. eq/l		1.1	
Volume change	OH^- --> Cl^- / SO_4^{2-}	max. vol. %		- 16	
Stability	at pH-range		0	-	14
Storability	of the product	max. years		2	
Storability	temperature range	°C	-20	-	40

Recommended Operating Conditions*

		metric units	
Operating capacity			**
Operating pH-range			6 - 8
Bed depth		min. mm	1000
Specific pressure drop	at viscosity 1 mPa*s	approx. kPa*h/m²	0.75
Pressure drop		max. kPa	300
Specific velocity	operation	BV/h	5 - 50
Linear verlocity	backwash (20 °C)	approx. m/h	4 - 5
Bed expansion		min. vol. %	40
Freeboard	backwash	vol. %	80 - 100
Regenerant ***	(for NOM-removal)		NaCl
Counter current regeneration	level	approx. g/l	100 - 200
Counter current regeneration	concentration	wt. %	8 - 12
Co current regeneration	level	approx. g/l	150 - 350
Co current regeneration	concentration	approx. wt. %	8 - 12
Specific velocity	regeneration	approx. BV/h	5
Specific velocity	rinsing	approx. BV/h	5
Rinse water requirement		approx. BV	20
Regenerant***	(for uranium-removal)		H_2SO_4
Counter current regeneration	level	approx. g/l	250 - 350
Counter current regeneration	concentration	wt. %	10
Co current regeneration	level	approx. g/l	350 - 550
Specific velocity	regeneration	approx. BV/h	5
Specific velocity	rinsing	approx. BV/h	5
Rinse water requirement		approx. BV	20

*

Operating conditions have to be adjusted according to the requirements of the technical concept of the plant as well as the water composition which is individual in every case. Therefore this data sheet gives ranges for operating parameters and no fixed values. Balancing of the parameters has to be done according to the specific requirements of NOM / uranium removal respectively. Specific know how and intellectual property on this applications has been elaborated within studies of third parties. These specialists should be contacted for detailed information. In any case it should be considered to carry out orienting tests as well as pilot studies to generate data for the design.

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Operating capacity, leakage levels as well as operating time depends on
1) reglementory or technical restrictions in the maximum load of ion exchangers
2) specific volumetric flow rate
3) water composition
4) pH
5) definition of the breakthrough point
6) complexing agents
7) number of columns
8) suspended solids in the feed
9) bed depth
8) level of regeneration
9) age of resin and others.
Related to 1): The maximum load of ion exchangers with uranium may be restricted by local regulations. The maximum load of NOM is restricted in terms to avoid irreversible fouling but may depend on the type of NOM.
Related to 3): Note that the efficiency of uranium removal may depend on the type of anionic complex the uranium is bound in as well as the concentration of competing ions such as sulphate, NOM etc. Note that NOM is a cocktail of very different natural organic matter and strongly depends on the geographic region and the depth of the well.
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Note that to carry out a regeneration involves risks. These risks are connected to the potential of bacteria contamination and loss in performance as well as the release of toxic substances in the environment if the regeneration is not carried out properly. One way use of the resin can reduce that risk.

Note that the level of regeneration has a strong impact on the performance of the resin in the following cycle. If regeneration and washing is not carried out properly a higher leakage level of the adsorptive in the outlet may occur as well as a shortage in cycle time. Therefore it is strongly recommended to adjust the regeneration procedure to the individual requirements. That means the higher is the load of adsorptive on the resin and the higher is the binding force (depending on the nature of the adsorptive) the higher is the required specific dosage rate of regenerant that has to be applied. In any case it is strongly recommended to carefully check leakage levels as well as bacteria count in the outlet of the column before switching the column on stream after regeneration is carried out.

In some cases regeneration can be improved by combining salt and acid or caustic respectively. E.g. the regeneration of NOM can be improved by adding amounts of caustic to the regenerant brine. Thereby the caustic content may vary in a range of 2 to 4 %. Note that after applying caustic within the regeneration of strongly basic resins the outlet of the resin will be of alkaline pH if the resin tower is not rinsed with a brine solution afterwards.

Recommended Start-up Conditions*

(in drinking water and food applications only)

Specific velocity	BV/h	5
Rinse water requirement	approx. BV	20

* should also be used after stand by times longer than 3 days

Additional Information & Regulations

Safety precautions

Strong oxidants, e.g. nitric acid, can cause violent reactions if they come into contact with ion exchange resins.

Do not load the resin with uranium above the level that is permitted by the environmental protection agency. Provide continious ventialtion of air around the ion exchange column and prevent accumulation of air inside the filters because it may contains radon (Rd). Always keep uranium loaded resin safely enclosed in vessels. This will prevent alpha-radiation to escape. Do not touch uranium loaded resin with bare hands nor do allow any other direct contact with the skin.

Toxicity

The safety data sheet must be observed. It contains additional data on product description, transport, storage, handling, safety and ecology.

Disposal

In the European Community Ion exchange resins have to be disposed, according to the European waste nomenclature which can be accessed on the internet-site of the European Union.

The storage, transportation and disposal of uranium loaded resins is subjected to special regulations. Please refer to the local instructions, given by the regional environmental protection agencies.

Storage

It is recommended to store ion exchange resins at temperatures above the freezing point of water under roof in dry conditions without exposure to direct sunlight. If resin should become frozen, it should not be mechanically handled and left to thaw out gradually at ambient temperature. It must be completely thawed before handling or use. No attempt should be made to accelerate the thawing process.

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For more information or a quote, please use the

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