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Technical guidelines on the storage of Lewatit® ion exchange resins

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STORAGE OF ION EXCHANGE RESINS

These technical guidelines set forth the recommended storage conditions and storage times for LANXESS's ion exchange resins in order to achieve maximum shelf life. However, we note that the shelf life of new, unused ion exchange resins depends on the specific (environmental) circumstances, including the packaging and storage conditions, and varies based on the type of resin. Besides these general technical guidelines, the specific storage conditions for individual resins set forth in the relevant product data sheet should always be complied with. In case of discrepancies between these general technical guidelines and the storage conditions for individual resins set forth in the relevant product data sheet, the latter prevails.

The optimum storage conditions

It is recommended to store ion exchange resins at temperatures above the freezing point of water, under a roof, and 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.

- Storage temperature range: –20–40 °C
- Optimum long-term storage temperature: +5–35 °C

If the above-mentioned conditions are applied, the storage life may be extended.

The influence of packaging type

Various types of packaging are available:

	L	Description
a.	25	poly bags
b.	200	cardboard drums with PP inliner
c.	200	cardboard drums with aluminium-coated inliner
d.	50	hobbocks
e.	50	hobbocks with aluminium-coated inliner
f.	1000	big bags (supersacks)
g.	1000	big bags (supersacks) with inliner
h.	700/ 1000	big bags (supersacks) with aluminium-coated inliner

Drums, hobbocks, or big bags (supersacks) with special inliners are better suited for a long-term storage since they protect the resins better against environmental impacts such as humidity, CO_2, and impurities than poly bags. Depending on the type of poly bags, the resins could be exposed to the surrounding atmosphere.

Due to environmental regulations, LPT poly bags are designed to decompose, starting after approximately 24 months. The decomposition is accelerated if the bags are exposed to UV light. For this reason, if the material is stored for a prolonged period, the bags must be checked for integrity and stability.

If the storage temperature exceeds the recommended 35 °C, some resin types exhibit a much faster rate of chemical degradation. Certain resins used in high-end applications such as the production of ultra-pure water or in the power industry may be no longer suitable for those applications if stored too long or under the wrong conditions in inappropriate packaging.

Resins used in the food and beverage industry or for drinking water applications should also be stored under optimum conditions.

General considerations depending on the type of resin

Anion exchange resins have a different shelf life, due to the fact that the strong basic amine group is less stable than the sulfonic acid group of a strong acidic cation exchanger. Strong type-II basic anion exchangers and all acrylic anions exhibit an even faster rate of degradation, even if stored under optimum conditions, due the chemical structure of the functional group of the styrenic type-II resin (di-methyl-ethanol-amine) and the structure of acrylic anion resins in general. The degradation of the strong basic group is accelerated for anion resins in the OH-form, since the alkaline conditions favor the so-called Hofmann degradation i.e., the partial or total degradation of the amine group.

In addition, strong basic anions, where more than 95% of the functional group are in the OH-form, tend to attract CO_2 from the ambient air, which reduces the number of active functional groups. Therefore, tightly sealed types of packaging, such as drums or hobbocks, are better suited for storing such resins for a prolonged period. (SBA-OH +CO_2 → SBA-HCO_3)

There are some general observations regarding the shelf life of the various resin types:

SAC > TP > SBA	SBA > SBA OH
SBA Type I > SBA Type II	Styrenic > Acrylic

General guidelines for recommended max. storage time

The shelf-life recommendation has been prepared based on the assumption that the resins are new, unused, and stored in their originally sealed packaging for the whole period under the recommended storage conditions. The individually recommended start-up conditioning must also be applied. Those guidelines serve only as an indication and while they have been prepared in good faith, they are provided without a warranty or guarantee. In particular, if the shelf life exceeds the recommended time period or if the optimum storage conditions could not be provided during the entire storage time, the resin should be checked before use.
In any case, every resin stored for a prolonged period should be rinsed thoroughly or undergo the recommended start-up procedure before use.

Recommend shelf life in months

Application		General water treatment				
		Packaging				
Type	Ionic form	Poly bag standard	Poly bag sealed	200-ltr. drum with inliner	1000-ltr. big bag (supersack) with inliner	50-ltr. hobbock
SAC	Na^+	36	n.a.	36	36	n.a.
SAC	H^+	36	n.a.	36	36	n.a.
SBA Type I (styrenic)	Cl^-	36	36	36	36	n.a.
SBA Type I (styrenic)	OH^-	6	12	24	24	24
SBA Type II (styrenic)	Cl^-	36	n.a.	36	36	n.a.
MBA (styrenic)	Free base / Cl^-	36	n.a.	36	36	n.a.
WBA (styrenic)	Free base	60	n.a.	60	60	n.a.
SBA Type I (acrylic)	Cl^-	24	n.a.	24	24	n.a.
MBA (acrylic)	Free base / Cl^-	24	n.a.	24	24	n.a.
WBA (acrylic)	Free base	24	n.a.	24	24	n.a.
MB (styrenic)	H^+ / OH^-	12	24	24	24	n.a.
WAC	H^+	60	n.a.	60	60	n.a.

Application	Condensate polishing / nuclear grades (KR)						
		Packaging					
Type	Ionic form	Poly bag standard	Poly bag sealed	200-ltr. drum with inliner	1000-ltr. big bag (supersack) with inliner	50-ltr. hobbock
SAC	H^+	24	n.a.	36	36	n.a.
SAC NG	H^+	12	n.a.	24	24	n.a.
SBA Type I (styrenic)	Cl-	36	36	36	36	n.a.
SBA Type I (styrenic)	OH-	6	n.a.	24	24	24
SBA Type I (styrenic) KR	OH-	6	n.a.	24	24	24
MB (styrenic) KR	H+ / OH-	6	12	24	24	24

Application	Ultra-pure water (UPW)					
		Packaging				
Type	Ionic form	Poly bag standard	Poly bag sealed	200-ltr. drum with inliner	1000-ltr. big bag (supersack) with inliner	50-ltr. hobbock
SAC	Na^+	24	n.a.	24	n.a.	n.a.
SAC	H^+	n.a.	n.a.	24	n.a.	24
SBA Type I (styrenic)	Cl^-	24	n.a.	24	24	n.a.
SBA Type I (styrenic)	OH^-	n.a.	n.a.	18	n.a.	18
MBA Type I (styrenic)	Free base / Cl^-	24	n.a.	24	24	n.a.
MB (styrenic) (UPW)	H^+ / OH^-	n.a.	6	18	18	18

n.a.: not applicable (packaging not available for that product category)

Application	Chlor-alkali and mining				
		Packaging			
Type	Ionic form	Poly bag standard	200-ltr. drum with inliner	1000-ltr. big bag (supersack) with inliner	50-ltr. hobbock
M+/MDS TP 220	H_2SO_4	24	24	24	24
(M+) TP 207, M+/ MDS TP 208 / 260, TP 209 X(X)L	Na	24	60	60	60
VP OC 1026 / TP 272	H^+	24	24	24	24
M+ TP 214	n.a.	24	60	60	60
SBA Type I (styrenic)	Cl^-	24	36	36	36
SBA Type I (acrylic)	Cl^-	24	24	24	24
WBA Type I (styrenic)	Free base	24	36	36	36
WBA Type I (acrylic)	Free base	24	24	24	24

Application	Catalysis	
Type	**Ionic form**	**All packaging types**
BPA catalysts K 1131 S / 1137 / 1161 / 1267	H^+	6
All other wet catalysts K 2XXX	H^+ / (Pd) / neutral	60
All dried catalysts	H^+	24
All SBA	OH^- / Pd and Cl^-	24
All WBA	Free base / (Pd)	60
WBA dried	Free base	24
Adsorber and carrier GF 808		24

Application	Food and beverage	
Type	**Ionic form**	**All packaging types**
SAC	H^+; Na^+	24
SBA	Cl^-; SO_4^{2-}	24
WBA/MBA	FB; FB/Cl^-	24
WAC	H^+; Na^+	24
MDS SAC	Ca^{2+}; K^+; Na^+	6
Adsorber		24

Application	Pharmaceuticals and biotechnology	
Type	**Ionic form**	**All packaging types**
SAC	H^+; Na^+	24
SBA	Cl^-; SO_4^{2-}	24
WBA/MBA	FB; FB/Cl^-	24
WAC	H^+; Na^+	24
MDS SAC	Ca^{2+}; K^+; Na^+	6
Adsorber		24

Acronyms and abbreviations

Abbreviation	Resin type
SAC	**S**trong **A**cidic **C**ation
SBA	**S**trong **B**asic **A**nion
WAC	**W**eak **A**cidic **C**ation
WBA	**W**eak **B**asic **A**nion
MBA	**M**ixed **B**asic **A**nion
TP	Chelating resin / special type
MB	**M**ixed **B**ed
NG (KR)	**N**uclear **G**rade

Term	Resin type
Styrenic	Resin based on copolymers consisting of the styrenic monomer cross-linked with divinylbenzene (DVB)
Acrylic	Resins based on copolymers consisting of an acrylic monomer and various cross-linking agents

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