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LANXESS Energizing Chemistry

Bayoxide® E 33 – Drinking Water Quality Synthetic Iron Oxide Adsorber

Bayoxide® E 33 is an NSF Standard 61 approved, granular iron oxide media specifically designed for use in drinking water applications in which it serves as an effective selective filter adsorbent for removal of various species, with a focus on arsenic removal. It is a dry, crystalline nanoparticular α-Ferric oxide hydroxide with a high surface area and adsorption capacity. At the same time, it also offers high abrasion resistance to the stream of water. Bayoxide® E 33 is utilized in a simple passive pump-and-treat system applying the technology of fixed-bed adsorption. In arsenic removal installations Bayoxide® E 33 provides a long-lasting, simple, and reliable solution.

Applications

- Arsenic removal from drinking water in which arsenate As(V) as well as arsenite As(III) are safely adsorbed below 5 µg/l (municipal water purification, ground water remediation, bottled water, and beverages purification)
- Phosphate removal from well water and surface water, such as ponds, lakes, pools
- Phosphate and silicate removal from aquariums in case NSF-certified media is required
- Antimony, vanadium, and selenium removal from water
- Heavy metal removal from drinking water, e.g., copper, lead, nickel, and zinc

Benefits

- Arsenic removal safely below < 5 µg/l
- High adsorption capacity by improved surface area (150 m²/g) and advanced adsorption kinetics
- Very high abrasion stability compared to standard media
- Specified metal content
- Simple once-through treatment system with low main-tenance requirements
- No additional chemicals requirements for regeneration
- Delivered as dry material
- Arsenic exhausted material disposable via non-hazardous landfill in some countries
- Wide operational pH range of pH 5.5 to 8.5

Bayoxide®

Bayoxide® E 33 has been developed specifically for the removal of arsenic from drinking water and can also be used as adsorbent for various applications within standard water purification installations. Relative to conventional adsorber media, Bayoxide® E 33 has a particularly high capacity for arsenic removal, which results in a longer lifetime compared to conventional media. Since Bayoxide® E 33 has a significant affinity for oxoanions, it is able to selectively bind those from solutions even containing other anions such as chloride, sulfate, or nitrate. It offers a high resistance against oxidants and affords very low backwash water volumes. The operating capacity and therefore life expectancy of Bayoxide® E 33 for all applications depends on the quality and composition of water to be treated and factors such as pH value, temperature, and targeted effluent limit. Bayoxide® E 33 selectively adsorbs oxoanions. Therefore, a detailed water quality analysis including a wide range of parameters should serve as the basis for the selection of the most appropriate adsorber system and amount. The following information provides a basis for a standard Bayoxide® setup system. Before each implementation, prior small scale and pilot testing is recommended. For this rapid small scale column tests (RSSCT) are preferable.

Specifications

- Certified under NSF/ANSI Std 61 "Drinking Water Systems Components – Health Effects"
- Specified in the List of Preparation Substances and Disinfection Processes in compliance with § 11 German Drinking Water Ordinance 2001, DIN EN 15029 (valid throughout Europe)

Proper and safe handling of spent media is tested in accordance with US EPA's Toxicity Characteristics Leaching Procedure TCLP RCRA (40 CFR 261) and, therefore, can be treated as non-hazardous waste. This is especially relevant for the removal of hazardous materials, such as arsenic, from water.

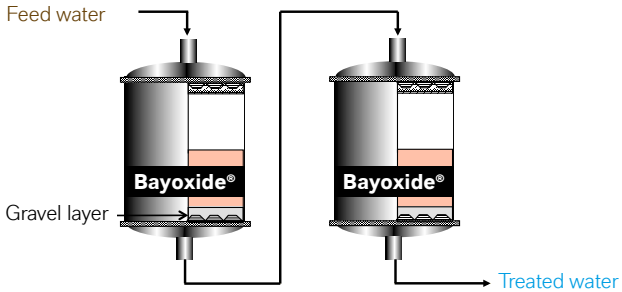

Figure 1: Standard technical setup of Bayoxide® E 33

Standard recommendations

- Gravel underbedding
- Simplest configuration contains two adsorber filters with parallel flow, treatment of higher contaminant feed concentrations requires two or three adsorber filters in series flow configuration
- Contact time (EBCT[1]) between 3 to 5 minutes, for high contaminant feed concentrations (> 2 mg/l) EBCT is increased to ≥ 5 minutes
- Periodic backwash for dirt and fines removal and for media fluffing for maximum capacity utilization

Technical conditions

- Filter arrangement: lead-lag, merry-go-round
- Operation mode: downflow
- Flow rate: 10–20 BV/h, 12–20 m/h (min. 2.5 m/h)
- Freeboard: 100%
- EBCT[1]: 3–5 min.
- Backwash velocity: 22–27 m/h, ≥ 30% bed expansion

[1] Empty bed contact time.

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