



Eagle Arsenic Oxide PRODUCT DATA SHEET

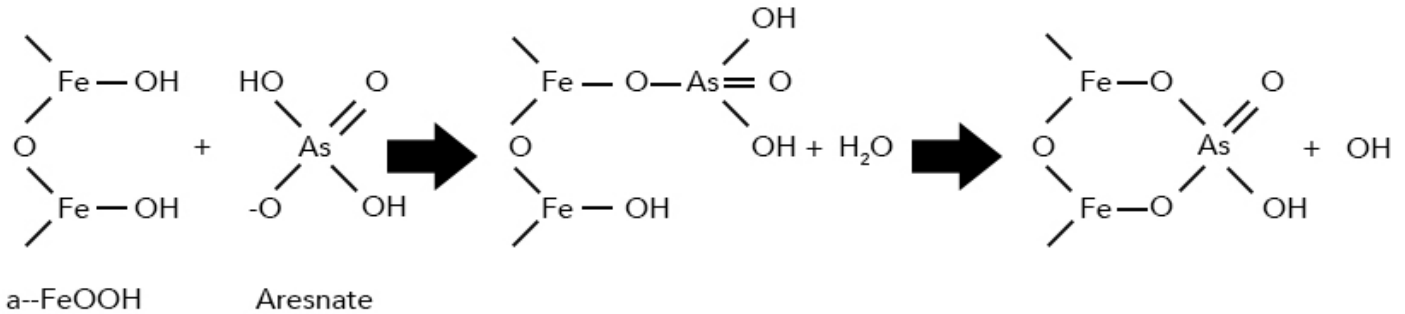
Iron Hydroxide reduces up to 99% of total Arsenic including Arsenic (III) and Arsenic (V). Iron Hydroxide is specifically designed for commercial and residential POE to meet the new EPA standard for Arsenic of 10ppb. The ferric oxide based media inside the media tank has been used in large-scale drinking water applications since 1999. This media is discardable when spent and requires no chemicals or regeneration.

| Technical Specification Data | | |
|--------------------------------|--|---------------------------------|
| Description | Value | |
| Fe ₂ O ₃ | >70% | by DIN 55913 (1972) |
| Bulk Density | 0.75 kg/litre(min) 0.95 kg/litre(max) | by DIN ISO 787 part 11 (1995) |
| Specific Surface Area | 250 m ² /g (max) 200 m ² /g (min) | by DIN 66 131 (1993) |
| Water Soluble Content | 2.0% (max) | by DIN EN ISO 787 Part 3 (1995) |
| Water Content (ex works) | 20% (max) | by Test Method SSP 27472 |
| Sieve Analysis <0.5 mm | 15% (max) | by Test Method K006-00 |
| Sieve Analysis >2.0 mm | 5% (max) | by Test Method K006-00 |
| Informative Technical Data | | |
| Description | Value | |
| Actual Density | 3.6 to 4.1 kg/litre | by DIN ISO 787 Part 10 (1995) |
| Informative Chemical Data | | |
| Description | Value | |
| Aluminum (Al) | <350 mg/kg | by AAS |
| Barium (Ba) | <10 mg/kg | by AAS |
| Cobalt (Co) | <150 mg/kg | by AAS |
| Chromium (Cr) | <250 mg/kg | by AAS |
| Chromium (Cr) | <100 mg/kg | by AAS |
| Manganese (Mn) | <3,000 mg/kg | by AAS |
| Nickel (Ni) | <300 mg/kg | by AAS |
| Lead (Pb) | <3 mg/kg | by AAS |
| Zinc (Zn) | 100 mg/kg | by AAS |

Arsenic Adsorption Chemistry

The Arsenic Removal Process is a fixed bed adsorption system using a granular ferric oxide media, or adsorbent, called Iron Hydroxide for the adsorption of dissolved arsenic onto the ferric oxide. It employs a simple "Pump & Treat" process that allows pressurized well water to flow through a fixed bed pressure vessel containing the media where the arsenic removal occurs.

In the process, both As(III) and As(V) oxyanions are removed from water via a combination of adsorption, occlusion (adhesion) or solid-solution formation by reaction with ferric oxide ions. Above pH 7, the primary mechanism is adsorption of the oxyanions to the surface hydroxyl groups of ferric oxide hydroxide as indicated below:



Adsorption is a continuous process conducted at a specific flow rate or velocity, normally about 7 gpm/ft², downward through the fixed bed adsorber for operating periods of about 1 month on stream duration. In addition to velocity, the other key process parameter is empty bed contact time (EBCT). This is the variable which dictates the amount of water contact time within the bed required to effect complete arsenic adsorption; the normal design value is 4 minutes. The media adsorbs As(V) with rapid kinetics (adsorption). Unlike most other adsorbents, it will also adsorb As(III). Arsenite is nonionic at normal water pH's, and therefore, it will not be adsorbed as an anion. Adsorption kinetics for As(III) are slower than that of As(V), probably because it is first oxidized by the media before it is adsorbed. Prechlorination for oxidation purposes is recommended for water sources with As(III) which also have elevated iron levels (over 150 µg/L Fe). Oxidation ensures efficient arsenic removal as As(V) along with co-removal of iron. Another benefit is that some arsenic is adsorbed onto the iron oxide precipitate and removed, thus extending the media's arsenic capacity.

| Physical Properties | AD33 Media |
|----------------------------|----------------------|
| Matrix | Iron Oxide Composite |
| Physical Form | Dry granular media |
| Color | Amber |
| Particle Size Distribution | 10x35 mesh |
| Moisture Content | < 15% by wt. |
| Packaged | Dry |

| Arsenic Removal Performance (POE) | |
|--|---------------------|
| Arsenic concentration range ^{1,2} | 10 – 100+ ppb |
| Arsenic species reduced | As (III) and As (V) |
| Removal efficiency | Up to 99% |
| Estimated media life | 2 to 3+ years |
| Expected life bed volumes ³ | 15,000 to 125,000 |
| Spent media disposal ⁴ | Non-hazardous waste |
| Empty bed contact time | 3 minutes typical |

Notes:

1. Typical arsenic contamination in U.S. < 50 ppb.
2. Capable of removing higher As concentrations. Consult Crystal Quest for applications above 100 ppb.
3. Actual bed volumes based on water quality.
4. Reference US EPA TCLP protocol

| Parameter | Value ¹ |
|-----------------------|--------------------|
| pH range ² | 5.5 - 8.5 |
| Arsenic ³ | < 100 ug/L |
| Iron | < 0.3 mg/L |
| Manganese | < 0.05 mg/L |
| Phosphate | < 0.5 mg/L |
| Silica | < 30 mg/L |
| Sulfate | < 100 mg/L |
| Sulfides | < detect mg/L |
| TSS | < 5 mg/L |
| Fluoride | < 1 mg/L |
| Hardness | < 300 mg/L |
| Turbidity | 5 NTU |

WATER QUALITY CRITERIA

Notes:

1. Recommendations for best performance.
2. Water > 8.5 pH may require pH adjustment for best results. Contact Crystal Quest for technical support.
3. For all applications, complete Adedge POE profile sheet to pre-qualify site for proper use; consult Crystal Quest for details
4. Pretreat for tannins if present prior to adsorption

| System Design Parameters | 5 GPM dual tank | 5 GPM single tank | 10 GPM single tank |
|--|--------------------------|-------------------|--------------------|
| Typical Tank size (inches) | 10 x 42 | 12 x 52 | 14 x 65 |
| Media Volume (cubic feet) | (2) 1-ft ³ ea | 2 ft ³ | 4 ft ³ |
| Operation mode | 2 in series | Single tank | Single tank |
| Media Type | AD33S | AD33S | AD33S |
| Underbedding | gravel | gravel | gravel |
| Typical Freeboard (%) | 40 | 40 | 40 |
| Backwash flow rate (gpm/ft ²) | 4 | 5 | 10 |
| Backwash cycles (per month) | 2x | 2x | 2x |
| Est. gallons per day ³ | 300 | 300 | 500 |
| Est. gallons to breakthrough ² | 374,000 | 374,000 | 561,000 |
| Estimated time to media changeout ¹ | 2-3+ years | 2-3+ years | 2-3+ years |
| Max flow rate (gpm) | 5 | 6 | 10 |

RESIDENTIAL SIZING PARAMETERS

Notes:

1. Media life based on gallon usage and water profile (Above is example only; example assumes 40 ppb
2. Arsenic, 25,000 bed volumes); will vary by individual site based on water quality and usage
3. Crystal Quest recommends effluent testing and monitoring program to determine media breakthrough.
4. Average gallons per day will be site and usage specific.