CRYSTAL QUEST®
Water Filters

EAGLE ARSENIC OXIDE

(IRON HYDROXIDE) BASED GRANULES)

Eagle Arsenic Oxide (Iron Hydroxide) Filter Media
Eagle Arsenic Oxide is a highly effective filtration media designed to remove some of the most harmful contaminants found in drinking water, including arsenic, chromium, copper, and others. Made from iron hydroxide ($Fe(OH)_3$), this media has a strong chemical affinity for binding arsenate, phosphate, and sulfide ions in water.

Using a patented process, Crystal Quest transforms ferric hydroxide into durable granules with various bead sizes through advanced crushing and sieving techniques. This granular form allows for a wide range of water treatment applications and improves overall performance.

The media has an amorphous (non-crystalline) structure and contains approximately 40% ferric ions by weight. Its highly porous design provides a large surface area for adsorption, allowing for high contaminant removal capacity while remaining cost-effective.

Removal Of

- ARSENIC
- CHROMIUM
- COPPER
- HYDROGEN SULFIDE
- PHOSPHATES
- SELENIUM (IV & VI)

APPLICATIONS:

- DRINKING WATER
- SURFACE WATER
- SEAWATER (VERIFY FEASIBILITY)
- WASTEWATER
- INDUSTRIAL WATER
- DRINKING WATER TREATMENT
- RO PRE/POST-TREATMENT
- RO CONCENTRATE TREATMENT
- AQUARIUM WATER

OPERATION PRINCIPLES

ARSENIC AND PHOSPHATE REMOVAL

In the first stage, arsenate and phosphate ions in the water are adsorbed onto the surface of the Eagle Arsenic Oxide media. In the second stage, these ions undergo a chemical reaction on the media's surface, converting into stable compounds—ferric arsenate or ferric phosphate—which are securely bound to the media.

$$Fe(OH)_3 + H_3AsO_4 \rightarrow FeAsO_4 + 3H_2O$$

$$Fe(OH)_3 + H_3PO_4 \rightarrow FePO_4 + 3H_2O$$

HYDROGEN SULFIDE REMOVAL

Hydrogen sulfide in water breaks down into sulfide ions, which are then removed by the Eagle Arsenic Oxide media. These ions react with the iron hydroxide to form ferric sulfide, a stable and insoluble compound that is effectively filtered out.

$$2\,Fe(OH)_3 + 3H_2S \rightarrow Fe_2S_3 + 6H_2O$$

WATER TREATMENT

EAGLE ARSENIC OXIDE media is applicable in a wide range of water treatment processes, from large-scale municipal systems to small-scale residential treatment units. Regardless of the system size, there are operational design parameters that must be considered to ensure effective, trouble free performance of the ***EAGLE ARSENIC OXIDE*** media.

Groundwater or surface water is simply pumped in up flow mode through a single or multiple up-flow pressure vessels containing the ***EAGLE ARSENIC OXIDE*** media, but it can be also successfully used in down flow filtration. In down flow filtration it is recommended to use oxygen dosing for better oxidation. It is also being used in systems to remove Chromium, Copper and Selenium.

The multiple pressure vessel design is either assembled in "**Parallel Flow**" or "**Series Flow**". Flow to each vessel is measured and totalized to record the volume of water treated. Pressure differential through each vessel is also monitored. Periodic backwashing is typically performed at start-up and after each pressure drop of 0.5-1.0 Bar thereafter depending on usage and water quality.

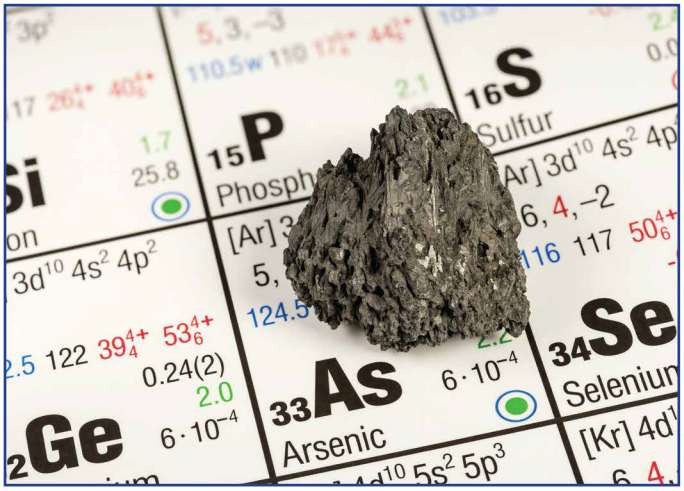
Arsenic: in drinking-water and food has a major impact on long term health effects and can cause cancer and skin lesions. It has also been associated with cardiovascular disease and diabetes.

Chromium: (Hexavalent Chromium - "it's a slow poison") A recently-released report by the Environmental Working Group has found that the water supplies of almost all major cities and small communities are contaminated with hexavalent chromium, an industrial chemical toxin that does not get filtered out by ordinary consumer filter except from Granulated Ferric hydroxide EAGLE ARSENIC OXIDE. According to the National Toxicology Program, hexavalent chromium is linked with gastrointestinal tumors and other forms of cancer. International governing bodies have stated that it is toxic when inhaled.

Copper: Long term exposure to copper can cause irritation of the nose, mouth and eyes and it causes headaches, stomach-aches, dizziness, vomiting and diarrhea. There are scientific articles that indicate a link between long term exposure to high concentrations of copper and a decline in intelligence with young adolescents.

Hydrogen Sulfide: Brief exposure to high concentration of hydrogen sulfide (>500 ppm) can cause loss of consciousness and possibly death. In most cases, the person appears to regain consciousness without any other effects. However, in any individuals, there may be permanent or long term effects such as headaches, poor attention span, poor memory and poor motor function. Exposure to low concentration may cause irritation to the eyes, nose or threat and fatigue. It may also cause difficulty in breathing for some asthmatics.

Phosphates: Adding sodium phosphate to drinking water is a common method used by cities to prevent pipe scaling and corrosion. However, this practice can pose serious health risks. Some people may develop kidney problems within just a few days of exposure, and those with existing conditions may even require dialysis. Phosphate in water can be especially harmful to vulnerable individuals.



*The **Crystal Quest** UP FLOW Adsorption system is an advanced design that uses best innovation and Crystal Quest extensive Adsorption experience to deliver a very compact design. When compared to all conventional filter systems, this up-flow system provides the following advantages.*

COMPACT DESIGN

The construction of **Crystal Quest** UP-FLOW Adsorbers systems permit a very smooth flow rates up to 2000 litres per minute in a single pressure vessels (1200 m3 /hr).



Very few pressure vessels can accommodate your flow requirements. In fact, the Crystal Quest UP-FLOW Adsorbers require 50% less number of tanks. Using less pressure vessels enables a reduction in the size of building required for conventional down flow systems. The result is lower capital investment costs

IMPORTANT!
Concentration of Arsenic & other contaminants can be expressed as Micrograms per liter, abbreviated as µg/L, milligram per liter (mg/L), parts per billion (ppb) or parts per million (ppm).

- *1 microgram per liter (µg/L) = 1 parts per billion (ppb)*
- *1 milligram per liter (mg/L) = 1 parts per million (ppm)*
- *10 microgram per liter (µg/L or ppb) is same as 0.01 milligram per liter (mg/L or ppm)*

ECO FRIENDLY

EASE OF USE

Crystal Quest UP-FLOW Adsorber systems are designed for simplicity and efficiency—no special tools, complex setup, or skilled labor needed.

These systems require:
- NO valves
- NO electricity
- NO backwash
- NO chemicals

To replace the media, just open the tank from the top, let the used media flow out, and refill with new media—it's quick and hassle-free.

UP-FLOW systems also help reduce operating costs by minimizing labor, maintenance, and water waste. The pressure vessels are up to 50% smaller than traditional down-flow systems.

DISPOSAL OF SPENT MEDIA

Spent Eagle Arsenic Oxide media is a non-toxic solid waste that does not leach arsenic under normal environmental conditions, making disposal simple and safe. Unlike ion-exchange or reverse osmosis systems—which generate problematic waste streams—this media poses no disposal concerns.

After use, the exhausted media can even be repurposed in brick manufacturing, adding environmental value.

Eagle Arsenic Oxide is considered one of the safest and most effective technologies for removing arsenic, copper, chromium, phosphates, and hydrogen sulfide from water and wastewater.

Because it operates in a UP-FLOW design, the media is used to 100% of its capacity, maximizing efficiency while keeping costs low.

This technology is suitable for point-of-entry residential systems in rural areas (e.g., hand tube-wells) as well as large-scale municipal applications. UP-FLOW systems using Eagle Arsenic Oxide are already in operation in Argentina, Vietnam, Portugal, India, Bangladesh, Chile, and other countries around the world.

LOADING INSTRUCTION

1. *Initial Water Filling: Fill the pressure vessel with water up to one-third of its height to prevent damage to the bottom distributor and the media. Ensure the water level remains at least 15 cm above the media at all times, as the media should never be allowed to dry.*

2. *Quartz Sand Underbed: Use high-quality quartz sand as the underbed. The sand should cover the bottom distributor completely and extend 3 cm above it.*

3. *Media Loading: Add EAGLE ARSENIC OXIDE media from the top of the vessel, leaving a 30 cm freeboard to allow the media to expand and fluidize easily during operation.*

4. *Inert Resin Layer: Place a layer of inert resin on top of the media, with a maximum height of 20 cm. This layer should cover the top distributor to prevent clogging.*

5. *Tank Preparation: Close the top of the tank with the distributor and fill the vessel with water from the bottom to the top. Allow the media to soak for at least **4 hours** before performing any backwash.*

6. *Backwashing: Begin backwashing at a very slow rate for 15 minutes. Ensure the outlet valve is closed and the drain valve is open during this process.*

PHYSICAL PROPERTIES

Bulk Weight	630 - 640 kg/m³
Porosity	min. 75%
Humidity	08%
$Fe(OH)_3$	min. 75%
Specific Surface	290 m² / gram
Mesh Size	0.5-2.0mm x 2.0-4.0mm
Color	Darl Brown

PHYSICAL PROPERTIES

Bed Depth	420 - 1500mm
Freeboard up flow	10-20%
Freeboard down flow	30-40%
Service Flow Rate	10 - 20 m/h
Back Wash Flow Rate	25 - 30 m/h
Total adsorption for P	16 g/kg
Total adsorption for As^{5+}	13 g/kg
Total adsorption for Zn	30 - 40 g/kg
Oxidation capacity for H_2S	Up to 22% of its dry weight
pH	5 - 9.5

MATERIAL PROPERTIES

Chemical formula and composition:
Amorphous $Fe(OH)_3$

Mineralogical composition:
Ferric ions up to (40%) by weight

Disclaimer: The information in this publication is based on reliable data and is provided in good faith, without warranty or performance guarantee, as product use conditions are beyond our control. Crystal Quest does not offer express or implied warranties, including merchantability or fitness for a particular purpose. Users should assess product suitability and performance with their equipment. Specifications may change without notice. Please note that the filter media described in this brochure do not eliminate bacteria. Do not use these products with microbiologically unsafe or unknown-quality water without appropriate disinfection. Crystal Quest is not liable for consequential or incidental damages, including but not limited to lost profits resulting from product use.

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