PRODUCT DESCRIPTION

Coconut Shell Granular Activated Carbon (GAC)

For Borehole, Groundwater, Municipal & Wastewater Treatment

Product Overview

Coconut Shell Granular Activated Carbon (GAC) is a high-performance adsorption media manufactured by controlled steam activation of coconut shell char. Compared with coal- or wood-based carbons, coconut shell GAC offers a naturally microporous structure, higher hardness, lower ash content, and a greater density of adsorption sites per gram — making it the preferred carbon type for potable water, borehole/groundwater, municipal, and wastewater treatment applications where both contaminant removal efficiency and media longevity matter.

Typical Specifications

Parameter	Typical Value
Raw material	100% coconut shell
Mesh size	8×30, 12×40, 20×50 (application dependent)
Iodine number	900–1100 mg/g
Ash content	< 3% (vs. 6–15% for coal-based carbon)
Hardness number	≥ 98%
Moisture content	< 5% (as packed)
Bulk density	0.45–0.55 g/mL
pH (aqueous extract)	7–9
Surface area (BET)	1000–1200 m²/g

Core Applications

1. Borehole & Groundwater Treatment

Groundwater frequently carries dissolved gases, natural organics, and geology-derived contaminants (H_2S, tannins, agricultural VOCs/pesticide residues, and taste/odour compounds) that are not effectively removed by simple filtration alone. GAC provides a robust polishing stage that adsorbs these dissolved organics and gases before water is used for domestic, agricultural, or process purposes.

2. Municipal Drinking Water Treatment

GAC is widely used as a finishing/polishing stage after coagulation, flocculation, and disinfection to remove disinfection by-products (THMs, HAAs), residual taste and odour compounds (geosmin, MIB), and trace organic contaminants, while also reducing chlorine taste ahead of distribution or point-of-use supply.

3. Wastewater & Effluent Treatment

In tertiary treatment, GAC removes residual dissolved organics, colour bodies, surfactants, and trace industrial contaminants that survive biological treatment, helping effluent meet discharge or reuse standards, and is also used in odour-control (H_2S scrubbing) duties on wastewater collection and treatment infrastructure.

Why VOCs, Hydrogen Sulfide & Chlorine Must Be Removed Before BIRM and Iron Removal Filters (Including RO)

Iron removal media such as BIRM® (and similar manganese-dioxide-catalysed filtration media), as well as Reverse Osmosis (RO) membranes, are chemically and mechanically sensitive systems. Pre-treatment with GAC is important for the following reasons:

- **Hydrogen Sulfide (H_2S):** BIRM relies on an active manganese dioxide coating to catalyse the oxidation of dissolved iron and manganese. H_2S competes for oxidation capacity, coats and fouls the catalytic media surface, and depletes its effectiveness rapidly — leading to iron/manganese breakthrough and persistent “rotten egg” odour in the treated water. RO membranes are similarly attacked: H_2S is corrosive to membrane elements and downstream metal fittings, and can support sulfur-reducing bacterial growth that fouls the membrane surface.
- **Chlorine (Residual Disinfectant):** BIRM's catalytic manganese dioxide coating is oxidised and destroyed by free chlorine, permanently deactivating the media over time. Thin-film composite RO membranes are even more chlorine-sensitive — continuous exposure oxidises the polyamide membrane layer, causing irreversible loss of rejection performance and premature membrane failure. GAC catalytically reduces free chlorine to chloride via a surface reaction, protecting both media types.
- **Volatile Organic Compounds (VOCs):** VOCs and other dissolved organics can foul RO membrane surfaces, promote biofilm formation, and in some cases chemically attack membrane polymers, reducing flux and rejection rates over the system's service life. Removing VOCs upstream extends membrane life and maintains consistent permeate quality.
- **Overall System Protection:** By stripping oxidants, corrosive gases, and organic foulants upstream, GAC pre-treatment reduces fouling frequency, extends the working life of iron removal media and RO membranes, lowers cleaning/replacement costs, and maintains consistent downstream water quality and system output.

Note: chlorine, the reactive disinfectant, is what GAC removes and what damages BIRM/RO membranes — this is distinct from chloride, the dissolved salt ion, which passes through GAC largely unaffected and is instead reduced by RO or ion exchange.

Effect of GAC Filtration on Raw Water Quality

Passing raw water through a properly sized and maintained GAC media filter typically produces the following changes:

- **Removal/reduction of dissolved organics —** natural organic matter, tannins, humic/fulvic acids, pesticide and herbicide residues, and industrial trace organics are adsorbed onto the carbon's internal pore structure.
- **De-chlorination —** free and combined chlorine residuals are catalytically reduced, eliminating chlorine taste and odour and protecting downstream media/membranes.
- **Odour and taste correction —** H_2S (“rotten egg” odour), geosmin, MIB, and other taste/odour-causing compounds are adsorbed, producing clearer-tasting, odour-free water.

- **Colour reduction —** organically bound colour (tannins, humic substances) is reduced, improving water clarity.
- **VOC reduction —** volatile organic compounds are adsorbed from solution, lowering the organic load carried into downstream processes.
- **Improved downstream treatment performance —** by removing oxidants, foulants, and competing contaminants, GAC pre-treatment protects and extends the service life of subsequent processes (iron/manganese removal media, softeners, RO membranes, UV disinfection).
- **Does not significantly affect** hardness, dissolved salts (including chloride, sulfate, nitrate), or turbidity/suspended solids — these require separate treatment steps (softening, RO, ion exchange, or mechanical filtration respectively).

The net result is water that is clearer, odour- and taste-neutral, lower in reactive oxidants and dissolved organics, and better conditioned for effective, long-lasting performance of downstream treatment stages such as BIRM/iron removal filtration and Reverse Osmosis.