

Filtration Media - Carbon



The term “Activated Carbon” describes a form of carbon produced from carbonaceous materials such as wood, coconut shell, coal, anthracite, peat, or petroleum residues. Activation generally involves:

- Carbonisation or physical activation using pyrolysis (600-900°C) in an inert atmosphere (argon or nitrogen typically)
- Oxidation, an alternative form of physical activation using pyrolysis (600-1200°C) in an oxidising atmosphere (steam or oxygen)
- Chemical activation where the carbon is chemically impregnated (with acids such as phosphoric acid, bases, or salts) and heated (250-600°C)

Activated carbon is not one single material, rather it is a family of substances characterised by their adsorptive and catalytic properties and not by definite structure or specific chemical composition. Specific properties may be imparted to an activated carbon using different raw materials and/or by using different preparation procedures.

Typical forms of activated carbon include:

- Powdered: Particle size range is typically <0.2mm diameter
- Granular: Particle size range is 0.2 to 5.0mm
- Extruded or Block form: Powdered activated carbon is fused with a binder and extruded into pellets and hollow cylinders
- Impregnated: Where inorganic additives such as iodine and silver are infused with the porous carbon to impart a specific mode of action to the material
- Polymer coated: Where porous carbon is coated with a biocompatible polymer to provide a smooth permeable covering for use in haemoperfusion
- Woven: Bonding of a fibre (generally synthetic) and activated carbon together to yield an activated carbon cloth

Characteristics of activated carbon used in classification and selection of the appropriate form to use in any specific application includes measures of:

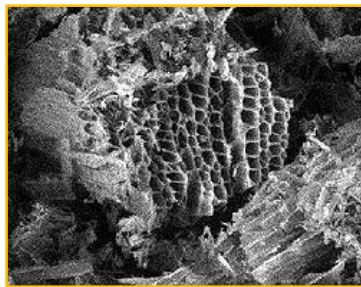
- Iodine number: A measure of the micropore content ($r < 1\text{nm}$) of the carbon form and by extension the ability to preferentially adsorb small molecules
- Molasses number: A measure of the mesopore content ($r 2\text{-}20\text{nm}$) of the carbon form and by extension the ability to preferentially adsorb large molecules
- Tannin number: A measure of macropore ($r > 25\text{nm}$) and mesopore characteristics
- Methylene Blue: A measure of mesopore structure ($r 2\text{-}5\text{nm}$). Higher numbers correlate with higher colour adsorption efficiency
- Dechlorination half-life: A measure of chlorine removal efficiency
- Apparent & Bulk density/Specific gravity: indicators of particulate pore volume

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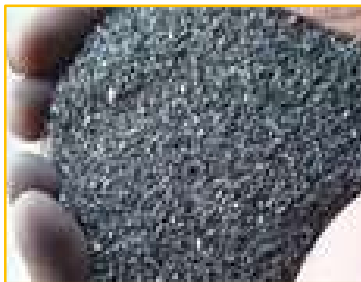
- Hardness abrasion number: Relates to the ability of the carbon form to maintain physical integrity. High hardness implies low adsorption capacity
- Ash content: Ash reduces the overall activity of activated carbon.
- Carbon tetrachloride activity: Measure of the porosity of the carbon form
- Particle size distribution and Uniformity coefficient: Used to balance reaction kinetics, surface area to volume ratio, pressure drop and flow characteristics

Rotek Australia can supply a wide range of activated carbons to suit most applications. A summary of the more popular activated carbon forms we have available is shown below. Please contact us if you have a specific application involving the use of activated carbon for suggestions on which of our range is best suited to your application.

Types of Activated Carbons



GC1200 and 1200N series are microporous, acid washed (N type), pH stabilised coconut-based media used to remove low molecular weight organic micro-pollutants, ozone, and chlorine-based sanitisers from feedwater sources.



Rotek GA1000N is an acid washed, pH stabilised coal based activated carbon used to remove high concentrations of organic contaminants through adsorption and bio assimilation. The media has been specially treated to yield high activity carbon with a bimodal pore distribution.



Anthracite MDW4050CB is a hard, dense Anthracite form of carbon which is steam activated to produce an excellent media for multi-layer sediment removal systems. It appears semi-metallic with a mildly brown reflection. It has carbon content and is low in volatile matter, free from soft or fibrous notches and does not soil the fingers when rubbed.

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Commonly Available Types of Activated Carbon

Typical Analysis	GC1200N	GC1200	GA1000N	Anthracite	MDW4050CB
Description	Microporous GAC	Microporous GAC	Bimodal Pore	Filtration	Filtration
Base Material	Coconut		Coal/Anthracite, Steam Activated		
Acid Washed	Yes	No	Yes	No	No
Apparent Density (g/ml)	0.42-0.50	0.42-0.50	0.35-0.45	0.7-0.8	0.25-0.30
Moisture as Packed (% max)	3	3	5	<3.5	<2
Acid Solubility (w/w)				<1.0	
Caustic Solubility (w/w)				<2.0	
Water Solubles (%)		<1.0			<0.5
Ash Content (% max)	1.5	3	6		
Iron Content (% max)		<0.01			
Iodine Number (mg/g min.)	>1200	>1200	1000		1000
Surface Area (BET M ² /g min.)	>1200	>1000	1000		1000
Butane Index (%)	>23.4	>23.4			
Hardness Index (% min.)	98	98	90		80-85