



CALGON CARBON CORPORATION

GRC

GRANULAR ACTIVATED CARBONS

DESCRIPTION

Calgon Carbon Type GRC Granular Carbons are coconut-based activated carbons specifically designed for gold recovery operations. In Carbon in Leach (CIL), Carbon in Pulp (CIP), and Heap Leach circuits, it is essential that the carbon used provides excellent process performance, minimal losses due to attrition, and minimal maintenance problems.

Calgon Carbon Corporation developed the GRC family of carbons to be high performance, high activity gold recovery carbons. Their ability to achieve high gold loadings and the ease with which they can be stripped enables gold processors to obtain the highest possible yields from ores with high silver/gold ratios, carbonaceous ores, and ores containing other metals that complex with cyanide, such as copper and nickel.

Through the years, Calgon Carbon Corporation has continually upgraded its manufacturing process to provide high quality products. Steps have been added to the manufacturing process which have improved the carbon's resistance to abrasion and reduced its tendency to plug slotted screens in adsorption tanks.

GRC carbons are pre-attrited through an attrition mill, resulting in lower losses due to attrition in the process operation. Using a pre-attrited carbon means that the customer no longer must pay for carbon that, in the past, was lost in the pre-attrition step and/or process. More importantly, the gold that is adsorbed on the fines is not lost from the process.

In order to have a product that has less tendency to plug screens with "platelets," GRC carbons are processed through a vee-wire screen and dedusted.

GRC activated carbons are available in three grades, each with a different range of mesh sizes, to meet individual plant requirements. For all GRC products, the limit on undersize particles is set particularly tight to minimize losses of carbon in the circuits.

Consistent high performance is assured from bag to bag and shipment to shipment because the products are manufactured to specifications that measure gold adsorption directly. Equilibrium gold adsorption capacity is expressed as K value and adsorption kinetics are defined by the R value. These values are determined by testing gold solutions with specific gold concentrations appropriate for the test.

PACKAGING

1000 lb/454 Kg extra heavy-duty bulk bags (with bottom spout for easy removal of carbon)

WAREHOUSING

Reno, NV, and several warehouses throughout the world to provide supply to all major mining regions.

SPECIFICATIONS

TYPE	GRC-11F	GRC-20	GRC-22
R-Value, min(6x12, 6x16)	0.06	0.08	0.09
K-Value, min(6x12, 6x16)	28	30	32
Hardness number, min	98	98	98
Abrasion number, min(6x12, 6x16)	98	98	98
Undersize %, max	3	3	3
Apparent density, min (g/ml)	0.50	0.47	0.44
Ash content %, max	4	4	4
Moisture %, max (as packaged)	4	4	4
Platelets specification			
6x12 mesh carbons, max	0.5%	0.5%	0.5%
6x16 mesh carbons, max	1%	1%	1%
Available mesh sizes	6x12 6x16	6x12 6x16 12x30	6x12 6x16 12x30

APPLICATIONS

In general, activated carbon is employed to extract gold from ores or tailings, including carbonaceous ores which are refractory to conventional cyanidation techniques. Because of the uniqueness and individuality of gold processing operations and the ore characteristics, only a general description of applications can be given here. Calgon Carbon's Technical Sales Representatives can assist in determining the best use of GRC carbon for specific applications.

Among the process applications where activated carbon has demonstrated its adsorption effectiveness are:

- Carbon In Pulp (CIP)
- Carbon In Leach (CIL)
- Heap Leaching

• Carbon In Pulp (CIP) - Crushed, ground, and leached pulp is mixed with activated carbon which flows countercurrent to the pulp in a series of adsorbers. Because of their superior hardness, GRC carbons exhibit low attrition during transport, agitation, and reactivation. The high adsorption rate and capacity of GRC carbons permit gold recoveries as high as 98%.

• Carbon In Leach (CIL) - for carbonaceous ores - Adsorption with granular activated carbon can result in recoveries of 97-98% of the gold. This compares with a recovery rate of 50% with conventional cyanidation techniques. Naturally present carbon competes with the activated carbon for the gold. Therefore, after oxygenation, the cyanidation process is carried out simultaneously as activated carbon is brought into contact with ore in the mixers. The superior initial adsorption rate of the GRC carbons minimizes interference with gold recovery from preg robbars in the ore, and thereby, results in improved leaching efficiency.

• Heap Leaching - Low-grade surface deposits and waste rock are candidates for heap leaching. Recoveries up to 85% can be achieved using GRC carbons.

FEATURES AND BENEFITS

When GRC carbons are used, the features shown below result in the associated benefits for operating plants.

- **HIGH GOLD ADSORPTION EQUILIBRIUM AND RATE VALUES** — Consistent high performance, low soluble gold losses, counteract preg robbers.
- **PRE-ATTRITED AND DEDUSTED** — Low carbon losses in the circuit.
- **HIGH HARDNESS AND ATTRITION RESISTANCE** — Minimal carbon and associated gold losses.
- **UNDERSIZE TIGHTLY CONTROLLED** — Low carbon losses.
- **SPECIALLY SCREENED THROUGH VEE-WIRE SCREEN** — Less screen plugging.
- **EASILY STRIPPED** — Low operating costs, low soluble losses to tails, low gold "lock-up".
- **EASILY REGENERATED** — Low operating cost, low carbon makeup, return to near virgin activity.
- **VARIETY OF MESH SIZES AND ACTIVITIES** — Provides flexibility for optimization and thus lower operating costs.
- **LOCAL INVENTORIES MAINTAINED** — Assured availability.

REGENERATION

After stripping gold by elution, the carbon's capacity for gold can be restored by thermal reactivation at temperatures in the range of 1100-1400°F. This process destroys adsorbed organic contaminants without significantly affecting the internal structure of the carbon.

In cases where organic contamination is known to be minimal and the measured adsorptive capacity of the stripped carbon indicates sufficient residual capacity, it may not be necessary to thermally reactivate every cycle.

ANALYTICAL TESTS

K Value - The K value index of equilibrium capacity uses pulverized activated carbon and a buffered solution of $KAu(CN)_2$ containing 100 ppm Au. K = mg of gold/g of activated carbon when the carbon is in equilibrium with 1 mg gold/liter of solution.

R Value - The R value is the reciprocal at zero time of a plot of time divided by Au loading on carbon versus time. A closely-sized granular carbon fraction is added to a 5 ppm gold cyanide solution at a concentration of 0.6 g/l and agitated under specified conditions for eight hours, during which time gold concentration is determined periodically.

% PLATELETS - This test measures the percent of a given fraction of carbon which passes through a 20 mesh vee-wire screen.

The detailed test procedures for the above can be obtained from your Calgon Carbon Corporation Technical Sales Representative.

CAUTION

Wet activated carbon preferentially removes oxygen from air. In closed or partially closed containers and vessels, oxygen depletion may reach hazardous levels. If workers are to enter a vessel containing carbon, appropriate sampling and work procedures for potentially low-oxygen spaces should be followed, including all applicable federal, state, and local requirements.

SALES OFFICES

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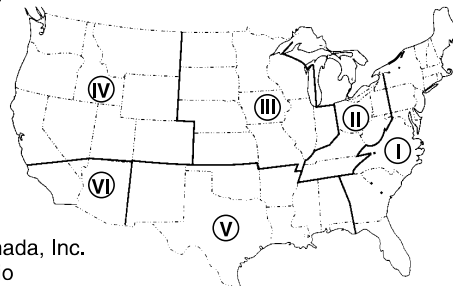
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If at any time our products or services do not meet your requirements or expectations, or if you would like to suggest any ideas for improvement, please call us at 1-800-548-1999. From outside the U.S. please call +1-412-787-6700.



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