



CALGON CARBON CORPORATION



## **Respirators and Human Protection**

**Technologies for Purification,  
Separation, Recovery and Synthesis**

## Calgon Carbon: 60+ Years of Proven Experience for Human Protection

Calgon Carbon Corporation, the world's leading manufacturer of granular activated carbon, has worked with the United States government since 1942 to develop and supply the most technologically advanced activated carbon for protective filters. Today, the U. S. military specifies Calgon Carbon's environmentally friendly impregnated carbon for use in its gas masks and collective protection filters.

### Carbon: Nature's Filter

Carbon is a non-metallic element, present in every organic compound. It can be chemically and physically treated to perform a variety of purification and filtration functions.

Activated carbon is a type of treated carbon, and impregnated carbon is a type of activated carbon.

Depending upon the requirements of the application, carbon can be impregnated with a variety of different metals to attract different contaminants.

In the simplest terms, impregnated carbon does double duty: first it grabs the contaminants, and then it turns them into something harmless. Accordingly, it is ideal for respirator applications because impregnated carbon

attracts and holds contaminants both physically and chemically, making the carbon more effective than other carbon products.

### Offering Application Specific Specialty Carbons

Calgon Carbon custom-manufactures specialty carbons to meet end-user requirements. We select the base stock source, manufacturing process variables, final product mesh size, and pore size distribution to ensure the carbon performs to your specifications. Most of our carbons are entirely safe for the environment, disposable, portable, and cost-effective.



## Carbons for Industrial/Civilian Applications

Non-military applications for impregnated carbon include:

- Manufacturing of personal protection and first responder masks
- Individual gas mask filters
- Collective protection filters
- Sulfur compounds removal
- Automotive cabin air purification systems
- Mercury abatement
- Odor control

Calgon Carbon manufactures carbons to provide protection against most industrial air contaminants, such as NIOSH gases, sulfur dioxide, hydrogen sulfide, and chlorine. The chart on page 3 can help you choose the right carbon for your application. A brief explanation of each carbon type is described below:

**URC, or Universal Respirator Carbon**—URC is widely used in the laboratory environment because it protects against contaminants produced in most processes. URC removes organic vapors ( $\text{CCl}_4$ , toluene, most hydrocarbons), acid gases ( $\text{SO}_2$ ,  $\text{H}_2\text{S}$ ), and basic gases ( $\text{NH}_3$ ). If a laboratory worker is not sure of the potential outcome of

a process with regard to contaminants, URC is usually the best choice because it protects against the widest range of probable irritants.

**AGR, or Acid Gas Removal**—This carbon is another industrial variety of impregnated carbon. AGR is designed to remove acid gases ( $\text{SO}_2$ ,  $\text{H}_2\text{S}$ ,  $\text{Cl}_2$ , etc.).

**RVG (Coal-Based) and RVG-C (Coconut-Based)**—RVG, or Respirator Vapor Grade carbon, provides protection based on physical adsorption principles only. A non-impregnated activated carbon, RVG is suitable for processes involving compounds that can be rendered harmless by physical adsorption such as organic vapors ( $\text{CCl}_4$ , toluene, and most hydrocarbons).

**ASZM-TEDA**—Calgon Carbon's military-use impregnated carbon, is also used in the industrial environment for first responder masks designed to protect against cyanide, cyanogen chloride (CK), and a variety of other harmful gases.

**FCA, Fortified Gas A Carbon**—For the European market, Calgon Carbon supplies this product which is designed to combat acid gases ( $\text{SO}_2$ ,  $\text{H}_2\text{S}$ ) and inorganic gases ( $\text{HCN}$ ,  $\text{Cl}_2$ ).



Photo used by permission. Millennium Chemical Biological Mask sold by MSA.

	PRODUCT	ORGANIC VAPORS (ex: CCl <sub>4</sub> )	ACID GASES	BLOOD AGENTS	NERVE AGENTS	TEAR AGENT	AMMONIA (NH <sub>3</sub> )	METHYLAMINE (CH <sub>3</sub> NH <sub>2</sub> )	FORMALDEHYDE (CH <sub>2</sub> O)	CHLORINE (Cl <sub>2</sub> )				
			SULFUR DIOXIDE (SO <sub>2</sub> )	HYDROGEN SULFIDE (H <sub>2</sub> S)	HYDROGEN CHLORIDE (HCl)	HYDROGEN CYANIDE (HCN)	ARSINE (AsH <sub>3</sub> )	CYANOGEN CHLORIDE (CICN)	TABUN	SARIN	SOMAN	AGENT VX	CHLOROACETOPHENONE	CHLOROPICRIN
INDUSTRIAL	URC	•	•	•	•									
	AGR	•	•	•	•									
	RVG	•												
	RVG-C	•												
	FCA*	•	•	•	•	•	•	•	•	•	•	•	•	•
MILITARY	ASZM-TEDA	•	•	•	•	•	•	•	•	•	•	•	•	•
	ASC*	•	•	•	•	•	•	•	•	•	•	•	•	•
	LC-HA*	•	•	•	•	•	•	•	•	•	•	•	•	•

Chart is intended only to provide guidance for carbon selection. The applicability of a given product for a specific respiration application will depend on the specific requirements and design parameters.

\* product sold in Europe

## Protection Against Respiratory Threats

Charcoal Cloth International (CCI), a division of Calgon Carbon Corporation, is the world leader in the development, manufacture and supply of activated charcoal cloth products for a broad range of industrial and medical markets.

Activated charcoal cloth was first developed for nuclear, biological and chemical protection (NBC) clothing and masks for the armed forces. Additional applications include odor-adsorbing wound dressings and ostomy bag filters, as well as anti-tarnish use and odor prevention for museum artifacts.

Calgon Carbon Corporation offers BreatheSafe™, a revolutionary respirator that is comfortable, reusable, and proven effective for adsorbing and filtering airborne odors, gases, mists, fumes, and dust. Use it for comfortable

protection in and around the house for cleaning, gardening, and spraying. BreatheSafe™ affords safe, convenient, and effective protection when traveling to polluted cities, inside airplane cabins and other enclosed areas.

### The BreatheSafe™ Mask:

- Has a layer of Zorflex® activated charcoal cloth with a vapor and solvent adsorbent microporous internal surface area of 3600m<sup>2</sup> built into the mask to give wearers superior protection.
- Protects from particulates as small as 0.3 microns (HEPA level)
- Protects (nuisance-level) from organic vapors and solvents
- Permits easy breathing
- Is washable and reusable



## Carbon for Military Use

Military applications for impregnated carbon include:

- Manufacturing of personal protection and first responder masks
- Individual gas mask filters
- Collective protection filters

A brief explanation of each type of military use carbon is described below:

**ASZM-TEDA**—Calgon Carbon's standard impregnated carbon for U. S. military use, ASZM-TEDA is named for its impregnates: copper (A), silver (S), zinc (Z), molybdenum (M), and triethylenediamine (TEDA). This versatile carbon is designed to protect against many of the chemical weapons the government lists as potential homeland threats.

**ASC and LC-HA**—Calgon Carbon manufactures two varieties of impregnated carbon for European use. ASC is named for its impregnates: copper (A), silver (S), and chromium (C). This carbon is designed to remove the nerve agent sarin, blood agents including arsine and hydrogen cyanide, and the tear agent chloropicrin. LC-HA, or Low Chrome-High Activity carbon, is impregnated with lower copper and chromium levels than ASC to increase its capacity for physical adsorption. LC-HA is primarily used to combat hydrogen cyanide and cyanogen chloride, which are blood agents. It also provides a measure of protection against arsine and chloropicrin.

## Helping the World Breathe Easier

For more than sixty years, Calgon Carbon Corporation has been providing products that protect people against dangerous conditions. As new needs emerge, Calgon Carbon Corporation will continue to develop new products and find innovative uses for existing ones. By

supplying high-quality impregnated carbon to the U.S. government, industrial customers, and laboratories, Calgon Carbon Corporation helps the world breathe easier. To find out more, contact Calgon Carbon at 1 800 422-7266.

## Your #1 Source for Impregnated Carbon Applications

Impregnated carbon cleans the air and protects against toxicity in:

- Laboratories
- Chemical plants
- Hospitals
- Airports
- Government buildings
- Other places where people gather and work

We are always looking for technological advancements to improve human protection. Calgon Carbon is willing to explore potential partnerships from toll manufacturing unique media or media blends to jointly developing new and innovative solutions for the most difficult nuclear,

biological, and chemical protection challenges. If you have an application that you would like to discuss, please contact us at 1-800-422-7266



## Customer and Technical Service

Customers at thousands of installations across the globe trust Calgon Carbon's extensive network of skilled service technicians to provide the support they need every day. If you have service needs related to any Calgon Carbon system, technology or type of equipment, we'll handle them for you.

All Calgon Carbon products, systems and technologies are available on a laboratory, pilot plant or full-scale production basis. Each customer is provided with

customized process engineering design to ensure that the manufacturing process meets their specific requirements. Full analytical laboratory support is also available which includes computer modeling to demonstrate product quality.



## The Calgon Carbon Difference

What makes Calgon Carbon a trusted and consistently reliable partner?

- More than 100 types of granular, powdered and pelletized activated carbon products
- Small and large pre-engineered adsorption systems inventoried across the U.S.
- Customized equipment to meet your needs
- Turnkey reactivation and recycling programs
- Quick response emergency deployment and installation programs
- Permanent or temporary system installations
- Field installation and operator training services
- Complete testing and analytical support, feasibility studies and cost evaluations

[www.calgoncarbon.com](http://www.calgoncarbon.com)



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