Active Carbon Absorption of Chemicals

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Active Carbon Absorption of Chemicals

The Atmos 500 uses a three stage process to remove airborne contaminants. The first stage filters large particles, the second and activated carbon bed, the third is a HEPA filter (small particles).

Of the three the activated carbon stage is the most important for removing smells and potentially toxic out-gasses caused by the laser cutting process, and is most critical to the operation of the fabrication lab.

While most organic compounds will adsorb on activated carbon to some degree, the adsorption process is most effective on higher molecular weight and high boiling point compounds. Compounds having a molecular weight over 50 and a boiling point greater than 50 degrees centigrade are good candidates for adsorption [1)]

These charts are adapted from More information about the Regeneration of Active Carbon - Lenntech

Chemicals with very high probability of being adsorbed by active carbon

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2,4-D	Deisopropyltatrazine	Linuron
Alachlor	Desethylatrazine	Malathion
Aldrin	Demeton-O	MCPA
Anthracene	Di-n-butylphthalate	Mecoprop
Atrazine	1,2-Dichlorobenzene	Metazachlor
Azinphos-ethyl	1,3-Dichlorobenzene	2-Methyl benzenamine
Bentazone	1,4-Dichlorobenzene	Methyl naphthalene
Biphenil	2,4-Dichlorocresol	2-Methylbutane
2,2-Bipyridine	2,5-Dichlorophenol	Monuron
Bis(2-Ethylhexyl)Phthalate	3,6-Dichlorophenol	Napthalene
Bromacil	2,4-Dichlorophenoxy	Nitrobenzene
Bromodichloromethane	Dieldrin	m-Nitrophenol
p-Bromophenol	Diethylphthalate	o-Nitrophenol
Butylbenzene	2,4-Dinitrocresol	p-Nitrophenol
Calcium Hypochloryte	2,4-Dinitrotoluene	Ozone
Carbofuran	2,6-Dinitrotoluene	Parathion
Chlorine	Diuron	Pentachlorophenol
Chlorine dioxide	Endosulfan	Propazine
Chlorobenzene	Endrin	Simazine
4-Chloro-2-nitrotoluene	Ethylbenzene	Terbutryn
2-Chlorophenol	Hezachlorobenzene	Tetrachloroethylene
Chlorotoluene	Hezachlorobutadiene	Triclopyr
Chrysene	Hexane	1,3,5-Trimethylbenzene

m-Cresol	Isodrin	m-Xylene
Cyanazine	Isooctane	o-Xylene
Cyclohexane	Isoproturon	p-Xylene
DDT	Lindane	2,4-Xylenol

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Chemicals with high probability of being adsorbed by active carbon

Aniline	Dibromo-3-chloropropane	1-Pentanol
Benzene	Dibromochloromethane	Phenol
Benzyl alcohol	1,1-Dichloroethylene	Phenylalanine
Benzoic acid	cis-1,2- Dichloroethylene	o-Phthalic acid
Bis(2-chloroethyl) ether	trans-1,2- Dichloroethylene	Styrene
Bromodichloromethane	1,2-Dichloropropane	1,1,2,2-Tetrachloroethane
Bromoform	Ethylene	Toluene
Carbon tetrachloride	Hydroquinone	1,1,1-Trichloroethane
1-Chloropropane	Methyl Isobutyl Ketone	Trichloroethylene
Chlorotoluron	4-Methylbenzenamine	Vinyl acetate

Chemicals with moderate probability of being adsorbed by active carbon

For these chemicals active carbon is only effective in certain cases.

Acetic acid	Dimethoate	Methionine
Acrylamide	Ethyl acetate	Methyl-tert-butyl ether
Chloroethane	Ethyl ether	Methyl ethyl ketone
Chloroform	Freon 11	Pyridine
1,1-Dichloroethane	Freon 113	1,1,2-Trichloroethane
1,2-Dichloroethane	Freon 12	Vinyl chloride
1,3-Dichloropropene	Glyphosate	
Dikegulac	Imazypur	

Chemicals for which adsorption with active carbon is unlikely to be effective

However it may be viable in certain cases such as for low flow or concentrations.

Acetone	Methylene chloride
Acetonitrile	1-Propanol
Acrylonitrile	Propionitrile
Dimethylformaldehyde	Propylene
1,4-Dioxane	Tetrahydrofuran
Isopropyl alcohol	Urea
Methyl chloride	

Factors that influence the performance of active carbon in air

- Type of compound to be removed: In general compounds with a high molecular weight, lower vapor pressure/higher boiling point and high refractive index are better adsorbed.
- Concentration: The higher the concentration, the higher the carbon consumption.
- Temperature: The lower the temperature, the better the adsorption capacity.
- Pressure: The higher the pressure, the better the adsorption capacity.
- Humidity: The lower the humidity, the better the adsorption capacity.

1) source: Wastewater Engineering; Metcalf & Eddy; third edition; 1991; page 317|

Read more: http://www.lenntech.com/library/adsorption/adsorption.htm#ixzz4880i9cJh

[1)]

www.carbtrol.com/voc.pdf|Shepard, 2001