ADSORPTION CAPACITY
of Various Compounds in Water

INTRODUCTION

Activated carbon has excellent adsorption capacity for a wide range of organic compounds as well as some inorganic compounds such as heavy metals. Activated carbon will also remove some oxidising agents such as chlorine. The performance of activated carbon can be difficult to predict as the performance depends on many factors including:

- The type of compound to be removed. Compounds with high molecular weight and low solubility are better adsorbed.
- The concentration of the compound to be removed. The higher the concentration, the higher the carbon consumption.
- Presence of other organic compounds which will compete with other compounds for the available adsorption sites.
- The pH of the waste stream. For example, acidic compounds are better removed at lower pH.

SPECIFIC COMPOUNDS

The tables show the relative adsorption capacity of various compounds in water. These tables can be used to quickly determine whether activated carbon is likely to be an effective technology.

The following adsorption ratings have been used:

1. Very high adsorption capacity
2. Good adsorption capacity
3. Moderate adsorption capacity. Activated carbon is an effective technology in only certain cases.
4. Activated carbon is unlikely to be effective, however it maybe viable in certain cases such as for low flow or concentrations.

The Class indicates whether the compound is listed under the European Union Dangerous Discharges Directives 76/464/EEC and 86/280/EEC.

Compounds such as chlorine and chloramines are removed catalytically by activated carbon. Further information is available on the removal of these compounds.

Löslichkeit

Name	Class	Molecular Weight	Solubility mg/l	Adsorption Rating
2,4-D	EU List II	221	620	1
Acetone		58.08	791000	4
Acetic acid Acetyl-Rest d. Essig		60.052	sol.	3
Acetonitrile		41.052	sol.	4
Acrylamide		71.08	586000	3
Acrylonitrile		53.063	73500	4
Alachlor		269.8	242	1
Aldrin	EU List I	364.9	0.0027	1
Aniline		93.128	33600	2
Anthracene	EU List II	178.233	0.075	1
Atrazine	EU List II	216.06	70	1
Azinphos-ethyl	EU List II	345.4	5	1
Bentazone		240.3	500	1
Benzene		78.113	1782.29	2
Benzl alcohol		108.14	35000	2
Benzoic acid		122.123	3500	2
Biphenyl	EU List II	154.2	insol.	1
2,2-Bipyridine		156	6370	1
Bis(2-chloroethyl) ether		143.013	10200	2
Bis(2-Ethylhexyl) Phtalate		390.562	100	1
Bromacil		261.1	815	1
Bromodichloromethane		163.83	6000	2
Bromoform		252.731	3180	2
p-Bromophenol		173.02	17700	1
Butylbenzene		312.4	2.9	1

Name	Class	Molecular Weight	Solubility mg/l	Adsorption Rating
Calcium Hypochlorite		142.99	-	Dechlorination
Carbofuran		221.3	700	1
Carbon tetrachloride	EU List I	153.823	770	2
Chloramines		-	-	Centaur
Chlorine		70.9	-	Dechlorination
Chlorine dioxide		67.5	-	Dechlorination
Chlorobenzene		112.559	488	1
Chloroethane		64.515	4470	3
Chloroform		119.378	8150	3
4-Chloro-2-nitrotoluene	EU List II	171.58	-	1
2-Chlorophenol		128.56	26000	1
1-Chloropropane		78.541	2710	2
Chlorotoluene		126.585	493	1
Chlorotoluron		212.7	70	2
Chrysene		228.28	0.006	1
m-Cresol		108.14	23000	1
Cyanazine		240.7	171	1
Cyclohexane		84.161	55	1
DDT	EU List I	354.5	insol.	1
Deisopropytatrazine		175.6	-	1
Desethylatrazine		187.6	-	1
Demeton-O	EU List II	258.3	60	1
Di-n-butylphthalate		278.34	4500	1
Dibromo-3-chloropropane		236.5	1000	2
Dibromochloromethane		208.29	4000	2
1,2-Dichlorobenzene		147.004	156	1
1,3-Dichlorobenzene		147.004	111	1
1,4-Dichlorobenzene	EU List II	147.004	87.2	1
2,4-Dichlorocresol		177.03	2200	1
1,1-Dichloroethane		98.96	5100	3
1,2-Dichloroethane	EU List I	98.96	8100	3
1,1-Dichloroethylene	EU List II	96.944	210	2
cis 1,2-Dichloroethylene		96.944	3500	2
trans-1,2-Dichloroethylene		96.944	6300	2
2,5-Dichlorophenol		163	3710	1
3,6-Dichlorophenol		163	8050	1
2,4-Dichlorophenoxy		221.04	890	1
1,2-Dichloropropane		112.986	2740	2
1,3-Dichloropropene	EU List II	110.98	2700	3
Dieldrin	EU List I	380.9	0.186	1
Diethylphthalate		222.2	210	1
Dikegulac		274.3	590000	3
Dimethoate		229.2	25000	3
Dimethylformaldehyde		73.094	sol.	4
2,4-Dinitrocresol		198.13	2200	1
2,4-Dinitrotoluene		182.15	270	1
2,6-Dinitrotoluene		182.15	270	1
2,4-Dinitrotoluene		184.11	1370	1

Name	Class	Molecular Weight	Solubility mg/l	Adsorption Rating
1,4-Dioxane		88.106	sol.	4
Diuron		233.1	42	1
Endosulfan		406.9	0.32	1
Endrin	EU List I	380.9	insol.	1
Ethyl acetate		88.106	80800	3
Ethyl ether		74.122	60400	3
Ethylbenzene		106.167	152	1
Ethylene		187.862	4290	2
Freon 11		137.368	1100	3
Freon 113		187.376	170	3
Freon 12		120.914	280	3
Glyphosate		169.1	12000	3
Hexachlorobenzene	EU List I	284.8	insol.	1
Hexachlorobutadiene	EU List I	260.76	2	1
Hexane		86.177	12.3	1
2-Hexanone		100.16	17500	2
Hydrogen Peroxide		34	sol.	Centaur
Hydroquinone		110.1	70000	2
Imazypur		261.3	650000	3
Isodrin	EU List I	380.9	-	1
Isooctane		114	2.4	1
Isopropyl alcohol		60.096	sol.	4
Isoproturon		206.3	55	1
Lindane	EU List I	290.85	10	1
Linuron		249.1	81	1
Malathion		330	145	1
MCPA		200.6	825	1
Mecoprop		214.6	620	1
Metazachlor		277.8	17	1
Methionine		149.22	34800	3
Methyl-tert-butyl ether		88.15	48000	3
2-Methyl benzenamine		107.155	16600	1
Methyl chloride		50.488	6480	4
Methyl ethyl ketone		72.107	240000	3
Methyl isobutyl ketone		100.16	17000	2
Methyl napthalene		142.2	28.5	1
4-Methylbenzenamine		107.155	73500	2
2-Methylbutane		72.15	48	1
Methylene chloride		84.933	13000	4
Monuron		198.7	230	1
Napthalene		128.173	31.69	1
Nitrobenzene		123.111	1900	1
m-Nitrophenol		139.11	13600	1
o-Nitrophenol		139.11	1620	1
p-Nitrophenol		139.11	16000	1
Ozone			-	Dechlorination
Parathion		291.3	24	1
Pentachlorophenol	EU List I	266.35	14	1

Name	Class	Molecular Weight	Solubility mg/l	Adsorption Rating
1-Pentanol		88.149	21900	2
Phenol		94.113	86600	2
Phenylalanine		169.2	14200	2
o-Phthalic acid		166.1	56800	2
1-Propanol		60.096	sol.	4
Propazine		230.09	8.6	1
Propionitrile		55.98	93880	4
Propylene		76.095	sol.	4
Pyridine		79.101	982000	3
Simazine		201.67	5	1
Sodium Hypochlorite		74.5	-	Dechlorination
Styrene		104.51	310	2
Terbutryn		241.4	25	1
1,1,2,2-Tetrachloroethane		167.85	2870	2
Tetrachloroethylene	EU List I	165.834	150	1
Tetrahydrofuran		72.107	sol.	4
Toluene		92.14	515	2
Trichlorobenzene (all isomers)	EU List I	181.46	insol.	?
1,1,1-Trichloroethane		133.405	1320	2
1,1,2-Trichloroethane		133.405	4400	3
Trichloroethylene	EU List I	131.389	1370	2
Triclopyr		256.5	440	1
1,3,5-Trimethylbenzene		120.194	48.2	1
Urea		60.06	655000	4
Vinyl acetate		86.09	20000	2
Vinyl chloride		62.499	2700	3
m-Xylene		106.167	146	1
o-Xylene		106.167	175	1
p-Xylene		106.167	156	1
2,4-Xylenol		122.16	7870	1

SAFETY MESSAGE

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.

QUALITY

Each of our worldwide operations has achieved **ISO9002** certification for their quality management system related to activated carbon. **Chemviron Carbon** guarantees the quality and consistency of every product shipment and all specifications are guaranteed against representative sampling.

CHEMVIRON CARBON

Chemviron Carbon, the European operation of Calgon Carbon Corporation, is a global manufacturer, supplier, and developer of granular activated carbon, innovative treatment systems, value added technologies, and services for optimising production processes and safely purifying the environment.

With over 60 years of experience, facilities around the world, and a world-class team of over 1,000 employees, Calgon Carbon Corporation can provide the solutions to your most difficult purification challenges.

Visit our website at www.chemvironcarbon.com

W-1060 – 25.09.2003

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