Molecular media selection chart

Target molecule	No. of carbon atoms & performance indicator: C1	C2	C3	C4	C5	C6	C7	C8	C9	>C9	non C	Camfil molecular media		Formula	Molecular weight	Boiling point (°C)	Vapour pressure (mmHg @ 20°C)
Alkanes																	
Methane	■													CH_4	16.0	-161.5	33,903
Ethane		■												C_2H_6	30.1	-88.6	28,127
Propane			■											C_3H_8	44.1	-42.1	6,774
Butane				■								LGS		C_4H_{10}	58.1	-0.6	1,557
Pentane					■							LGS		C_5H_{12}	72.2	36.1	424.2
Hexane						■						LGS		C_6H_{14}	86.2	68.7	123.0
Heptane							■					LGS	CEX	C_7H_{16}	100.2	98.4	47.3
Octane								■				LGS	CEX	C_8H_{18}	114.2	125.5	12.1
Nonane									■			LGS	CEX	C_9H_{20}	128.3	150.6	3.60
Decane										#		LGS	CEX	$C_{10}H_{22}$	142.3	173.8	20.3
Dodecane										#		LGS	CEX	$C_{12}H_{26}$	170.3	216.3	0.98
Eicosane (n-)										■		LGS	CEX	$C_{20}H_{42}$	282.6	343.0	0.98
Cyclohexane						#						LGS	CEX	C_6H_{12}	84.2	80.7	78.0
Alkenes																	
Ethylene		+										C8	C4	C_2H_4	28.1	-103.7	26,627
Propylene			■											C_3H_6	42.1	-47.7	7,678
Butene				■										C_4H_8	56.1	-6.3	1,910
Pentene					■							LGS		C_5H_{10}	70.1	30.0	548.8
Hexene						■						LGS		C_6H_{12}	84.2	63.0	160.1
Heptene							■					LGS	CEX	C_7H_{14}	98.2	94.0	47.1
Octene								■				LGS	CEX	C_8H_{16}	112.2	121.0	14.4
Nonene									■			LGS	CEX	C_9H_{18}	126.2	146.9	3.30
Decene										#		LGS	CEX	$C_{10}H_{20}$	140.3	170.0	1.28
1,3-Butadiene					■							LGS		C_4H_6	54.1	-4.6	1,838
1,3-Hexadiene						■						LGS		C_6H_{10}	82.1	59.0	173
Pinene (α-)										■		LGS	CEX	$C_{10}H_{16}$	136.2	156.2	3.53
Arenes (Aromatics)																	
Benzene						■						LGS	CEX	C_6H_6	78.1	80.1	75.8
Toluene							■					LGS	CEX	C_7H_8	92.1	110.6	21.7
Ethylbenzene								■				LGS	CEX	C_8H_{10}	106.2	136.2	6.98
Styrene								■				LGS^	CEX^	C_8H_8	104.1	145.0	4.65
Xylene								■				LGS	CEX	C_8H_{10}	106.2	144.4	6.00
Trimethylbenzene									■			LGS	CEX	C_9H_{12}	120.2	164.7	1.88
Naphtalene										#		LGS	CEX	$C_{10}H_8$	128.2	218.0	0.08
Biphenyl										■		LGS	CEX	$C_{12}H_{10}$	154.2	259.9	0.00
Alcohols																	
Methanol	■													CH_3OH	32.0	64.7	97.7
Ethanol		■										LGS		C_2H_5OH	46.1	78.5	44.3
Isopropanol			■									LGS		C_3H_7OH	60.1	82.2	34.6
Butanol				■								LGS		C_4H_9OH	74.1	117.0	5.70
Pentanol					■							LGS	CEX	$C_5H_{11}OH$	88.2	138.0	4.50
Hexanol						■						LGS	CEX	$C_6H_{13}OH$	102.2	158.0	0.98
Heptanol							■					LGS	CEX	$C_7H_{15}OH$	116.2	175.8	0.11
Octanol								■				LGS	CEX	$C_8H_{17}OH$	130.2	195.0	0.14
Nonanol									■			LGS	CEX	$C_9H_{19}OH$	144.3	214.0	0.01
Decanol										#		LGS	CEX	$C_{10}H_{21}OH$	158.3	232.9	0.01
Ethylene glycol		■										LGS		$C_2H_6O_2$	62.1	198.0	0.08
Phenol						■						LGS	CEX	C_6H_5OH	94.1	181.7	0.16

Target molecule	No. of carbon atoms & performance indicator: C1	C2	C3	C4	C5	C6	C7	C8	C9	>C9	non C	Camfil molecular media			Formula	Molecular weight	Boiling point (°C)	Vapour pressure (mmHg @ 20°C)
Nitriles																		
Acetonitrile		■										LGS			C_2H_3N	41.1	81.0	72.7
Acrylonitrile			+									LGS^			C_3H_3N	53.1	77.5	93.0
Organic acids																		
Formic acid	+											CEX A6	CEX A3	LGS	CH_2O_2	46.0	100.5	32.43
Acetic acid		+										CEX A6	CEX A3	LGS	CH_3COOH	60.1	118.2	11.37
Propanoic acid			+									CEX A6	CEX A3	LGS	$C_3H_6O_2$	74.1	141.0	9.16
Butyric acid				+								CEX A6	CEX A3	LGS	$C_4H_8O_2$	88.1	164.0	7.81
Benzoic acid							+					CEX A6	CEX A3	LGS	$C_7H_6O_2$	122.1	249.8	10.00
Acid gases																		
Hydrogen fluoride											+	CEX A3	CEX A6	LGS	HF	20.0	19.5	675
Hydrogen sulfide											+	CEX A1	CEX A3	C15	H_2S	34.1	-60.3	13,576
Hydrogen chloride											+	CEX A3	CEX A6	LGS	HCl	36.5	-85.0	31,525
Sulfur dioxide											+	CEX A3	C15	LGS	SO_2	64.1	-10.0	2,479
Chlorine											+	CEX A3	C8	LGS	Cl_2	70.9	-34.1	5,049
Hydrogen cyanide											+	CEX J5			HCN	27.02	25.6	621
Nitrogen dioxide											+	CEX A6	LGS		NO_2	46.0	21.2	720
Ammonia and Amines																		
Ammonia											+	CEX B1			NH_3	17.0	-33.4	6,430
Methylamine	+											CEX B1			CH_5N	31.1	-6.9	2,280
Trimethylamine			+									CEX B1			C_3H_9N	59.1	3.0	1,365
Pyridine					+							CEX B1	LGS	CEX	C_5H_5N	79.1	115.0	15
N-methyl pyrrolidone					■							LGS	CEX	CEX B1	C_5H_9NO	99.1	202.0	1.95
Triethylamine						+						CEX B1	LGS	CEX	$C_6H_{15}N$	101.2	89.0	53.3
Toluidine							■					LGS	CEX	CEX B1	C_7H_9N	107.2	203.0	0.30
Nicotine											■	LGS	CEX	CEX B1	$C_{10}H_{14}N_2$	162.2	246.0	0.06
Tributylamine										+		CEX B1	LGS	CEX	$C_{12}H_{27}N$	185.4	216.5	0.18
Hydrazine											+	CEX B1			N_2H_4	32.1	113.5	15.8
Miscellaneous compounds																		
Carbon monoxide	■														CO	28.0	-191.5	-
Carbon dioxide	■														CO_2	44.0	-78.5	42,971
Acetylene		■													C_2H_2	26.0	-81.5	32,568
Radon											■				Rn	222.0	-61.7	10,230
Dimethyl sulfide		+										C8	C4		C_2H_6S	62.1	37.0	420
Ethyl mercaptan		+										CEX A1	CEX A3	C8	C_2H_5SH	62.1	35.0	439
Hexamethyldisiloxane (HMDSO)							■					LGS	CEX		$C_6H_{18}OSi_2$	162.4	101.0	39.9
Toluene-2, 4-diisocyanate (TDI)									■			LGS	CEX		$C_9H_6N_2O_2$	174.2	251.0	0.010
Di-2-ethylhexyl phthalate (DEHP or DOP)										■		LGS	CEX		$C_{24}H_{38}O_4$	390.6	385.0	18.8
Diisononyl phthalate (DINP)										■		LGS	CEX		$C_{26}H_{42}O_4$	418.6	244.0	1.00
Diisodecyl phthalate (DIDP)										■		LGS	CEX		$C_{28}H_{46}O_4$	446.7	250.0	1.11
Mercury vapour											+	CEX J4	CEX J3		Hg	200.6	356.7	0.0015
Hydrogen peroxide												LGS	CEX		H_2O_2	34.0	150.2	5.70
Ozone												LGS	CEX		O_3	48.0	-111.9	0

Target molecule	No. of carbon atoms & performance indicator: C1	C2	C3	C4	C5	C6	C7	C8	C9	>C9	non C	Camfil molecular media		Formula	Molecular weight	Boiling point (°C)	Vapour pressure (mmHg @ 20°C)
Esters																	
Methyl acetate			■									LGS		$C_3H_6O_2$	74.1	57.1	196.2
Ethyl acetate				■								LGS		$C_4H_8O_2$	88.1	77.0	72.6
Vinyl acetate				■								LGS		$C_4H_6O_2$	86.1	72.7	93.3
Methyl acrylate				■								LGS		$C_4H_6O_2$	86.0	80.0	66.9
Alkyl acetate					■							LGS	CEX	$C_4H_8O_2$	100.1	103.0	30.8
Methyl methacrylate					■							LGS	CEX	$C_5H_8O_2$	100.1	100.0	22.0
Ethyl acrylate					■							LGS	CEX	$C_5H_8O_2$	100.1	99.0	32.6
Propyl acetate					■							LGS	CEX	$C_5H_{10}O_2$	102.1	102.0	28.4
Ethyl lactate					■							LGS	CEX	$C_5H_{10}O_3$	118.1	154.0	1.65
Ethyl methacrylate						■						LGS	CEX	$C_6H_{10}O_2$	114.1	118.5	25.4
Isopropyl acrylate						■						LGS	CEX	$C_6H_{10}O_2$	114.1	110.0	20.4
Butyl acetate						■						LGS	CEX	$C_6H_{12}O_2$	116.2	127.0	8.03
Propylene glycol methyl ether acetate						■						LGS	CEX	$C_6H_{12}O_3$	132.2	146.0	3.68
Butyl acrylate							■					LGS	CEX	$C_7H_{12}O_2$	128.2	145.0	4.43
Pentyl acetate							■					LGS	CEX	$C_7H_{14}O_2$	130.2	149.0	7.50
Ethylene acrylate								#				LGS	CEX	$C_5H_8O_2$	170.2	67.0	-
Ethers																	
Ethylene oxide		■										LGS			C_2H_4O	44.1	11.0	1,088
Propylene oxide			■									LGS			C_3H_6O	58.1	34.3	443
Diethyl ether				■								LGS			$C_4H_{10}O$	74.1	34.6	464.0
Dimethoxyethane				■								LGS			$C_4H_{10}O_2$	90.1	85.0	55.7
Dioxane				■								LGS			$C_4H_8O_2$	88.1	101.1	28.2
Anisole							■					LGS			C_7H_8O	108.1	154.0	1.63
Tetrahydrofuran								■				LGS			C_4H_8O	72.1	67.0	150
Diphenyl ether										#		LGS	CEX		$C_{12}H_{10}O$	170.2	257.9	0
Aldehydes																	
Formaldehyde	+											C8	CEX J2		CH_2O	30.0	-19.3	3,315
Acetaldehyde		+										C8	CEX J2		CH_3CHO	44.1	20.2	833
Acrolein				■								LGS			C_3H_4CHO	56.1	52.5	248.3
Propanal				■								LGS			C_3H_6O	58.1	48.8	255
Butanal					■							LGS			C_4H_8O	72.1	75.7	90
Pentanal						■						LGS			$C_5H_{10}O$	86.1	103.0	30
Hexanal							■					LGS			$C_6H_{12}O$	100.2	128.0	7.5
Benzaldehyde								■				LGS	CEX		C_6H_5CHO	106.1	179.0	0.98
Heptanal								■				LGS	CEX		$C_7H_{14}O$	114.2	153.0	2.63
Nonanal									#			LGS	CEX		$C_9H_{18}O$	142.3	93.0	0.92
Ketones																	
Acetone			■									LGS^			C_3H_6O	58.1	56.0	209.3
Methyl ethyl ketone				■								LGS^			C_4H_8O	72.1	78.2	79.5
Cyclohexanone						#						LGS^	CEX^		$C_6H_{10}O$	98.1	156.0	2.09
Alkyl halides (Halogenated)																	
Dichloromethane	■											LGS			CH_2Cl_2	84.9	40.7	352.5
Chloroform	■											LGS			$CHCl_3$	119.4	61.7	159.6
Carbon tetrachloride	■											LGS			CCl_4	153.8	76.7	89.6
Vinyl chloride		■													CH_2CHCl	62.5	-13.4	2,555
Ethyl chloride			■									LGS			C_2H_5Cl	64.5	12.0	1,013
Trichloroethylene			■									LGS			C_2HCl_3	131.4	87.0	58.0
Tetrachloroethylene			■									LGS			C_2Cl_4	165.8	121.4	14.2

Adsorption guide

■ Adsorption not possible

Substances mark as this colour are neither adsorbed by Camfil's activated carbon/alumina nor other company's activated carbon/alumina

■ Low adsorption

■ Medium adsorption

■ Good adsorption

■ + Good adsorption, use impregnated molecular media

■ # Chemicals in the same functional group with higher molecular weight or carbon atoms will also have good adsorption

Camfil molecular media

LGS, CEX	Unimpregnated activated carbon, coconut shell carbon, coal carbon
CEX A1, A3, A4, A6, B1, J2, J3, J4, J5	Impregnated activated carbon
C4, C5, C8, C15	Impregnated activated alumina

Instructions:

1. The chart lists common compounds based on chemistry and increasing number of carbon atoms
2. Find the target molecule in the left hand column
3. If the target molecule is found
   - i. Check performance indicator (colour code) in columns 2 to 12 to understand how effective molecular filtration would be
   - ii. In columns 13-15, see which molecular filtration media should be applied
4. If target molecule is not in the list
   - i. Identify which chemical group the molecule belongs to (e.g. alcohols, aromatics, acid gases, etc...)
   - ii. Count the number of carbon atoms in the target molecule and find the molecular weight and boiling point values with the MSDS
   - iii. Find the molecule in the chart with same number of carbons atoms
   - iv. Use the recommendation for this molecule only if its boiling point and molecular weight are lower or equal to those of the target molecule
   - v. If not, use the recommendation for the molecule in the list with one carbon atom less than your target molecule.

^ Refer to Molecular Filtration Guidance Note 'Risk of Bed Ignition'