

APPENDIX B

DATA SHEETS FOR CHEMICALS WITH HAZARD-INDEX RANKING: MEDIUM

Chemical Name	Hazard Index: Medium	
Common Name: 1,2-Dimethyl Hydrazine		
Empirical Formula: C ₂ H ₈ N ₂	CAS Number: 540-73-8	
Sorptive Properties		
Filter Performance Index: Poor		
Physical Adsorption:	Weak adsorption on activated carbon, desorption likely to occur under dry conitions. Water soluble, desorption may increase with increasing relative humidity and adsorbed water.	
Chemisorption:	unknown	
Physical Properties		
Molecular Weight:	60.10	
Boiling Point:	81 C	
Vapor Pressure:	69 mm Hg at 25 C, Antoine: T=274.52-297.61K A=2.96404 B=707.722 C=-120.979 (T=K, Log P=bar, NIST)	
Volatility:		
Critical Temperature:		
Critical Pressure:		
Heat of Vaporization:		
Solubility in Water:	miscible	
Liquid Density:	0.8274g/mL at 20 C	
Toxicity		
ACGIH TLV-TWA: 0.02 mg/m ³	NIOSH REL-TWA: 0.15 mg/m ³	OSHA PEL: 1.2 mg/m ³
ACGIH TLV-STEL:	NIOSH REL-STEL:	
References		
1. NIST Chemistry WebBook 2. Merck Index, 12th edition		

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Chemical Name		Hazard Index: Medium	
Common Name: acetone cyanohydrin (lactonitrile)		CAS Number: 78977	
Empirical Formula: C ₃ H ₅ NO			
Sorptive Properties			
Filter Performance Index: Marginal			
Physical Adsorption:	Moderate to weak adsorption, desorption likely to follow under dry conditions, water soluble, adsorbed water may help to slow desorption.		
Chemisorption:	Decomposes readily to form hydrogen cyanide, which is effectively removed by NBC filters due to reaction with metal impregnants		
Physical Properties			
Molecular Weight:	71.09		
Boiling Point:	81		
Vapor Pressure:	ca. 70 mm Hg at 25 C		
Volatility:	2.45 (air=1)		
Critical Temperature:			
Critical Pressure:			
Heat of Vaporization:			
Solubility in Water:	freely soluble		
Liquid Density:	0.9267 g/mL at 25 C		
Toxicity			
ACGIH TLV-TWA:	NIOSH REL-TWA: 2.9 mg/m ³	OSHA PEL:	
ACGIH TLV-STEL: 13.6 mg/m ³	NIOSH REL-STEL:		
References			
1. Merck Index			
2. Dangerous Properties of Industrial Materials, SAX			

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Chemical Name	Hazard Index: Medium	
Common Name: Acrolein		
Empirical Formula: C3H4O	CAS Number: 107-02-8	
Sorptive Properties		
Filter Performance Index: Poor		
Physical Adsorption:	Weak adsorption on activated carbon, followed by desorption with under dry conditions, water soluble, desorption may decrease or be delayed with increasing relative humidity and adsorbed water.	
Chemisorption:	unknown	
Physical Properties		
Molecular Weight:	56.06	
Boiling Point:	53 C	
Vapor Pressure:	760 mmHg at 52.5 C, 400 mmHg at 34.5 C, 330 mmHg at 30 C, 100 mmHg at 2.5 C, 60 mmHg at -7.5 C, 40 mmHg at -15 C (2), 214.5 mmHg at 20 C (3), 1 mmHg at -64.5 C, 10 mmHg at -36.7 C, Antoine: T= 235-360 K, A=15.9057 B=2606.53 C=-45.15 (T=K, LnP=mm Hg, Prausnitz)	
Volatility:	1.94	
Critical Temperature:	254 C	
Critical Pressure:	38000 mmHg	
Heat of Vaporization:	120 cal/g	
Solubility in Water:	100 mg/mL at 21 C	
Liquid Density:	0.8621 g/mL at 0 C, 0.8075 g/mL at 50C	
Toxicity		
ACGIH TLV-TWA: .23 mg/m3	NIOSH REL-TWA: 0.23 mg/m3	OSHA PEL: 0.23 mg/m3
ACGIH TLV-STEL: 0.69 mg/m3	NIOSH REL-STEL: 0.69 mg/m3	
References		
<ol style="list-style-type: none"> 1. NIST Chemistry WebBook 2. MSDS, Radian Corporation, August 29, 1991 3. MSDS, Fisher, 7/16/96 4. MSDS, Howard Hughes Medical Institute 5. Prausnitz 6. Aldrich 		

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Chemical Name	Hazard Index: Medium	
Common Name: Acrylonitrile		
Empirical Formula: C ₃ H ₃ N	CAS Number: 107-13-1	
Sorptive Properties		
Filter Performance Index: Poor		
Physical Adsorption:	Moderate adsorption on activated carbon, followed by desorption under dry conditions. Water soluble, desorption may decrease or be delayed with increasing relative humidity and adsorbed water, (Henry, 1979)	
Chemisorption:	unknown	
Physical Properties		
Molecular Weight:	53.06	
Boiling Point:	77.3	
Vapor Pressure:	100 mm Hg at 22.8 C, 90 mmHg at 20 C, antoine: T=255-385 K, A=15.9253 B=2782.21 C=-51.15 (T=K, LnP=mm Hg, Prausnitz)	
Volatility:	1.83 (air=1)	
Critical Temperature:	263 C	
Critical Pressure:	45 atm	
Heat of Vaporization:	147 cal/g	
Solubility in Water:	7.3% at 20 C	
Liquid Density:	0.8004 at 25 C	
Toxicity		
ACGIH TLV-TWA:	4.3 mg/m ³	NIOSH REL-TWA: 2.1 mg/m ³ OSHA PEL: 4.3 mg/m ³
ACGIH TLV-STEL:		NIOSH REL-STEL:
References		
<ol style="list-style-type: none"> 1. NIST Chemistry WebBook 2. MSDS, Howard Hughes Medical Institute, July 1994 3. The Merck Index, 11th Edition 4. MSDS, Fisher Corp 5. Prausnitz 6. Aldrich 		

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Chemical Name	Hazard Index: Medium	
Common Name: Allyl Alcohol		
Empirical Formula: C3H6O	CAS Number: 107-18-6	
Sorptive Properties		
Filter Performance Index: Marginal		
Physical Adsorption:	Moderate adsorption on activated, delayed desorption under dry conditions. Infinitely soluble in water, desorption may be decreased or be delayed with increasing relative humidity and water adsorption.	
Chemisorption:	unknown	
Physical Properties		
Molecular Weight:	58.08	
Boiling Point:	97C	
Vapor Pressure:	1 mmHg at -20 C, 19 mmHg at 20C, 100 mmHg at 50C, 40 mmHg at 33.4C, Antoine: T=294-370.23K, A=8.782524 B=4510.213 C=143.647 (T=K, Ln P=bar, NIST)	
Volatility:	2.00 (air=1)	
Critical Temperature:	270 C	
Critical Pressure:	57 atm	
Heat of Vaporization:	163 cal/g at 96C	
Solubility in Water:	infinite	
Liquid Density:	0.8540 g/mL at 20 C	
Toxicity		
ACGIH TLV-TWA: 4.7 mg/m3	NIOSH REL-TWA: 4.7 mg/m3	OSHA PEL: 4.7 mg/m3
ACGIH TLV-STEL:	NIOSH REL-STEL: 9,5 mg/m3	
References		
1. NIST Chemistry WebBook 2. MSDS, Radian Corporation 3. MSDS, IUCLID, Oct 23, 95 4. Prausnitz		

Chemical Name	Hazard Index: Medium	
Common Name: allyl chlorocarbonate		
Empirical Formula: C4H5ClO2	CAS Number: 2937-50-0	
Sorptive Properties		
Filter Performance Index: Marginal		
Physical Adsorption:	Moderate adsorption on activated carbon followed by delayed desorption under dry conditions. Water soluble, desorption may decrease or be delayed with increasing relative humidity and adsorbed water.	
Chemisorption:	unknown	
Physical Properties		
Molecular Weight:	120.54	
Boiling Point:	109-110 C	
Vapor Pressure:	ca. 30 mm Hg at 25 C	
Volatility:	4.2 (air=1)	
Critical Temperature:		
Critical Pressure:		
Heat of Vaporization:	56 cal/g	
Solubility in Water:	1.139 g/mL at 20 C	
Liquid Density:	1.14 g/mL	
Toxicity		
ACGIH TLV-TWA:	NIOSH REL-TWA:	OSHA PEL:
ACGIH TLV-STEL:	NIOSH REL-STEL:	
References		
1. 1997 Beilstein CD&S Reg No. 773915 Dangerous Properties of Industrial Materials, SAX 19?		

Chemical Name	Hazard Index: Medium	
Common Name: Allylamine		
Empirical Formula: C3H7N	CAS Number: 107-11-9	
Sorptive Properties		
Filter Performance Index: Poor		
Physical Adsorption:	Moderate to weak adsorption on activated carbon under dry conditions, followed by desorption. Water soluble, desorption will decrease or be delayed with increasing relative humidity and adsorbed water.	
Chemisorption:	unknown	
Physical Properties		
Molecular Weight:	57.09	
Boiling Point:	56.5 C	
Vapor Pressure:	400 mmHg at 35C	
Volatility:	2.00 (air =1)	
Critical Temperature:		
Critical Pressure:		
Heat of Vaporization:		
Solubility in Water:	very soluble	
Liquid Density:	0.761 g/mL at 20 C	
Toxicity		
ACGIH TLV-TWA:	NIOSH REL-TWA:	OSHA PEL:
ACGIH TLV-STEL:	NIOSH REL-STEL:	
References		
<ol style="list-style-type: none"> 1. NIST Chemistry WebBook 2. MSDS, Radian Corporation, August 29, 1991 3. MSDS, Fisher, 5/28/96 4. Aldrich 		

Chemical Name	Hazard Index: Medium	
Common Name: Boron Tribromide		
Empirical Formula: BBr ₃	CAS Number: 10294-33-4	
Sorptive Properties		
Filter Performance Index: Marginal		
Physical Adsorption:	Moderate adsorption on activated carbon, followed by desorption under dry conditions. Water reactive, retention may increase with increasing relative humidity and adsorbed water.	
Chemisorption:	Possible removal by NBC filters due to hydrolysis and reaction with metal impregnants.	
Physical Properties		
Molecular Weight:	250.5	
Boiling Point:	91.7 C	
Vapor Pressure:	40 mmHg at 14C, 100 mm Hg at 35 C, Antoine: T=273-361K, A=4.01652 B=1262.484 C=-48.318 (T=K, Log P=bar, NIST)	
Volatility:		
Critical Temperature:		
Critical Pressure:		
Heat of Vaporization:	29 cal/g	
Solubility in Water:	reacts violently	
Liquid Density:	2.6 g/mL at 0 C	
Toxicity		
ACGIH TLV-TWA:	NIOSH REL-TWA: 10 mg/m ³	OSHA PEL:
ACGIH TLV-STEL: 10 mg/m ³	NIOSH REL-STEL:	
References		
<ol style="list-style-type: none"> 1. NIST Chemistry WebBook 2. The Merck Index, 11th Edition 3. MSDS, Fisher Corp 4. Handbook of Chemistry and Physics 		

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Chemical Name	Hazard Index: Medium	
Common Name: Carbon Monoxide		
Empirical Formula: CO	CAS Number: 630-08-0	
Sorptive Properties		
Filter Performance Index: Poor		
Physical Adsorption:	weakly adsorbed	
Chemisorption:	negligible	
Physical Properties		
Molecular Weight:	28.01	
Boiling Point:	-191 C	
Vapor Pressure:	Antoine: T=63-108 K, A=14.3686 B=530.22 C=-13.15 (T=K, Ln P= mm Hg, Prausnitz)	
Volatility:	0.968	
Critical Temperature:	-139 C	
Critical Pressure:	26600 mmHg	
Heat of Vaporization:	51.57 cal/g	
Solubility in Water:	3.3 ml/100 ml at 0 C, 2.3 ml/100 ml at 20C	
Liquid Density:		
Toxicity		
ACGIH TLV-TWA: 28.6 mg/m3	NIOSH REL-TWA: 40.0 mg/m3	OSHA PEL: 57.2 mg/m3
ACGIH TLV-STEL:	NIOSH REL-STEL:	
References		
<ol style="list-style-type: none"> 1. MSDS, BOC Group, May 9, 1989 2. MSDS, Specialty Gas, November 1, 1987 3. The Merck Index, 11th Edition 4. NIST Chemistry WebBook 5. Handbook of Chemistry and Physics 6. Prausnitz 		

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Chemical Name		Hazard Index: Medium	
Common Name: Carbonyl Sulfide		CAS Number: 463-58-1	
Empirical Formula: COS			
Sorptive Properties			
Filter Performance Index: Poor			
Physical Adsorption:	Weakly adsorbed on activated carbon. Desorption likely under dry conditions. Desorption may decrease or be delayed with increasing relative humidity and adsorbed water.		
Chemisorption:	Negligible removal by NBC filters		
Physical Properties			
Molecular Weight:	60.07		
Boiling Point:	-49.9		
Vapor Pressure:	1 mmHg at -132.4 C, 10 mmHg at -113.3 C, 100mmHg at -85.5C, Antoine: T=161.8-223.84, A=4.04360 B=808.490 C=-22.72 (T=K, Log P=bar, NIST)		
Volatility:	2.1 (air=1)		
Critical Temperature:	105 C		
Critical Pressure:	61 atm		
Heat of Vaporization:	73.67 cal/g		
Solubility in Water:	1.220 g/L at 25C		
Liquid Density:	1.24g/ml at -87 C		
Toxicity			
ACGIH TLV-TWA:	NIOSH REL-TWA:	OSHA PEL:	
ACGIH TLV-STEL:	NIOSH REL-STEL:		
References			
<ol style="list-style-type: none"> 1. NIST Chemistry WebBook 2. MSDS, Med Access Corporation, 1996 3. Handbook of Chemistry and Physics 			

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Chemical Name	Hazard Index: Medium	
Common Name: chloroacetone		
Empirical Formula: C3H5ClO	CAS Number: 78-95-5	
Sorptive Properties		
Filter Performance Index: Marginal		
Physical Adsorption:	Moderate adsorption on activated carbon, delayed desorption under dry conditions. Water soluble, desorption may decrease or be delayed with increasing relative humidity and adsorbed water.	
Chemisorption:	unknown	
Physical Properties		
Molecular Weight:	92.53	
Boiling Point:	119.7 C	
Vapor Pressure:	ca 15 mm Hg at 25 C, Antoine: T=303-391.6 A=5.0848 B=1902.738 C=-17.202 (T=K, Log P= bar, NIST)	
Volatility:		
Critical Temperature:		
Critical Pressure:		
Heat of Vaporization:		
Solubility in Water:	0.10 g/g	
Liquid Density:	1.162 g/mL at 20 C	
Toxicity		
ACGIH TLV-TWA:	NIOSH REL-TWA:	OSHA PEL:
ACGIH TLV-STEL: 3.7 mg/m3	NIOSH REL-STEL:	
References		
1. NIST Chemistry WebBook		
2. Meck Index, 12th edition		

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Chemical Name	Hazard Index: Medium	
Common Name: chloroacetonitrile		
Empirical Formula: C ₂ H ₂ CIN	CAS Number: 107-14-2	
Sorptive Properties		
Filter Performance Index: Marginal		
Physical Adsorption:	Moderate to strong adsorption on activated carbon, delayed desorption under dry conditions. Water soluble, desorption may decrease or be delayed with increasing relative humidity and adsorbed water.	
Chemisorption:	unknown	
Physical Properties		
Molecular Weight:	75.5	
Boiling Point:	124C	
Vapor Pressure:		
Volatility:		
Critical Temperature:		
Critical Pressure:		
Heat of Vaporization:		
Solubility in Water:	50-100 mg/mL at 21.5 C	
Liquid Density:	1.202 g/mL at 25 C	
Toxicity		
ACGIH TLV-TWA:	NIOSH REL-TWA:	OSHA PEL:
ACGIH TLV-STEL:	NIOSH REL-STEL:	
References		
1. NIST Chemistry WebBook		

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Chemical Name	Hazard Index: Medium	
Common Name: chlorosulfonic acid Empirical Formula: ClSO ₃ H	CAS Number: 7790-94-5	
Sorptive Properties		
Filter Performance Index: Effective		
Physical Adsorption:	Strongly adsorbed, decompose in water	
Chemisorption:	Possible removal by NBC filters by hydrolysis and reaction with metal impregnants	
Physical Properties		
Molecular Weight:	116.52	
Boiling Point:	152 C	
Vapor Pressure:	1 mmHg at 25 C	
Volatility:	4.0 (air=1)	
Critical Temperature:		
Critical Pressure:		
Heat of Vaporization:	110 cal/g	
Solubility in Water:	decomposes	
Liquid Density:	1.75 g/mL at 20 C	
Toxicity		
ACGIH TLV-TWA:	NIOSH REL-TWA:	OSHA PEL:
ACGIH TLV-STEL:	NIOSH REL-STEL:	
References		
1. www.chem.utah.edu/MSDS/		

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Chemical Name	Hazard Index: Medium	
Common Name: Crotonaldehyde		
Empirical Formula: C ₄ H ₆ O	CAS Number: 4170-30-3	
Sorptive Properties		
Filter Performance Index: Marginal		
Physical Adsorption:	Moderate to strong adsorption on activated carbon, delayed desorption under dry conditions. Water soluble, desorption may decrease or be delayed with increasing relative humidity and adsorbed water.	
Chemisorption:	Unknown	
Physical Properties		
Molecular Weight:	70.09	
Boiling Point:	104 C	
Vapor Pressure:	ca. 15-20 mmHg at 20C	
Volatility:	2.41 (air=1)	
Critical Temperature:	295 C	
Critical Pressure:	43 atm	
Heat of Vaporization:	38 kJ/mol	
Solubility in Water:	150 g/l at 20C	
Liquid Density:	0.853 @ 20 C	
Toxicity		
ACGIH TLV-TWA: 5.7 mg/m ³	NIOSH REL-TWA: 5.7 mg/m ³	OSHA PEL: 5.7 mg/m ³
ACGIH TLV-STEL: 0.86 mg/m ³	NIOSH REL-STEL:	
References		
1. NIST Chemistry WebBook 2. MSDS, IUCLID, October 23, 1995 3. MSDS, Radian Corporation, August 29, 1991 Dangerous Properties of Industrial Materials, SAX		

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Chemical Name	Hazard Index: Medium	
Common Name: diketene		
Empirical Formula: C ₄ H ₄ O ₂	CAS Number: 674-82-8	
Sorptive Properties		
Filter Performance Index: Marginal		
Physical Adsorption:	Moderate to strong adsorption, decomposes in water	
Chemisorption:	unknown	
Physical Properties		
Molecular Weight:	84.07	
Boiling Point:	127.4	
Vapor Pressure:	ca. 20 mm Hg at 25 C	
Volatility:	2.9 (air=1)	
Critical Temperature:		
Critical Pressure:		
Heat of Vaporization:		
Solubility in Water:	decomposes, nonhygroscopic	
Liquid Density:	1.0897 g/mL at 20 C	
Toxicity		
ACGIH TLV-TWA: 1.7 mg/m ³	NIOSH REL-TWA: 1.7 mg/m ³	OSHA PEL: 1.7 mg/m ³
ACGIH TLV-STEL: 5.1 mg/m ³	NIOSH REL-STEL: 5.1 mg/m ³	
References		
1. NIST Chemistry WebBook Dangerous Properties of Industrial Materials, SAX		

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Chemical Name	Hazard Index: Medium	
Common Name: dimethyl sulfate		
Empirical Formula: C2H6O4S	CAS Number: 77-78-1	
Sorptive Properties		
Filter Performance Index: Effective		
Physical Adsorption:	Strong adsorption, water soluble	
Chemisorption:	unknown	
Physical Properties		
Molecular Weight:	126.13	
Boiling Point:	188 C	
Vapor Pressure:	0.1 mmHg at 68 C	
Volatility:	4.36 (air=1)	
Critical Temperature:		
Critical Pressure:		
Heat of Vaporization:		
Solubility in Water:	2.8%	
Liquid Density:	1.332	
Toxicity		
ACGIH TLV-TWA:	NIOSH REL-TWA:	OSHA PEL:
ACGIH TLV-STEL:	NIOSH REL-STEL:	
References		
1. NIST Chemistry WebBook		
2. www.pdc.cornell.edu/msds		

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Chemical Name	Hazard Index: Medium	
Common Name: ethylene dibromide		
Empirical Formula: C ₂ H ₄ Br ₂	CAS Number: 106-93-4	
Sorptive Properties		
Filter Performance Index: Marginal		
Physical Adsorption:	Moderate to strong adsorption on activated carbon, delayed desorption under dry conditions. Low water solubility, desorption likely to increase with increasing relative humidity and adsorbed water.	
Chemisorption:	unknown	
Physical Properties		
Molecular Weight:	187.86	
Boiling Point:	131.5 C	
Vapor Pressure:	5 mm Hg at 4.7 C, 10 mm Hg at 18.6 C	
Volatility:	6.5 (air=1)	
Critical Temperature:		
Critical Pressure:		
Heat of Vaporization:	45.6 cal/g	
Solubility in Water:	0.4%	
Liquid Density:	2.177 g/mL at 21 C	
Toxicity		
ACGIH TLV-TWA:	NIOSH REL-TWA: 0.3 mg/m ³	OSHA PEL: 153 mg/m ³
ACGIH TLV-STEL:	NIOSH REL-STEL:	
References		
<ol style="list-style-type: none"> 1. NIST Chemistry WebBook 2. www.pdc.cornell.edu/msds/hazcom/ 		

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Chemical Name	Hazard Index: Medium	
Common Name: Hydrogen Selenide		
Empirical Formula: H ₂ Se	CAS Number: 7783-07-5	
Sorptive Properties		
Filter Performance Index: Poor		
Physical Adsorption:	Weakly adsorbed on activated carbon due to high vapor pressure, water soluble, desorption may increase with increasing relative humidity and adsorbed water	
Chemisorption:	unknown	
Physical Properties		
Molecular Weight:	80.98	
Boiling Point:	-41.3 C	
Vapor Pressure:	1mmHg at -115.3C, 40 mmHg at -84.7C, 400 mmHg at -53.6C, 7438.7 at 20C, Antoine: T=157.8-232K , A=3.61665 B=596.484 C=-66.353 (T=K, Log P=bar, NIST)	
Volatility:		
Critical Temperature:	138C	
Critical Pressure:	88 atm	
Heat of Vaporization:	58.8 cal/g	
Solubility in Water:	270 ml/100 ml water	
Liquid Density:	2.12 g/mL at -42 C	
Toxicity		
ACGIH TLV-TWA: 0.16 mg/m ³	NIOSH REL-TWA: 0.16 mg/m ³	OSHA PEL: 0.16 mg/m ³
ACGIH TLV-STEL:	NIOSH REL-STEL:	
References		
<ol style="list-style-type: none"> 1. NIST Chemistry WebBook 2. Worksafe Australia, 1996 3. The Merck Index, 11th Edition 4. Handbook of Chemistry and Physics 		

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Chemical Name	Hazard Index: Medium	
Common Name: Iron Pentacarbonyl		
Empirical Formula: C5FeO5	CAS Number: 13463-40-6	
Sorptive Properties		
Filter Performance Index: Marginal		
Physical Adsorption:	Moderate to strong adsorption on activated carbon, delayed desorption under dry conditions. Water insoluble, desorption likely to increase with increasing relative humidity and adsorbed water.	
Chemisorption:	unknown	
Physical Properties		
Molecular Weight:	195.90	
Boiling Point:	103 C	
Vapor Pressure:	26 mmHg at 20C, 40 mmHg at 30.3 C, 69 mmHg at 40C	
Volatility:		
Critical Temperature:	285-288 C	
Critical Pressure:	29.6 atm	
Heat of Vaporization:	9.6 kcal/mole	
Solubility in Water:	practically insoluble	
Liquid Density:	1.46 - 1.52 g/mL at 20 C	
Toxicity		
ACGIH TLV-TWA: 0.8 mg/m3	NIOSH REL-TWA: 0.8 mg/m3	OSHA PEL:
ACGIH TLV-STEL: 1.6 mg/m3	NIOSH REL-STEL: 1.6 mg/m3	
References		
<ol style="list-style-type: none"> 1. NIST Chemistry WebBook 2. MSDS, IUCLID, Oct 23, 1995 3. The Merck Index, 11th Edition 4. Handbook of Chemistry and Physics 5. Aldrich 		

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Chemical Name	Hazard Index: Medium	
Common Name: methanesulfonyl chloride		
Empirical Formula: CH ₃ ClO ₂ S	CAS Number: 124-63-0	
Sorptive Properties		
Filter Performance Index: Effective		
Physical Adsorption:	Moderate to strong adsorption on activated carbon, delayed desorption under dry conditions. Low water solubility, increased desorption with increasing relative humidity and adsorbed water.	
Chemisorption:	unknown	
Physical Properties		
Molecular Weight:	114.55	
Boiling Point:	162 C	
Vapor Pressure:	18 mmHg at 21 C	
Volatility:	3.94 (air=1)	
Critical Temperature:		
Critical Pressure:		
Heat of Vaporization:		
Solubility in Water:	negligible	
Liquid Density:	1.4805 g/ml at 18 C	
Toxicity		
ACGIH TLV-TWA:	NIOSH REL-TWA:	OSHA PEL:
ACGIH TLV-STEL:	NIOSH REL-STEL:	
References		
1. NIST Chemistry WebBook		

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Chemical Name	Hazard Index: Medium	
Common Name: Methyl Bromide		
Empirical Formula: CH ₃ Br	CAS Number: 74-83-9	
Sorptive Properties		
Filter Performance Index: Poor		
Physical Adsorption:	Weakly adsorbed on activated carbon. Water soluble, desorption may increase with increasing relative humidity and adsorbed water.	
Chemisorption:	unknown	
Physical Properties		
Molecular Weight:	94.94	
Boiling Point:	3.56 C	
Vapor Pressure:	40 mmHg at -54.2C, 760 mmHg at 3.6C, 1250 mmHg at 20C, Antoine: T=203-276.7K A=4.26874 B=1069.708 C=-25.771 (T=K, LogP=bar, NIST), T= 215-326 K, A=16.0252 B=2271.71 C=-34.83 (T=K, LnP=mm Hg, Prausnitz)	
Volatility:	3.3 (air=1)	
Critical Temperature:	194C	
Critical Pressure:	66.1 bar	
Heat of Vaporization:	23.91kJ/mol	
Solubility in Water:	1.75g/100g at 20C and 748 mmHg	
Liquid Density:	1.737 g/mL at 268K	
Toxicity		
ACGIH TLV-TWA: 4.7 mg/m ³	NIOSH REL-TWA:	OSHA PEL: 4.7 mg/m ³
ACGIH TLV-STEL:	NIOSH REL-STEL:	
References		
<ol style="list-style-type: none"> 1. NIST Chemistry WebBook 2. MSDS, Radian Corporation, August 29, 1991 3. The Merck Index, 11th Edition 4. Prausnitz 5. Aldrich 		

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Chemical Name	Hazard Index: Medium	
Common Name: Methyl Chloroformate		
Empirical Formula: C2H3ClO2	CAS Number: 79-22-1	
Sorptive Properties		
Filter Performance Index: Poor		
Physical Adsorption:	Moderate to weak adsorption followed by desorption under dry conditions. Slightly soluble in water, increased desorption with increasing relative humidity and adsorbed water.	
Chemisorption:	unknown	
Physical Properties		
Molecular Weight:	94.50	
Boiling Point:	71.4 C	
Vapor Pressure:	95.2 mmHg at 20C	
Volatility:	3.26 (air=1)	
Critical Temperature:		
Critical Pressure:		
Heat of Vaporization:	85 cal/g	
Solubility in Water:	slightly soluble, gradual decomposition	
Liquid Density:	1.223 g/mL at 20 C	
Toxicity		
ACGIH TLV-TWA:	NIOSH REL-TWA:	OSHA PEL:
ACGIH TLV-STEL:	NIOSH REL-STEL:	
References		
<ol style="list-style-type: none"> 1. NIST Chemistry WebBook 2. The Merck Index, 11th Edition 3. Aldrich 		

Chemical Name	Hazard Index: Medium	
Common Name: methyl chlorosilane		
Empirical Formula: CH ₅ ClSi	CAS Number: 993-00-0	
Sorptive Properties		
Filter Performance Index: Poor		
Physical Adsorption:	Weakly adsorbed on activated carbon due to high vapor pressure.	
Chemisorption:	Unknown	
Physical Properties		
Molecular Weight:	80.59	
Boiling Point:		
Vapor Pressure:	543 mm Hg at 0C, 63 mm Hg at -45C, 0.5 mm Hg at -105C	
Volatility:		
Critical Temperature:		
Critical Pressure:		
Heat of Vaporization:		
Solubility in Water:		
Liquid Density:		
Toxicity		
ACGIH TLV-TWA:	NIOSH REL-TWA:	OSHA PEL:
ACGIH TLV-STEL:	NIOSH REL-STEL:	
References		
1998 Beilstein CD&S		

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Chemical Name	Hazard Index: Medium	
Common Name: Methyl Hydrazine		
Empirical Formula: CH6N2	CAS Number: 60-34-4	
Sorptive Properties		
Filter Performance Index: Marginal		
Physical Adsorption:	Moderate to strong adsorption under dry conditions, delayed desorption under dry conditions. Low water solubility, increased desorption with increasing relative humidity and adsorbed water.	
Chemisorption:	unknown	
Physical Properties		
Molecular Weight:	46.07	
Boiling Point:	87.5 C	
Vapor Pressure:	39.5 mmHg at 20C, 49.6 mmHg at 25 C, Antoine: T=275.11-298.32K , A=3.96787 B=1115.190 C=-81.502 (T=K, LogP=bar, NIST), T=270-400K, A=15.1424 B=2319.84 C=-91.7 (T=K, LnP=mmHg, Prausnitz)	
Volatility:	1.6 (air=1)	
Critical Temperature:		
Critical Pressure:		
Heat of Vaporization:	40.4 kJ/mol	
Solubility in Water:	<1mg/mL at 24C	
Liquid Density:	0.874 g/mL at 25C	
Toxicity		
ACGIH TLV-TWA: 0.018 mg/m3	NIOSH REL-TWA: 0.075 mg/3	OSHA PEL: 0.37 mg.m3
ACGIH TLV-STEL:	NIOSH REL-STEL:	
References		
<ol style="list-style-type: none"> 1. NIST Chemistry Webbook 2. MSDS, Radian Corporation, August 29, 1991 3. MSDS, Fisher Corp 4. Prausnitz 		

Chemical Name	Hazard Index: Medium	
Common Name: Methyl Isocyanate Empirical Formula: C2H3NO	CAS Number: 624-83-9	
Sorptive Properties		
Filter Performance Index: Poor		
Physical Adsorption:	Weakly adsorbed on activated carbon due to high vapor pressure, desorption under dry conditions.	
Chemisorption:	Limited removal by NBC filters under humid conditions due to reaction with metal impregnants. Chemisorption may be reduced under dry conditions, leading to desorption. Decomposes in water. (Buettner, 198)	
Physical Properties		
Molecular Weight:	57.06	
Boiling Point:	37-39 C	
Vapor Pressure:	200 mmHg at 4.2 C, 300 mmHg at 13.5 C, 348 mmHg at 20 C , 400 mmHg at 20.6 C, 600 mmHg at 31.2 C, antoine: T= 230-340, A=16.3258 B=2480.37 C=-56.31 (T=K, LnP=mmHg, Prausnitz)	
Volatility:	2.0 (air=1)	
Critical Temperature:	218 C	
Critical Pressure:	55 atm	
Heat of Vaporization:		
Solubility in Water:	decomposes	
Liquid Density:	0.96 g/mL at 20 C	
Toxicity		
ACGIH TLV-TWA: 0.046 mg/m3	NIOSH REL-TWA: 0.046 mg/m3	OSHA PEL: 0.046 mg/m3
ACGIH TLV-STEL:	NIOSH REL-STEL:	
References		
<ol style="list-style-type: none"> 1. MSDS, Radian Corporation, August 29, 1991 2. NIST Chemistry WebBook 3. The Merck Index, 11th Edition 4. Prausnitz 		

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Chemical Name	Hazard Index: Medium	
Common Name: Methyl Mercaptan, methanethiol		
Empirical Formula: CH4S	CAS Number: 74-93-1	
Sorptive Properties		
Filter Performance Index: Poor		
Physical Adsorption:	Weakly adsorbed, water soluble, desorption may increase with increasing relative humidity and adsorbed water.	
Chemisorption:	negligible	
Physical Properties		
Molecular Weight:	48.11	
Boiling Point:	5.95 C	
Vapor Pressure:	400 mmHg at -7.9C, 1317 mmHg at 20C, Antoine: T=221.87-279.13K A=4.19201 B=1031.431 C=-32.72 (T=K, LogP=bar, NIST), A=16.1909 B=2338.38 C=-34.44 (T=K, LnP=mmHg, Prausnitz)	
Volatility:	0.125 (air=1)	
Critical Temperature:	196.8 C	
Critical Pressure:	71.4 atm	
Heat of Vaporization:	24.568kJ/mol(2), 122.1 cal/g	
Solubility in Water:	2.33% at 20C	
Liquid Density:	0.8665 g/mL at 20C	
Toxicity		
ACGIH TLV-TWA: 0.98 mg/m3	NIOSH REL-TWA: 0.98 mg/m3	OSHA PEL: 19.6 mg/m3
ACGIH TLV-STEL:	NIOSH REL-STEL:	
References		
<ol style="list-style-type: none"> 1. MSDS, University of Akron, Ohio 2. NIST Chemistry WebBook 3. The Merck Index, 11th Edition 4. MSDS, Fisher Corp. 5. Prausnitz 		

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Chemical Name	Hazard Index: Medium	
Common Name: n-butyl isocyanate		
Empirical Formula: C ₅ H ₉ NO	CAS Number: 111-36-4	
Sorptive Properties		
Filter Performance Index: Marginal		
Physical Adsorption:	Morderate to strong adsorption on activated carbon, delayed desorption under dry conditions. Low water solubility, desorption may increase with increasing relative humidity and adsorbed water.	
Chemisorption:	Possible removal by NBC filters due to hydrolysis and reaction with metal impregnants. May be similar to methylisocyanate.	
Physical Properties		
Molecular Weight:	99.1	
Boiling Point:	113-116 C	
Vapor Pressure:	40.2 mmHg at 20C	
Volatility:		
Critical Temperature:		
Critical Pressure:		
Heat of Vaporization:		
Solubility in Water:	<0.001% in water	
Liquid Density:	0.880 g/mL at 20 C	
Toxicity		
ACGIH TLV-TWA:	NIOSH REL-TWA:	OSHA PEL:
ACGIH TLV-STEL:	NIOSH REL-STEL:	
References		
1. NIST Chemistry WebBook 2. www.pdc.cornell.edu/msds/hazcom		

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Chemical Name	Hazard Index: Medium	
Common Name: Nitrogen Dioxide		
Empirical Formula: NO ₂	CAS Number: 10102-44-0	
Sorptive Properties		
Filter Performance Index: Poor		
Physical Adsorption:	Weakly adsorbed on activated carbon due to high vapor pressure. Water miscible and reactive.	
Chemisorption:	Limited chemisorption by NBC filters with possible reversal of reaction products. See fuming nitric acid.	
Physical Properties		
Molecular Weight:	46.01	
Boiling Point:	21.15 C	
Vapor Pressure:	1 mmHg at -55.6C, 10 mmHg at -36.7C, 400 mmHg at 8C, 720 mmHg at 20 C, Antoine: T=217.5-294K A=3.35248 B=540.635 C=-131.93 (T=K, LogP=bar, NIST), T=230-32-K, A=20.5324 B=4141.29 C=3.65 (T=K, LnP=mmHg, Prausnitz)	
Volatility:	1.58 (air=1)	
Critical Temperature:	158.2 C	
Critical Pressure:	99.96 atm	
Heat of Vaporization:	99cal/g	
Solubility in Water:	Miscible, reacts with water to form nitric acid and nitrous acids	
Liquid Density:	1.447 g/mL at 20 C	
Toxicity		
ACGIH TLV-TWA: 5.6 mg/m ³	NIOSH REL-TWA:	OSHA PEL: 9.4 mg/m ³
ACGIH TLV-STEL: 9.4 mg/m ³	NIOSH REL-STEL: 1.8 mg/m ³	
References		
<ol style="list-style-type: none"> 1. Laboratory Chemical Safety Sheet, Howard Hughes Medical Institute, July 1994 2. NIST Chemistry WebBook 3. The Merck Index, 11th Edition 4. Prausnitz 5. Aldrich 6. Handbook of Chemistry and Physics 		

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Chemical Name	Hazard Index: Medium	
Common Name: Phosphine		
Empirical Formula: H3P	CAS Number: 7803-51-2	
Sorptive Properties		
Filter Performance Index: Poor		
Physical Adsorption:	Weakly adsorbed on activated carbon due to high vapor pressure. Low water solubility, desorption likely under dry and humid conditions.	
Chemisorption:	Likely removal by NBC filters due to reaction with metal impregnants. Chemisorption similar to arsine. (Kloos, 1966; Muthu, 1974)	
Physical Properties		
Molecular Weight:	34	
Boiling Point:	-87.7 C	
Vapor Pressure:	40 mmHg at -129.4 C, 400mmHg at -98.3 C, 26702 mmHg at 20C, Antoine: T=143.7-185.6K , A=4.02591 B=702.651 C=-11.065 (T=K, LogP=bar, NIST)	
Volatility:	1.146 (air=1)	
Critical Temperature:	52 C	
Critical Pressure:	65 atm	
Heat of Vaporization:		
Solubility in Water:	0.27 v/v at 20C	
Liquid Density:		
Toxicity		
ACGIH TLV-TWA: 0.41 mg/3	NIOSH REL-TWA: 0.41 mg/m3	OSHA PEL: 0.41 mg/m3
ACGIH TLV-STEL: 1.39 mg/m3	NIOSH REL-STEL: 1.39 mg/m3	
References		
<ol style="list-style-type: none"> 1. US Dept of Labor, OSHA 2. MSDS, Voltaix, Inc, 1994 3. MSDS, Radian Corporation, August 29, 1991 4. NIST Chemistry WebBook 5. The Merck Index, 11th Edition 		

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Chemical Name	Hazard Index: Medium	
Common Name: Phosphorus Oxychloride		
Empirical Formula: Cl ₃ OP	CAS Number: 10025-87-3	
Sorptive Properties		
Filter Performance Index: Marginal		
Physical Adsorption:	Moderate to strong adsorption on activated carbon, delayed desorption under dry conditions. Water reactive, desorption may decrease or be delayed with increasing relative humidity and co-adsorbed water.	
Chemisorption:	Possible removal by NBC filters due to hydrolysis and reaction with metal impregnants	
Physical Properties		
Molecular Weight:	153.33	
Boiling Point:	105.1 C	
Vapor Pressure:	27 mmHg at 20 C, Antoine: T=275-378.2K A=4.28166 B=1445.959 C=-40.119 (T=K, LogP= bar, NIST)	
Volatility:		
Critical Temperature:	332 C	
Critical Pressure:		
Heat of Vaporization:	54 cal/g	
Solubility in Water:	reacts exothermically with water	
Liquid Density:	1.68 g/mL at 20 C	
Toxicity		
ACGIH TLV-TWA: 0.62 mg/m ³	NIOSH REL-TWA: 0.62 mg/m ³	OSHA PEL:
ACGIH TLV-STEL:	NIOSH REL-STEL: 3.1 mg/m ³	
References		
<ol style="list-style-type: none"> 1. NIST Chemistry WebBook 2. MSDS, IUCLID, Oct 23, 1995 3. Aldrich 		

Chemical Name	Hazard Index: Medium	
Common Name: Phosphorus Pentafluoride		
Empirical Formula: PF ₅	CAS Number: 7647-19-0	
Sorptive Properties		
Filter Performance Index: Poor		
Physical Adsorption:	Weakly adsorbed on activated carbon due to high vapor pressure	
Chemisorption:	Possible removal by NBC filters due to hydrolysis and reaction with metal impregnants. (Dickinson, 1942 and Stosick, 1942 on PF ₃)	
Physical Properties		
Molecular Weight:	125.966	
Boiling Point:	-84.8 C	
Vapor Pressure:		
Volatility:	5.81 g/l	
Critical Temperature:	15 C	
Critical Pressure:	125 atm	
Heat of Vaporization:	31.8 cal/g	
Solubility in Water:	rapid hydrolysis	
Liquid Density:		
Toxicity		
ACGIH TLV-TWA:	NIOSH REL-TWA:	OSHA PEL:
ACGIH TLV-STEL:	NIOSH REL-STEL:	
References		
<ol style="list-style-type: none"> 1. Matheson Gas Data Book 2. CRC Handbook of Chemistry and Physics 3. Registry of Toxic Effects of Chemical Substances 		

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Chemical Name	Hazard Index: Medium	
Common Name: selenium hexafluoride		
Empirical Formula: SeF6	CAS Number: 7783-79-1	
Sorptive Properties		
Filter Performance Index: Effective		
Physical Adsorption:	Weakly adsorbed on activated carbon due to high vapor pressure. Water insoluble, hydrolyzes slowly. Desorption likely under dry and humid conditions.	
Chemisorption:	Effectively removed by NBC filters due to reaction with metal impregnants. (Dickinson, 1941 on SeF6, Olszowski, 1950 on UF6)	
Physical Properties		
Molecular Weight:	192.95	
Boiling Point:	sublimes at -63.8 C	
Vapor Pressure:	651.2 mm Hg at -48.7 C, 213.1 mm Hg at -64.8 C, 30.4 mm Hg at -87.5 C, Antoine: T=154.5-227.3, A=6.53311 B=1556.66 C=10.902 (T=K, LogP=bar, NIST)	
Volatility:		
Critical Temperature:		
Critical Pressure:		
Heat of Vaporization:		
Solubility in Water:	insoluble, hydrolyzes slowly	
Liquid Density:		
Toxicity		
ACGIH TLV-TWA: 0.39 mg/m3	NIOSH REL-TWA: 0.39 mg/m3	OSHA PEL: 0.39 mg/m3
ACGIH TLV-STEL:	NIOSH REL-STEL:	
References		
1. NIST Chemistry WebBook		

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Chemical Name	Hazard Index: Medium	
Common Name: Silicon Tetrafluoride		
Empirical Formula: SiF ₄	CAS Number: 7783-61-1	
Sorptive Properties		
Filter Performance Index: Poor		
Physical Adsorption:	Weakly adsorbed on activated carbon due to high vapor pressure	
Chemisorption:	Unknown. Reacts with water.	
Physical Properties		
Molecular Weight:	104.08	
Boiling Point:	-95.7 C sublimes	
Vapor Pressure:	1 mmHg at -144C, 400 mmHg at -100.7 C, 2670 mmHg at -79C, 3.56 bar at -79 C, Antoine: T=129-178.3K A=7.10978 B=1220.564 C=-6.884, T=163.16-186.91K A=8.377664 B=1643.698 C=18.344 (T=K, LogP=bar, NIST)	
Volatility:	4.69 g/L	
Critical Temperature:	-1.5 C	
Critical Pressure:	38000 mmHg	
Heat of Vaporization:	34.12 cal/g	
Solubility in Water:	hydrolyzes in water to form silicic acid and HF	
Liquid Density:	1.59 at -80 C	
Toxicity		
ACGIH TLV-TWA: 2.5 mg/m ³	NIOSH REL-TWA: 2.5 mg/m ³	OSHA PEL: 2.5 mg/m ³
ACGIH TLV-STEL:	NIOSH REL-STEL:	
References		
<ol style="list-style-type: none"> 1. MSDS, Liquid Air Corporation, January 1, 1987 2. NIST Chemistry WebBook 3. US Dept of Labor, OSHA 4. MSDS, Voltaix Inc., 1994 5. The Merck Index, 11th Edition 6. Aldrich 		

Chemical Name	Hazard Index: Medium	
Common Name: Stibine		
Empirical Formula: H3Sb	CAS Number: 7803-52-3	
Sorptive Properties		
Filter Performance Index: Poor		
Physical Adsorption:	Weakly adsorbed due to high vapor pressure. Low water solubility.	
Chemisorption:	Possible removal by NBC filters due reaction with metal impregnants (may be similar to arsine removal)	
Physical Properties		
Molecular Weight:	124.78	
Boiling Point:	-18.4	
Vapor Pressure:		
Volatility:		
Critical Temperature:		
Critical Pressure:		
Heat of Vaporization:		
Solubility in Water:	slightly soluble at 20 C	
Liquid Density:	2.204 g/mL at boiling point	
Toxicity		
ACGIH TLV-TWA:	0.51 mg/m3	NIOSH REL-TWA: 0.51 mg/m3 OSHA PEL: 0.51 mg/m3
ACGIH TLV-STEL:		NIOSH REL-STEL:
References		
<ol style="list-style-type: none"> 1. MSDS, University of Akron, Ohio 2. The Merck Index, 11th Edition 3. NIST Chemistry WebBook 		

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Chemical Name	Hazard Index: Medium	
Common Name: Sulfur Trioxide		
Empirical Formula: SO ₃	CAS Number: 7446-11-9	
Sorptive Properties		
Filter Performance Index: Marginal		
Physical Adsorption:	Moderate to weak adsorption on activated carbon under dry conditions followed by desorption	
Chemisorption:	Possible removal by NBC filters due to reaction with water and metal impregnants	
Physical Properties		
Molecular Weight:	80.06	
Boiling Point:	44.8 C (gamma form)	
Vapor Pressure:	Three forms exist: 73 mm Hg at 25 C (alpha form, most stable), 344 mm Hg at 25 C (beta form), 433 mmHg at 25 C(gamma form), Antoine: T=333-483K A=4.20515 B=892.175 C=-103.564 (T=K, Log P=bar, NIST, form unidentified), A=20.8403 B=3995.7 C=-36.66 (T=K, LnP=mm Hg, Prausnitz, form unidentified)	
Volatility:	2.76 (air=1) gamma form	
Critical Temperature:		
Critical Pressure:		
Heat of Vaporization:		
Solubility in Water:	reacts violently forming H ₂ SO ₄	
Liquid Density:	1.92 g/cm-3 gamma form	
Toxicity		
ACGIH TLV-TWA: 6.5 mg/m ³	NIOSH REL-TWA: 6.5 mg/m ³	OSHA PEL: 6.3 mg/m ³
ACGIH TLV-STEL: 16.3 mg/m ³	NIOSH REL-STEL: 6.3 mg/m ³	
References		
<ol style="list-style-type: none"> 1. NIST Chemistry WebBook 2. The Merck Index, 11th Edition 3. MSDS, Fisher Corp 4. Prausnitz 5. Handbook of Chemistry and Physics 6. Aldrich 		

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Chemical Name	Hazard Index: Medium	
Common Name: Sulfuryl Chloride		
Empirical Formula: Cl ₂ O ₂ S	CAS Number: 7791-25-5	
Sorptive Properties		
Filter Performance Index: Poor		
Physical Adsorption:	Moderate to weak adsorption under dry conditions. Hydrolyzes, desorption may decrease or be delayed with increasing relative humidity and adsorbed water.	
Chemisorption:	Possible removal by NBC filters due to hydrolysis and reaction with metal impregnants	
Physical Properties		
Molecular Weight:	134.97	
Boiling Point:	69 C	
Vapor Pressure:	100 mmHg at 17.8 C, 111 mmHg at 20 C, 383 mmHg at 50 C	
Volatility:	4.65 (air=1)	
Critical Temperature:		
Critical Pressure:		
Heat of Vaporization:	49.5 cal/g	
Solubility in Water:	hydrolyzes	
Liquid Density:	1.67 g/cm ³ at 20 C	
Toxicity		
ACGIH TLV-TWA:	NIOSH REL-TWA:	OSHA PEL:
ACGIH TLV-STEL:	NIOSH REL-STEL:	
References		
1. NIST Chemistry WebBook		
2. MSDS, IUCLID, Oct 23, 1995		

Chemical Name	Hazard Index: Medium	
Common Name: tellurium hexafluoride		
Empirical Formula: TeF6	CAS Number: 7783-80-4	
Sorptive Properties		
Filter Performance Index: Poor		
Physical Adsorption:	Weakly adsorbed on activated carbon, slow reaction in water. (see SeF6)	
Chemisorption:	unknown	
Physical Properties		
Molecular Weight:	241.59	
Boiling Point:	sublimes at -38.9 C	
Vapor Pressure:	Antoine: T=161.8-234.5, A=5.35543 B=1122.339 C=-25.437 (T=K, LogP=bar, NIST)	
Volatility:		
Critical Temperature:	83 C	
Critical Pressure:		
Heat of Vaporization:		
Solubility in Water:	gradual reaction with water	
Liquid Density:	2.499 g/mL at -10 C	
Toxicity		
ACGIH TLV-TWA: 0.19 mg/m3	NIOSH REL-TWA: 0.19 mg/m3	OSHA PEL: 0.19 mg/m3
ACGIH TLV-STEL:	NIOSH REL-STEL:	
References		
1. NIST Chemistry WebBook		

Chemical Name	Hazard Index: Medium	
Common Name: tert-octyl mercaptan		
Empirical Formula: C8H18S	CAS Number: 111-88-6	
Sorptive Properties		
Filter Performance Index: Effective		
Physical Adsorption:	Strong adsorption on activated carbon.	
Chemisorption:	negligible	
Physical Properties		
Molecular Weight:	146.29	
Boiling Point:	155-156 C	
Vapor Pressure:		
Volatility:		
Critical Temperature:		
Critical Pressure:		
Heat of Vaporization:		
Solubility in Water:		
Liquid Density:		
Toxicity		
ACGIH TLV-TWA:	NIOSH REL-TWA: 3 mg/m3	OSHA PEL:
ACGIH TLV-STEL:	NIOSH REL-STEL:	
References		
<ol style="list-style-type: none"> 1. NIST Chemistry WebBook 2. 1997 Beilstein CD&S Reg No. 1732867 		

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Chemical Name	Hazard Index: Medium	
Common Name: titanium tetrachloride		
Empirical Formula: Cl ₄ Ti	CAS Number: 7550-45-0	
Sorptive Properties		
Filter Performance Index: Effective		
Physical Adsorption:	Strong adsorption followed by delayed desorption under dry conditions. Water soluble, desorption may decrease with increasing relative humidity and co-adsorbed water.	
Chemisorption:	unknown	
Physical Properties		
Molecular Weight:	189.68	
Boiling Point:	136.4 C	
Vapor Pressure:	Antoine: T=249.93-423, A=4.84969, B=1990.235, C=2.0 (T=K, LogP=bar, NIST), ca. 12 mm Hg at 25 C	
Volatility:		
Critical Temperature:		
Critical Pressure:		
Heat of Vaporization:	44.3 cal/g	
Solubility in Water:	soluble	
Liquid Density:	1.726 g/ml at 20 C	
Toxicity		
ACGIH TLV-TWA:	NIOSH REL-TWA:	OSHA PEL:
ACGIH TLV-STEL:	NIOSH REL-STEL:	
References		
1. NIST Chemistry WebBook		

Chemical Name	Hazard Index: Medium	
Common Name: trichloroacetyl chloride		
Empirical Formula: C2Cl4O	CAS Number: 76-02-8	
Sorptive Properties		
Filter Performance Index: Marginal		
Physical Adsorption:	Strong to moderate adsorption on activated carbon followed by delayed desorption under dry conditions. Effect of co-adsorbed water unknown	
Chemisorption:	unknown	
Physical Properties		
Molecular Weight:	181.83	
Boiling Point:	115 C	
Vapor Pressure:	Antoine: T=305.32-392.58 A=4.11208 B=1388.325 C=-53.272 (T=K, log P= bar, NIST), ca. 29 mm Hg at 32 C	
Volatility:		
Critical Temperature:		
Critical Pressure:		
Heat of Vaporization:		
Solubility in Water:		
Liquid Density:		
Toxicity		
ACGIH TLV-TWA:	NIOSH REL-TWA:	OSHA PEL:
ACGIH TLV-STEL:	NIOSH REL-STEL:	
References		
<ol style="list-style-type: none"> 1. Aldrich 2. NIST Chemistry WebBook 		

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Chemical Name	Hazard Index: Medium	
Common Name: trifluoroacetyl chloride		
Empirical Formula: C2ClF3O	CAS Number: 354-32-5	
Sorptive Properties		
Filter Performance Index: Poor		
Physical Adsorption:	Weakly adsorbed on activated carbon due to high vapor pressure.	
Chemisorption:	unknown	
Physical Properties		
Molecular Weight:	132.47	
Boiling Point:	-26.9 C	
Vapor Pressure:		
Volatility:		
Critical Temperature:		
Critical Pressure:		
Heat of Vaporization:		
Solubility in Water:		
Liquid Density:		
Toxicity		
ACGIH TLV-TWA:	NIOSH REL-TWA:	OSHA PEL:
ACGIH TLV-STEL:	NIOSH REL-STEL:	
References		
1. Aldrich 2. NIST Chemistry WebBook		