Potential to Emit

Fluid Motion, LLC, Monroe Product Usage and Emissions Calculations

Product Used	Application Method	Used (gal/year)	Density (lb/gal)	Used (ton/yr)	Styrene (%)	MMA (%)	Methyl ethyl ketone (%)	n-Hexane (%)	Xylene (%)	Toluene (%)	Cyclohexane (%)	Ethyl benzene (%)	Benzene (%)	Dimethyl ether (%)	VOC (%)
Gelcoat (1)	controlled spray	4977	10.85	27	33%	3%	0	0	0	0	0	0	0		36%
Polyester resin (2)	mechanical non-atomized	24834	9.00	112	35%		0	0	0	0	0	0	0		35%
Vinyl ester resin(3)	mechanical non-atomized	2889	9.00	13	35%		0	0	0	0	0	0	0		35%
Radius Putty(4)	mechanical non-atomized	2035	13.76	14	20%	0%	0	0	0	0	0	0	0		20%
Initiator (MEKP-925)(5)		959	8.34	4	0%		5%	0	0	0	0	0	0		5%
Mold Release (6)		3	7.30	0.01	0%		0	35%	35%	20%	20%	7%	5%		98%
Wood Stain(7)		53	7.52	0.2	0%		0%	16.8%	16.8%	9.6%	9.6%	3.4%	2.4%		56%
Spray Adhesive(8)		90	6.67	0.3	0%	0%	0	0.0%	0.0%	0	20%	0	0	20%	40%
HAP					Y	Y	N	Y	Y	Y	N	Y	Y	N	NA
TAP					Y	Y	Y	Y	Y	Y	Y	Y	Y	N	NA
VOC					Y	Y	y	Y	Y	Y	Y	Y	Y	Y	Y

(1) SDS for HK Research Corp Product No. HD-2588
(2) SDS for Ashland Aropol Q-67700 T-30
(3) SDS for Ashland AME 6001 T-25 Resin
(4) SDS for U.S. Chemical putty Duraglas
(5) SDS for Cadox L-50 A MEKP
(6) SDS for TR-900 + SDS for WOLO +SDS for naphtha
(7) SDS for Minwax Spar Urethane Stain. Note product is 48% mineral spirits or naphtha derivative. SDS for naphtha used to determne hazardous constituents.

11660 Actual Emissions Calculation

Product	Amount Used	Annual Potential to Emit VOCs, HAPs and TAPs													
		Styrene		Methyl methacrylate		Methyl ethyl ketone	n-Hexane	Xylene	Toluene	Cyclohexane	Ethyl benzene	Benzene	Dimethyl ether	VOC	Total HAPs
	(ton/yr)	Emission Factor (10) (lb/ton)	(ton/yr)	Emission Factor (10) (lb/ton)	(ton/yr)	(ton/yr)	(ton/yr)	(ton/yr)	(ton/yr)	(ton/yr)	(ton/yr)	(ton/yr)	(ton/yr)	(ton/yr)	(ton/yr)
Gelcoat	27	215	2.903	45	0.608	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	3.510	
Polyester resin	111.7	77	4.300		0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	4.300	
Vinyl ester resin	13	77	0.501		0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.501	
5Gal Hi-Thix Radius Putty	14	77	0.539		0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.539	
Initiator (MEKP-925)	4	NA	0.000		0.000	0.200	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.200	
Mold Release	0.01	NA	0.000		0.000	0.000	0.004	0.004	0.002	0.002	0.001	0.001	0.000	0.010	
Wood Stain	0.2	NA	0.000		0.000	0.000	0.034	0.034	0.019	0.019	0.007	0.005	0.000	0.112	
Spray Adhesive	0.3	NA	0.000		0.000	0.000	0.000	0.000	0.000	0.060	0.000	0.000	0.060	0.120	
Total:		ton/year	8.242		0.608	0.200	0.037	0.037	0.021	0.081	0.007	0.005	0.060	9.292	
		lb/hr	8.121		0.599	0.197	0.037	0.037	0.021	0.080	0.007	0.005	0.059	9.154	
Total HAPS			8.242		0.608	0.000	0.037	0.037	0.021	0.000	0.007	0.005	0.000		8.96

(10) Unified Emission Factors for Open Modling of Composites, July 23,2001

WAC 173-460 TAPs Thresholds for Air Dispersion Modeling

TAP	SQER		Potential Emissions		Model?
Styrene	65	lb/24-hr	64.97	lb/24-hr	no
Methyl methacrylate	52	lb/24-hr	4.79	lb/24-hr	no
Methyl ethyl ketone	370	lb/24-hr	1.58	lb/24-hr	no
n-Hexane	52	lb/24-hr	0.29	lb/24-hr	no
Xylene	16	lb/24-hr	0.29	lb/24-hr	no
Toluene	370	lb/24-hr	0.17	lb/24-hr	no
Cyclohexane	440	lb/24-hr	0.64	lb/24-hr	no
Ethyl benzene	65	lb/year	14.84	lb/yr	no
Benzene	21	lb/yr	10.60	lb/yr	no

Maximum Potential Emissions (1.1 scaling factor corresponding to 9.0 TPY styrene emissions as limited in NOC 11660)

Product	Amount Used	Annual Potential to Emit VOCs, HAPs and TAPs													
		Styrene		Methyl methacrylate		Methyl ethyl ketone	n-Hexane	Xylene	Toluene	Cyclohexane	Ethyl benzene	Benzene	Dimethyl ether	VOC	Total HAPs
	(ton/yr)	Emission Factor (10) (lb/ton)	(ton/yr)	Emission Factor (10) (lb/ton)	(ton/yr)	(ton/yr)	(ton/yr)	(ton/yr)	(ton/yr)	(ton/yr)	(ton/yr)	(ton/yr)	(ton/yr)	(ton/yr)	(ton/yr)
Gelcoat	29	215	3.164	45	0.662	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	3.83	
Polyester resin	122	77	4.687		0.000	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	4.69	
Vinyl ester resin	14	77	0.546		0.000	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.55	
5Gal Hi-Thix Radius Putty	15	77	0.588		0.000	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.59	
Initiator (MEKP-925)	4	NA	0.000		0.000	0.22	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.22	
Mold Release	0	NA	0.000		0.000	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.01	
Wood Stain	0	NA	0.000		0.000	0.00	0.04	0.04	0.02	0.02	0.01	0.01	0.00	0.13	
Spray Adhesive	0	NA	0.000		0.000	0.00	0.00	0.00	0.00	0.07	0.00	0.00	0.07	0.13	
Total:		ton/year	**9.0**		**0.7**	**0.2**	**0.04**	**0.04**	**0.02**	**0.09**	**0.01**	**0.01**	**0.07**	**10.1**	**9.8**

TAP	SQER			Potential Emissions		Model?
Styrene	65	lb/24-hr		64.97	lb/24-hr	no
Methyl methacrylate	52	lb/24-hr		5.22	lb/24-hr	no
Methyl ethyl ketone	370	lb/24-hr		1.72	lb/24-hr	no
n-Hexane	52	lb/24-hr		0.32	lb/24-hr	no
Xylene	16	lb/24-hr		0.32	lb/24-hr	no
Toluene	370	lb/24-hr		0.18	lb/24-hr	no
Cyclohexane	440	lb/24-hr		0.70	lb/24-hr	no
Ethyl benzene	65	lb/year		16.18	lb/yr	no
Benzene	21	lb/yr		11.55	lb/yr	no

Unified Emission Factors for Open Molding of Composites

July 23, 2001

Emission Rate in Pounds of Styrene Emitted per Ton of Resin or Gelcoat Processed

Styrene content in resin/gelcoat, % [1]	<33 [2]	33	34	35	36	37	38	39	40	41	42	43	44	45	46	47	48	49	50	>50 [2]
Manual	0.126 x %styrene x 2000	83	89	94	100	106	112	117	123	129	134	140	146	152	157	163	169	174	180	((0.286 x %styrene) - 0.0529) x 2000
Manual w/ Vapor Suppressed Resin VSR [5]	**Manual emission factor** [listed above] x (1 - (0.50 x specific VSR reduction factor for each resin/suppressant formulation))																			
Mechanical Atomized	0.169 x %styrene x 2000	111	126	140	154	168	183	197	211	225	240	254	268	283	297	311	325	340	354	((0.714 x %styrene) - 0.18) x 2000
Mechanical Atomized with VSR [3]	**Mechanical Atomized emission factor** [listed above] x (1 - (0.45 x specific VSR reduction factor for each resin/suppressant formulation))																			
Mechanical Atomized Controlled Spray [4]	0.130 x %styrene x 2000	86	97	108	119	130	141	152	163	174	185	196	207	218	229	240	251	262	273	0.77 x ((0.714 x %styrene) - 0.18) x 2000
Mechanical Controlled Spray with VSR	**Mechanical Atomized Controlled Spray emission factor** [listed above] x (1 - (0.45 x specific VSR reduction factor for each resin/suppressant formulation))																			
Mechanical Non-Atomized	0.107 x %styrene x 2000	71	74	77	80	83	86	89	93	96	99	102	105	108	111	115	118	121	124	((0.157 x %styrene) - 0.0165) x 2000
Mechanical Non-Atomized with VSR [3]	**Mechanical Non-Atomized emission factor** [listed above] x (1 - (0.45 x specific VSR reduction factor for each resin/suppressant formulation))																			
Filament application	0.184 x %styrene x 2000	122	127	133	138	144	149	155	160	166	171	177	182	188	193	199	204	210	215	((0.2746 x %styrene) - 0.0298) x 2000
Filament application with VSR [3]	0.120 x %styrene x 2000	79	83	86	90	93	97	100	104	108	111	115	118	122	125	129	133	136	140	0.65 x ((0.2746 x %styrene) - 0.0298) x 2000
Gelcoat Application	0.445 x %styrene x 2000	294	315	336	356	377	398	418	439	460	481	501	522	543	564	584	605	626	646	((1.03646 x %styrene) - 0.195) x 2000
Gelcoat Controlled Spray Application [4]	0.325 x %styrene x 2000	215	230	245	260	275	290	305	321	336	351	366	381	396	411	427	442	457	472	0.73 x ((1.03646 x %styrene) - 0.195) x 2000
Gelcoat Non-Atomized Application [9]	SEE **Note 9** below	196	205	214	223	232	241	250	259	268	278	287	296	305	314	323	332	341	350	((0.4506 x %styrene) - 0.0505) x 2000
Covered-Cure after Roll-Out	**Non-VSR process emission factor** [listed above] x (0.80 for Manual <or> 0.85 for Mechanical)																			
Covered-Cure without Roll-Out	**Non-VSR process emission factor** [listed above] x (0.50 for Manual <or> 0.55 for Mechanical)																			

Emission Rate in Pounds of Methyl Methacrylate Emitted per Ton of Gelcoat Processed

MMA content in gelcoat, % [6]	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	≥ 20
Gel coat application [7]	15	30	45	60	75	90	105	120	135	150	165	180	195	210	225	240	255	270	285	0.75 x %MMA x 2000