Stick to the Safer Stuff

Adhesives Use and Innovations in Massachusetts

April 11, 2013

Continuing Education Conference, Session B

Sturbridge, MA

Toxics Use Reduction Institute ▪ UMass Lowell

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Agenda

- Who's In the Room
- Introduction to Adhesives
- Case Study – Moving Towards Safer Adhesives in the Footwear and Apparel Industry
- What's on the Horizon – On-going research into safer adhesive formulations at UMass Lowell

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Who's In the Room?

- Who uses, or consults with companies that use, adhesives in their production process?
- What are the various applications in which you use adhesives?
- What are the toxic chemicals used in adhesives?

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Adhesives Chemical Use Reported in MA

- Solvents (19)
  - Toluene, n-Hexane, MEK, Acetone, **Methylene Chloride**, Tetrahydrofuran, Methanol, Ethyl Acetate, Ethylene Glycol
- Reaction Chemicals (12)
  - Methyl Methacrylate, Diisocyanates, Adipic Acid, Ethylenediamine, Resorcinol
- Phthalate Plasticizers (4)
  - Di-Butyl, Butylbenzyl, Bis 2-Ethylhexyl, Di-n-Octyl
- Flame Retardants (5)
  - Deca BDE, Antimony compounds
- Others
  - including wastewater treatment chemicals

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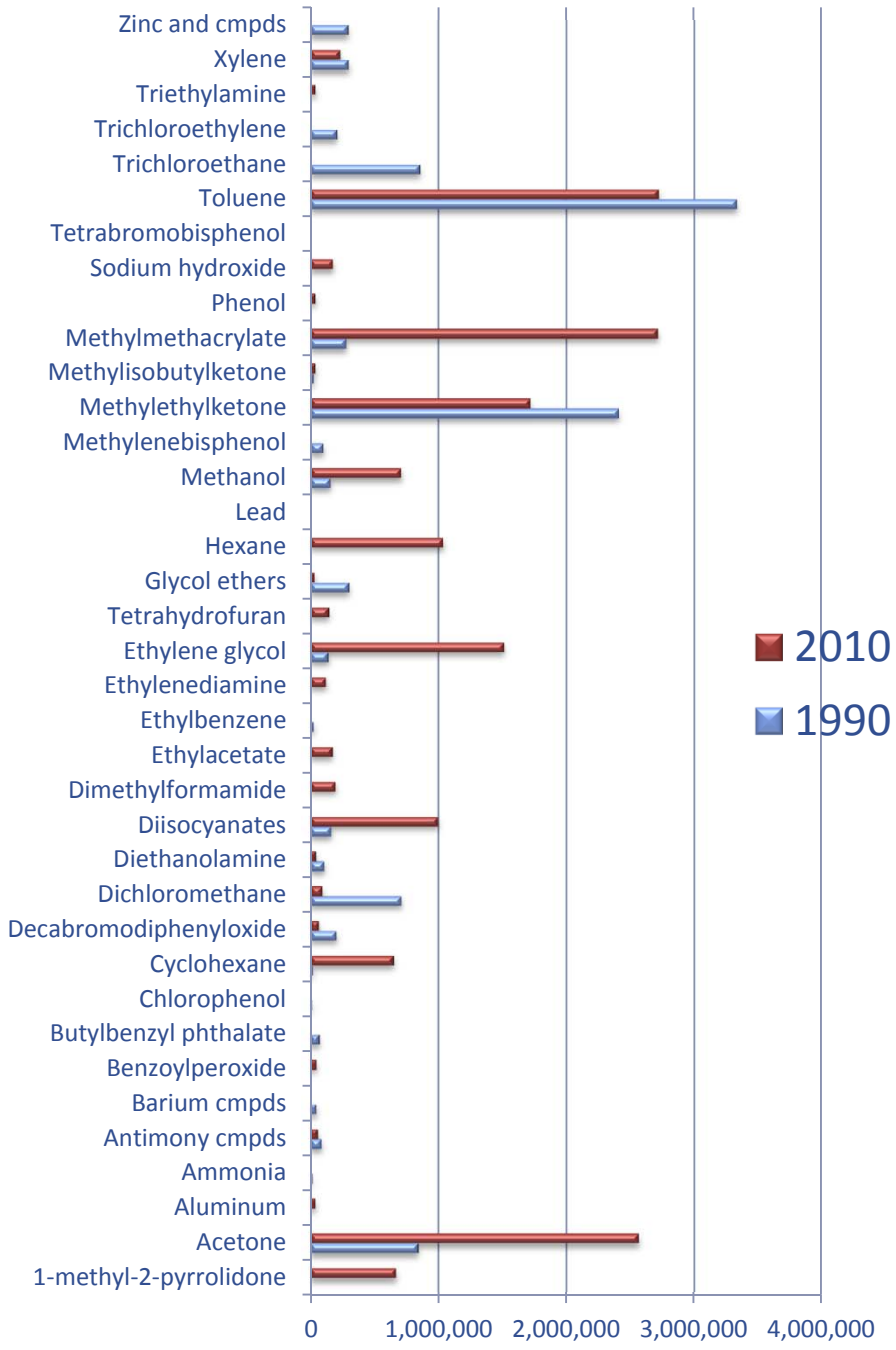
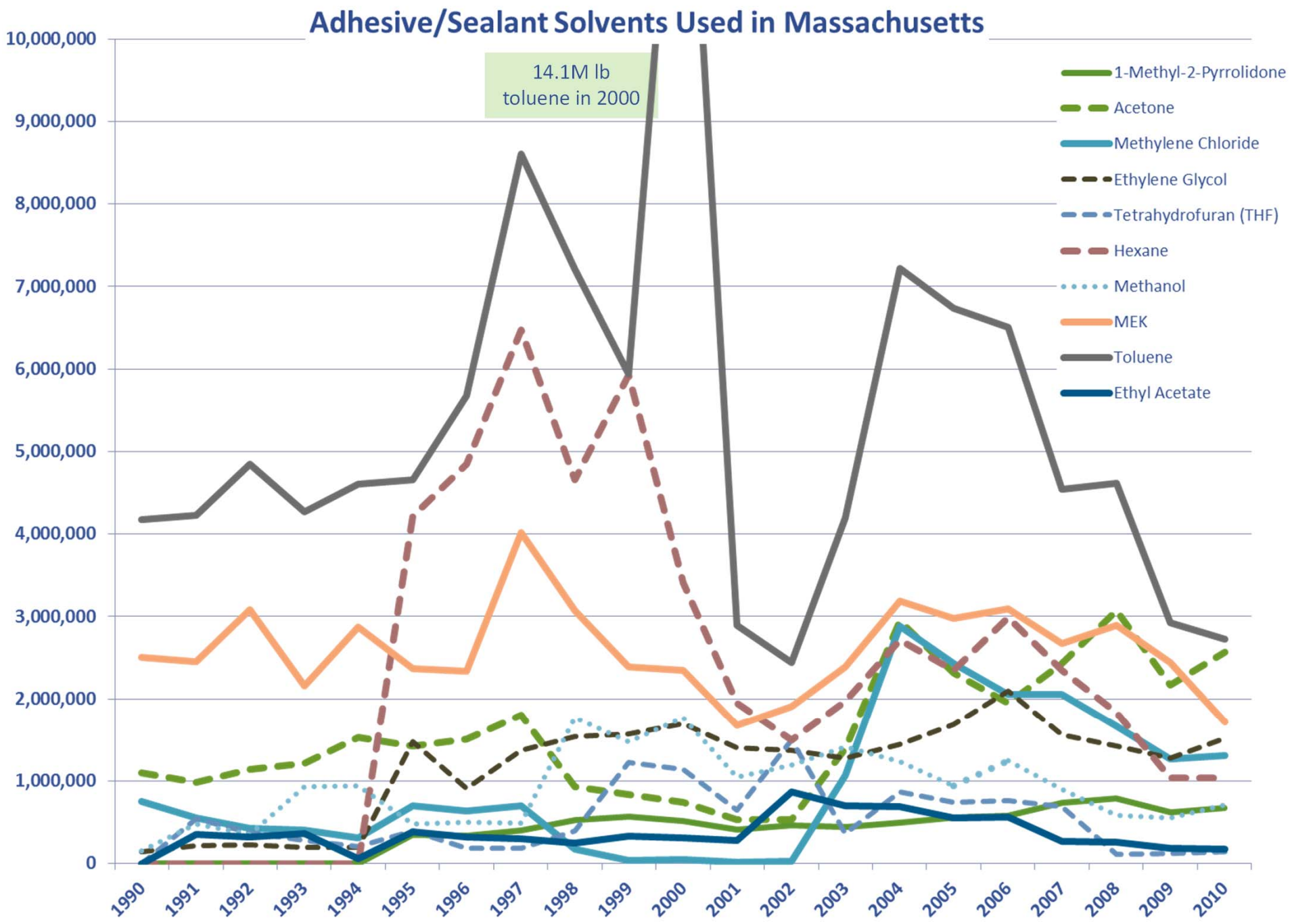
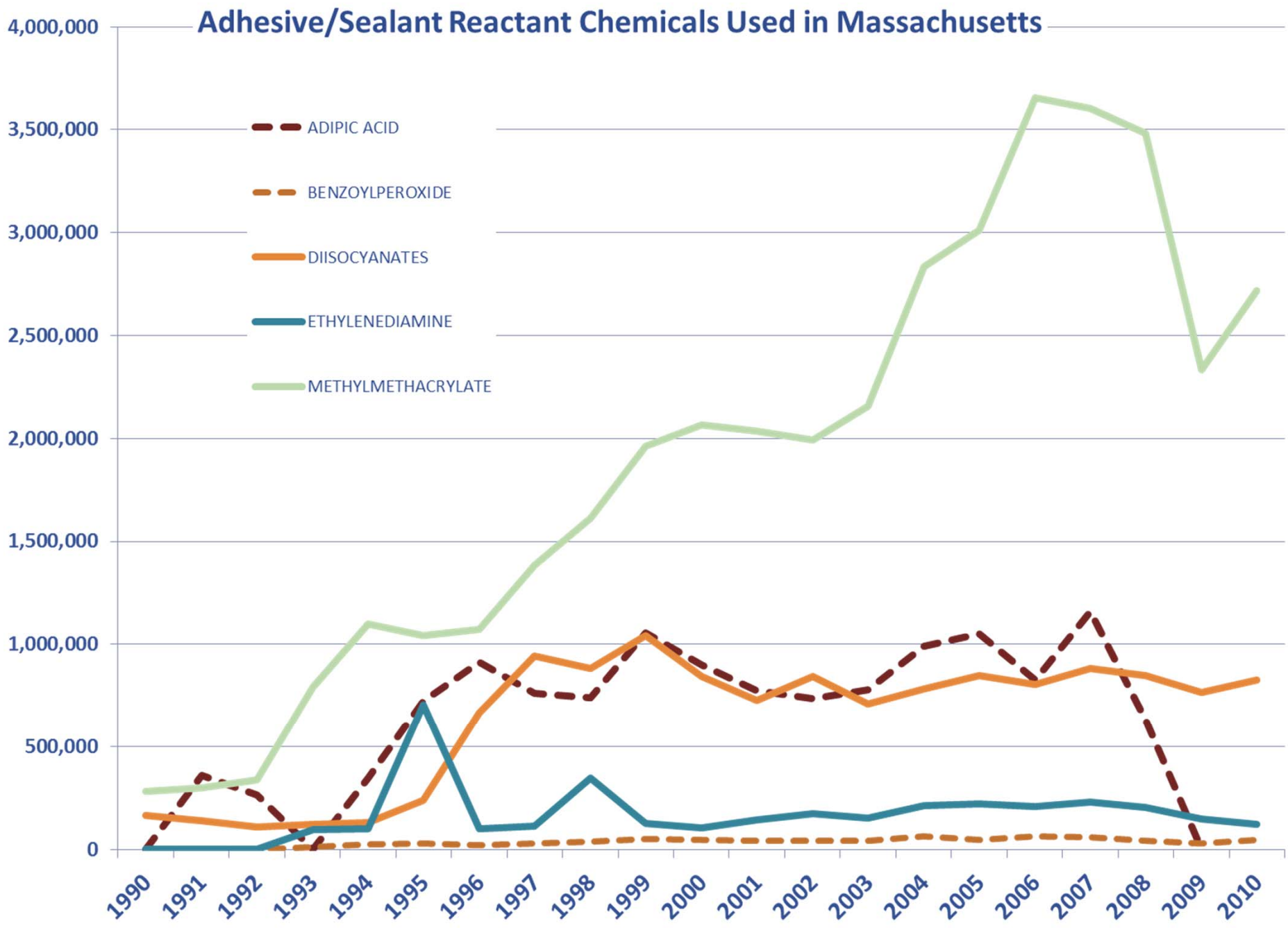
Chemical	1990	2010
1-methyl-2-pyrrolidone	-	670,431
Acetone	842,102	2,565,472
Aluminum	-	40,516
Ammonia compounds	15,120	-
Antimony compounds	89,059	58,229
Barium compounds	47,567	-
Benzoyl peroxide	-	48,963
Butylbenzyl phthalate	70,140	-
Chlorophenol	12,960	-
Cyclohexane	18,900	651,080
Decabromodiphenyloxide	204,652	66,265
Dichloromethane	711,500	93,763
Diethanolamine	107,758	42,393
Diisocyanates	164,425	997,929
Dimethyl formamide	-	197,575
Ethyl acetate	-	172,829
Ethylbenzene	27,500	-
Ethylenediamine	-	122,212
Ethylene glycol	140,152	1,514,230
Tetrahydrofuran (THF)	-	144,927
Glycol ethers	302,400	34,078
Hexane	-	1,038,230
Lead	-	114
Methanol	157,565	709,154
Methylene bisphenol	99,500	-
Methylethylketone (MEK)	2,411,192	1,719,526
Methylisobutylketone (MiBK)	26,400	38,253
Methylmethacrylate (MMA)	281,007	2,716,447
Phenol	-	37,004
Sodium hydroxide	-	177,967
Tetrabromobisphenol	-	743
Toluene	3,332,827	2,722,298
Trichloroethane	857,290	-
Trichloroethylene	207,563	-
Triethylamine	-	38,389
Xylene	297,778	232,786
Zinc and compounds	296,563	-




Adhesive/Sealant Solvents Used in Massachusetts
14.1M lb
toluene in 2000
10,000,000
9,000,000
8,000,000
7,000,000
6,000,000
5,000,000
4,000,000
3,000,000
2,000,000
1,000,000
0
1990
1991
1992
1993
1994
1995
1996
1997
1998
1999
2000
2001
2002
2003
2004
2005
2006
2007
2008
2009
2010
1-Methyl-2-Pyrrolidone
Acetone
Methylene Chloride
Ethylene Glycol
Tetrahydrofuran (THF)
Hexane
Methanol
MEK
Toluene
Ethyl Acetate


Adhesive/Sealant Reactant Chemicals Used in Massachusetts
4,000,000
3,500,000
3,000,000
2,500,000
2,000,000
1,500,000
1,000,000
500,000
0
ADIPIC ACID
BENZOYLPEROXIDE
DIISOCYANATES
ETHYLENEDIAMINE
METHYLMETHACRYLATE
1990
1991
1992
1993
1994
1995
1996
1997
1998
1999
2000
2001
2002
2003
2004
2005
2006
2007
2008
2009
2010