Testing for Phthalates in Consumer Products

These comments are those of the CPSC staff, have not been reviewed or approved by, and may not necessarily reflect the views of, the Commission

Evaluating Consumer Products for Phthalates

- Total Phthalate Content in Toy or Child Care Article
- Prohibited Phthalates
  - DEHP – di (2-ethylhexyl) phthalate
  - DBP – dibutyl phthalate
  - BBP – benzyl butyl phthalate
- Interim - Prohibited Phthalates
  - DINP – di “isononyl” phthalate
  - DIDP – di “isodecyl” phthalate
  - DnOP – di-n-octyl phthalate

Evaluating Consumer Products for Phthalates

- CPSC Staff Method: http://www.cpsc.gov/about/cpsia/phthalatesop.pdf
  - Grind or mill toy into a powder
  - Dissolve/Extract in tetrahydrofuran (THF)
  - Precipitate with hexane
  - Analyze by GC/MS with Select Ion Monitoring (SIM)
- Seeking Comments: section108definitions@cpsc.gov

Alternate Methods

Method	Extraction Procedure	Analytical Procedure
CPSC-CH-C1001-09	Dissolve in THF then precipitate PVC with Hexane	GC/MS SIM
ASTM D 7083-04	ASTM D2124 – 6 hour Soxhlet extraction in ethyl ether	GC-FID
EPA 8061	Several including: Soxhlet Extraction Microwave Extraction Ultrasonic Extraction Methylene Chloride / Acetone	GC-ECD
Health Canada C-34	2-hr extraction in Dichloromethane Precipitate in Methanol -12 hrs	GC/MS SIM (Chemical Ionization)
EN 14372	6 hr Soxhlet extraction with diethyl ether, heat to dryness then dissolve extract in hexane	Recommends GC/MS SIM
ASTM D 3421	Withdrawn – without replacement	

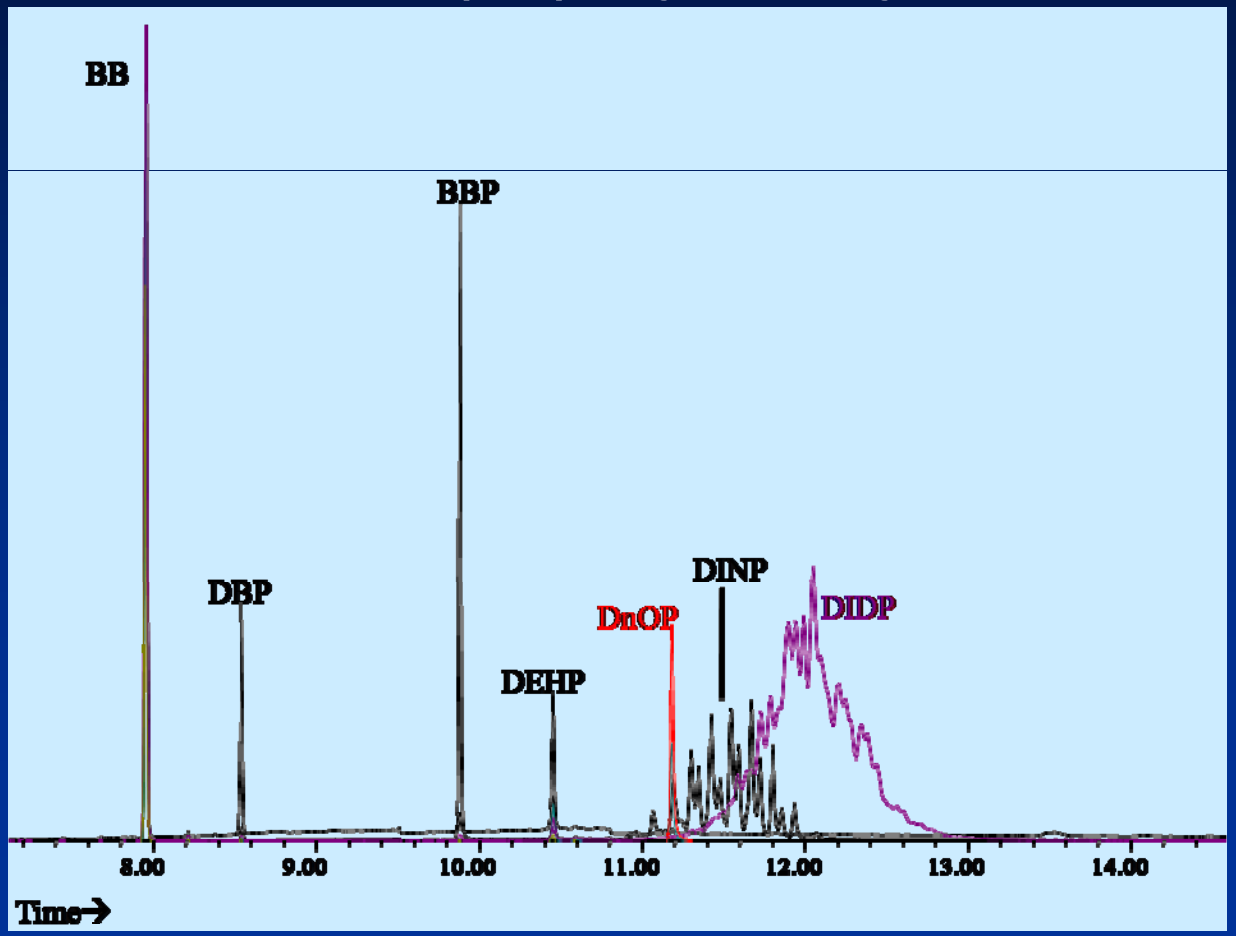
Sample Preparation for Phthalate Testing

Testing Issues for Phthalates

- See FAQ http://www.cpsc.gov/about/cpsia/faq/faq.html#sect108
  - 0.1 % of any of the 6 phthalates, not total of the 6.
  - Must differentiate alternate plasticizers (not banned by CPSIA, but subject to FHSA)
  - CPSIA language differs from EU: “any children’s toy or child care article that contains concentrations of more than 0.1 percent” of the regulated phthalates
  - No inaccessibility exemption
  - May consider alternate methods such as LC/MS if proposed and accompanied by evidence of effectiveness
  - Composite testing

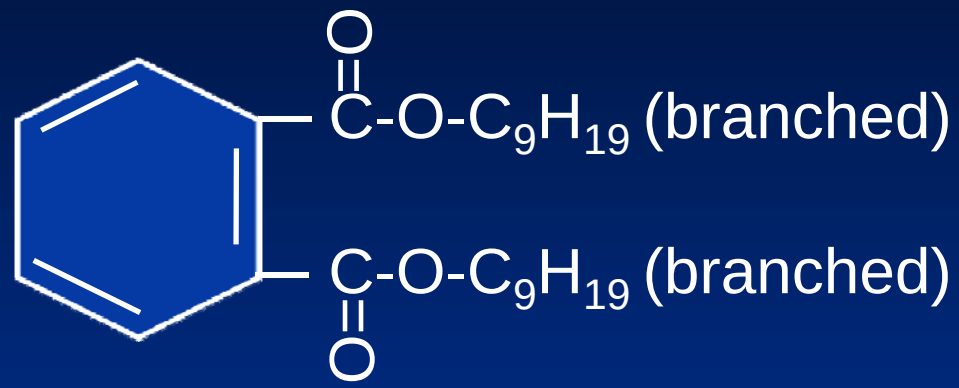
Identifying Phthalates

- Some of the regulated phthalates are complex mixtures and share similarities with non-regulated phthalates – care must be used to properly identify:

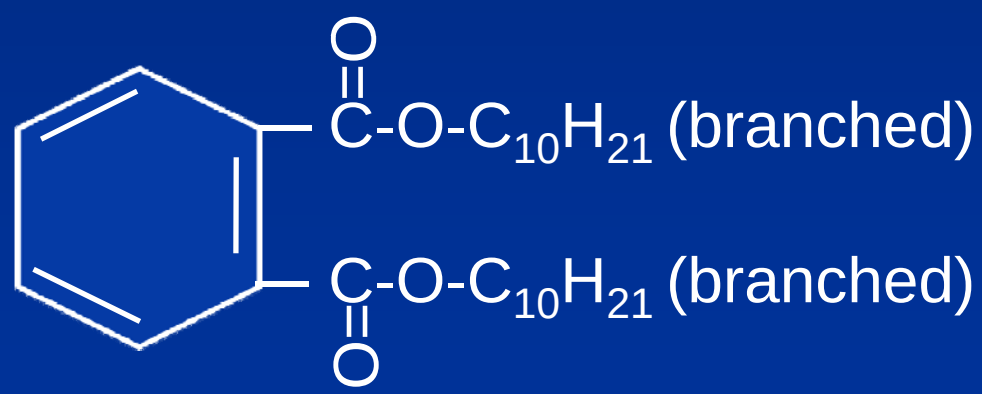


Definitions of DINP and DIDP

- Staff considers DINP as any isomer or mixture of isomers of di-esters of phthalic acid with any branched 9-carbon alcohol



- Staff considers DIDP as any isomer or mixture of isomers of di-esters of phthalic acid with any branched 10-carbon alcohol



Screening For Phthalates

- FT/IR and Raman Spectroscopy – limited sensitivity, selectivity
- Pyrolysis GC/MS – possible breakdown of long chain phthalates such as DINP and DIDP, difficult quantification, not portable
- DART-MS – Direct Analysis Real Time Mass Spectrometry – difficult quantification, not portable
- ASTM D2124 extraction then FT/IR – time consuming, not portable