Currently Cited Test Methods for Adhesives

1. USEPA Method 24
2. Exempt Compounds By SCAQMD Method 303
3. VOC Of PVC, CPVC, ABS Pipe Cements, And Adhesive Primer By Method 316A
4. VOC Of Cyanoacrylate Adhesives By Method 316B

SCAQMD M303
Determination of Exempt Compounds

Performed on GC-MS/FID
Challenging Sample Introduction
Exempts Subtracted From VOC Calculation

USEPA Method 24
Determination of Volatile Matter Content

Default VOC Determination Method:
Ambient Cure
Dispersion Without A Diluent?
Use A Paperclip!
Induction Time - 24 Hour Default
Analyzed In Tandem With SCAQMD M303

VOC Calculation

VOC of Material
\[ \frac{W_s - W_w - W_{es}}{V_m} \]

VOC Of Regulated Product
(less water and exempts)
\[ \frac{W_s - W_w - W_{es}}{V_m - V_w - V_{es}} \]
**Additional Test Methods**

VOC Of PVC, CPVC, And ABS Pipe Cements

Adhesive Primer By *Method 316A*

VOC Of Cyanoacrylate Adhesives By Method 316B

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**Method 316A**

*VOC Used In Materials For Pipes And Fittings*

Used For PVC/ABS Systems

8 Replicate Preps Per Sample; Time And Effort Intensive

Precision Lacking Compared To M24

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**Method 316B**

*VOCs in Adhesives Containing Cyanoacrylates*

“Sandwich” Test Method

Aluminum Sheets Simulate Traditional Curing Conditions

Utilizes Spacers To Prevent “Squish” Effect From Clamps

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**Proposed Methods**

*Modification of EPA 40 CFR Appendix A Subpart PPPP*

“Determination Of VOCs For Reactive Adhesives”

24 Hour Cure By Default

“Sandwich” Test Method With 3x3 Inch Aluminum Or Plastic Sheets

Not Applicable For Cyanoacrylates, Moisture-Cured Urethanes, or Silicone Adhesives

Sample Size (10 - 15 g) And Sandwich Material Considerations

Possible Replacement For 316A And Others; Lacks QC, Bias, Precision, Repeatability, And Reproducibility Data
**Method 313**
VOCs By GC/MS/FID

<table>
<thead>
<tr>
<th>Gravimetric Methods</th>
<th>Direct Method</th>
</tr>
</thead>
<tbody>
<tr>
<td>Assume 100% VOC; Deduct Non-VOC</td>
<td>Quantitate All Sample Peaks</td>
</tr>
</tbody>
</table>

**Quantitation Tactic**

**Exempts Handling**

- Measure And Discount
- Ignore

**Advantages**
- Direct VOC Measurement; Increased Accuracy
- High Precision At Low Concentrations
- High Degree of Quality Control

**Disadvantages**
- Not For Multi-Component Products
- Difficult Sample Introduction For Adhesives
- Must Cure In Inlet; Discount Unreacted Monomer

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**Polyurethane Foam Adhesive Test Method Concept**

Weigh The Following:
- Canister Of Product
- Jar
- Tedlar Bag
- Expended Canister
- Jar + Solvent
- Jar + Solvent + Product
- Tedlar Bag + Propellant

**Challenges**
1. Cost, development time
2. Solvent choice/blowthrough
3. NV Solvent Correction
4. Tedlar bag permeation
5. Mass balance

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**ASTM D2369 Solids Test**

**GC-MS/FID**