

## 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

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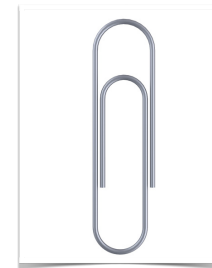
## USEPA Method 24 Determination of Volatile Matter Content

Default VOC Determination Method:  
Ambient Cure

Dispersion Without A Diluent?  
Use A Paperclip!

Induction Time - 24 Hour Default

Analyzed In Tandem With SCAQMD M303



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## SCAQMD M303 Determination of Exempt Compounds



Performed on GC-MS/FID

Challenging  
Sample Introduction

Exempts Subtracted From  
VOC Calculation

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### VOC of Material Calculation (Actual VOC):

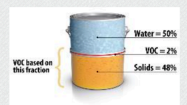
$$VOC_{material} = (100 - 48 - 50) \times 0.99 \times 10 = 20g/L$$



### VOC of Coating Calculation (Regulatory VOC, less water and exempt compounds):

Remove the volume solid from denominator  
Volume Solids = [Weight Solids]/[Density]

$$VOC_{coating} = \frac{(100 - 48 - 50)}{\left(\frac{100}{0.99} - \frac{50}{0.97}\right)} \times 1000 = 39g/L$$



## VOC Calculation

### VOC of Material

$$\frac{100 - W_s - W_w - W_{es}}{V_m}$$

### VOC Of Regulated Product (Less Water And Exempts)

$$\frac{100 - W_s - W_w - W_{es}}{V_m - V_w - V_{es}}$$

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## 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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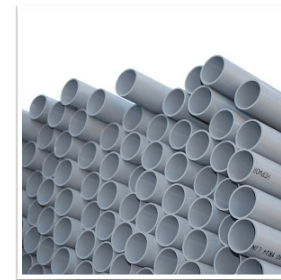
## Method 316A

### *VOC Used In Materials For Pipes And Fittings*

Used For PVC/ABS Systems

8 Replicate Preps Per Sample;  
Time And Effort Intensive

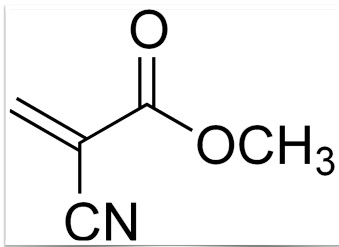
Precision Lacking Compared To M24



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## Method 316B

### *VOCs in Adhesives Containing Cyanoacrylates*



“Sandwich” Test Method

Aluminum Sheets Simulate  
Traditional Curing Conditions

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## Proposed Methods

### *Modification of EPA 40 CFR Appendix A Subpart P PPP*

“Determination Of VOCs For Reactive Adhesives”

24 Hour Cure By Default

“Sandwich” Test Method With Aluminum/Plastic Sheets & Spacers

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

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**Method 313**  
VOCs By GC/MS/FID

	Gravimetric Methods	Direct Method
<b>Quantitation Tactic</b>	Assume 100% VOC; Deduct Non-VOC	Quantitate All Sample Peaks
<b>Exempts Handling</b>	Measure And Discount	Ignore

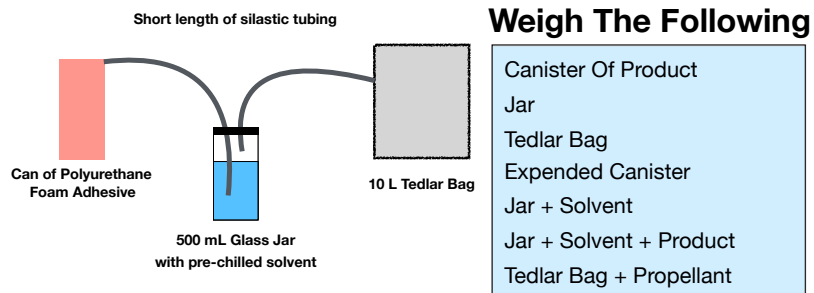
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**Method 313**  
VOCs By GC/MS/FID

Advantages	Disadvantages
Direct VOC Measurement; Increased Accuracy	Not For Multi-Component Products
High Precision At Low Concentrations	Difficult Sample Introduction For Adhesives
High Degree of Quality Control	Must Cure In Inlet; Discount Unreacted Monomer

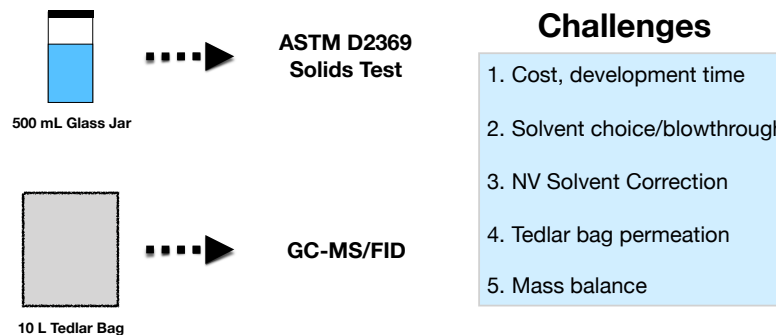
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**Polyurethane Foam Adhesive**  
**Test Method Concept**



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**Polyurethane Foam Adhesive**  
**Test Method Concept**



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**Brad Parrack**  
**Senior Air Quality Chemist**  
**909.396.3071**  
**[bparrack@aqmd.gov](mailto:bparrack@aqmd.gov)**