Metropolitan Museum of Art
Gas Chromatography- Mass Spectrometry (GC-MS) Results from Material Analysis

This document includes (1) a mass spectrum and (2) the volatile organic compounds (VOCs) emitted from samples using GC-MS analysis. The data is not interpreted; however, several classes of chemicals are highlighted because they are potential risks for artwork in an enclosed environment. A basic key, provided below, indicates those classes. The amount of each chemical identified has not been determined; similarly, it is not known how much of each chemical is necessary to do damage to art. Finally, peaks may be present that are the result of the sample adsorbing chemicals from the air and reemitting them during testing rather than being inherent to the sample. Research is ongoing to determine specifically which chemicals and amounts are required to negatively affect artifacts.

Highlighted data:

Pink – chemicals currently known to be hazardous to art

Green – amines; can raise the pH, are suspected to react with acids and may form crystals in an enclosed environment

Yellow – chemicals of the following type, which *may* be hazardous to art:

Acids – lower the pH, corrosive to metals, degrade organic materials

Aldehydes – can convert to acids with heat or exposure to UV light

Esters – can hydrolyze into acids with heat and humidity

Sulfur-containing compounds – known to tarnish and corrode some metals

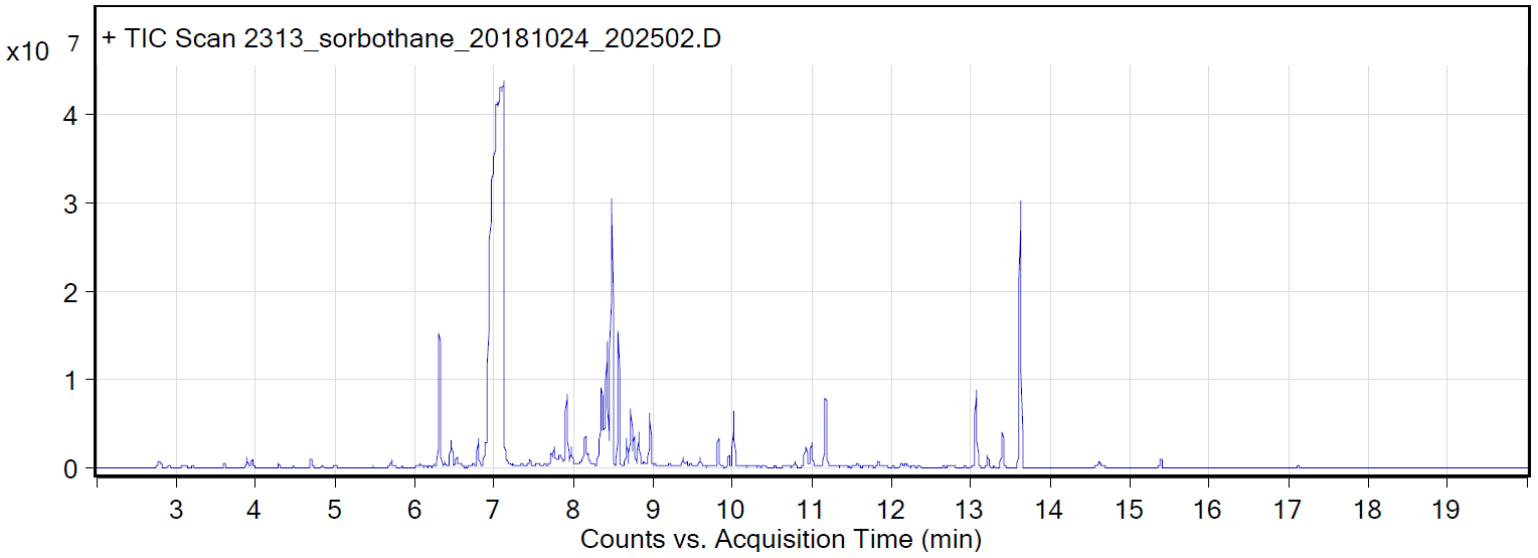
Halogenated compounds – can become reactive with exposure to heat and UV light

Nitrogen-containing, not amine – can react with other off-gassed chemicals

Alkynes – can become reactive when exposed to heat or UV light

Sample: Sorbothane 0212012-40-10 flexibke polymer sheet
Oddy test result: Temporary
Date collected: 10/23/2018
Technique used: SPME with a PDMS/Carbon WR fiber; Agilent 7890B GC and 5977B MS fitted with a GL Sciences OPTIC-4 multimode inlet and LEAP PAL RTC autosampler; Pre-heated at 60°C for 20 minutes; fiber exposure at 60°C for 20 minutes; sample injected into 220°C inlet and cryo-trapped for 2 min at -15°C; GC ramped from 35°C to 250 °C at 10°C/min. Data analyzed in Masshunter Qualitative Analysis. Deconvoluted data with > 85% match with a NIST 17.0 or Wiley 9 library are reported.

VOCs not highlighted are because they were also observed in blanks: VOCs not highlighted are because they were also observed in blanks: (1) 12.4 min: 2-methyl-, 2,2-dimethyl-1-(2-hydroxyl-1-methylethyl) propyl ester propanoic acid; (2) 12.7 min: 2-methyl-, 3-hydroxyl-2,4,4-trimethylpentyl ester propanoic acid



Compound Table

RT	Score (Lib)	Area	Name	Formula
2.78	93.69	2309620	Silanediol, dimethyl-	C2H8O2Si
6.31	97.18	21705283	Cyclotetrasiloxane, octamethyl-	C8H24O4Si4
6.46	92.37	5394272	1-Heptanol, 6-methyl-	C8H18O
6.8	97.1	4416930	dl-Limonene	C10H16
7.03	86.63	49289728	1-Hexanol, 2-ethyl-	C8H18O
7.08	89.76	24507135	(Z)-3-(Fluoromethyl)-7-methylocta-2,6-dien-yl acetate	C12H19FO2
7.75	86.9	4159972	1-Octanol, 2-methyl-	C9H20O
7.91	90.34	15321420	2,3,4-trimethyl-1-pentanol	C8H18O
7.97	96.16	3674375	Nonanal	C9H18O
8.15	89.41	8564959	1-Octanol, 2-methyl-	C9H20O
8.35	89.93	20530172	1-Nonanol	C9H20O
8.42	90.75	28809375	1-Nonanol	C9H20O
8.48	97.29	56098766	Pentanedioic acid, dimethyl ester	C7H12O4
8.56	95.65	21175573	(S)-(+)-6-Methyl-1-octanol	C9H20O
8.66	95.51	4647488	Acetic acid, 2-ethylhexyl ester	C10H20O2
8.72	94.05	9375719	Cyclopentasiloxane, decamethyl-	C10H30O5Si5
8.76	91.69	4783835	PROPYLENE GLYCOL TRIMER 3	C9H18O3
8.82	94.35	6095803	PROPYLENE GLYCOL TRIMER 1	C9H18O3
8.96	98.41	9038923	1-Nonanol	C9H20O
9.82	95.28	4674891	2-Ethylhexyl acrylate	C11H20O2
10.01	97.29	9437922	Hexanedioic acid, dimethyl ester	C8H14O4
10.93	92.19	4928332	TRIPROPYLENE GLYCOL 1	C9H20O4
10.99	92.24	4944718	TRIPROPYLENE GLYCOL 2	C9H20O4
11.17	95.73	12474327	Cyclohexasiloxane, dodecamethyl-	C12H36O6Si6
13.06	97.5	13573112	2,5-Cyclohexadiene-1,4-dione, 2,6-bis(1,1-dimethylethyl)-	C14H20O2
13.62	95.35	44706123	Phenol, 2,6-bis(1,1-dimethylethyl)-4-methyl-	C15H24O