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

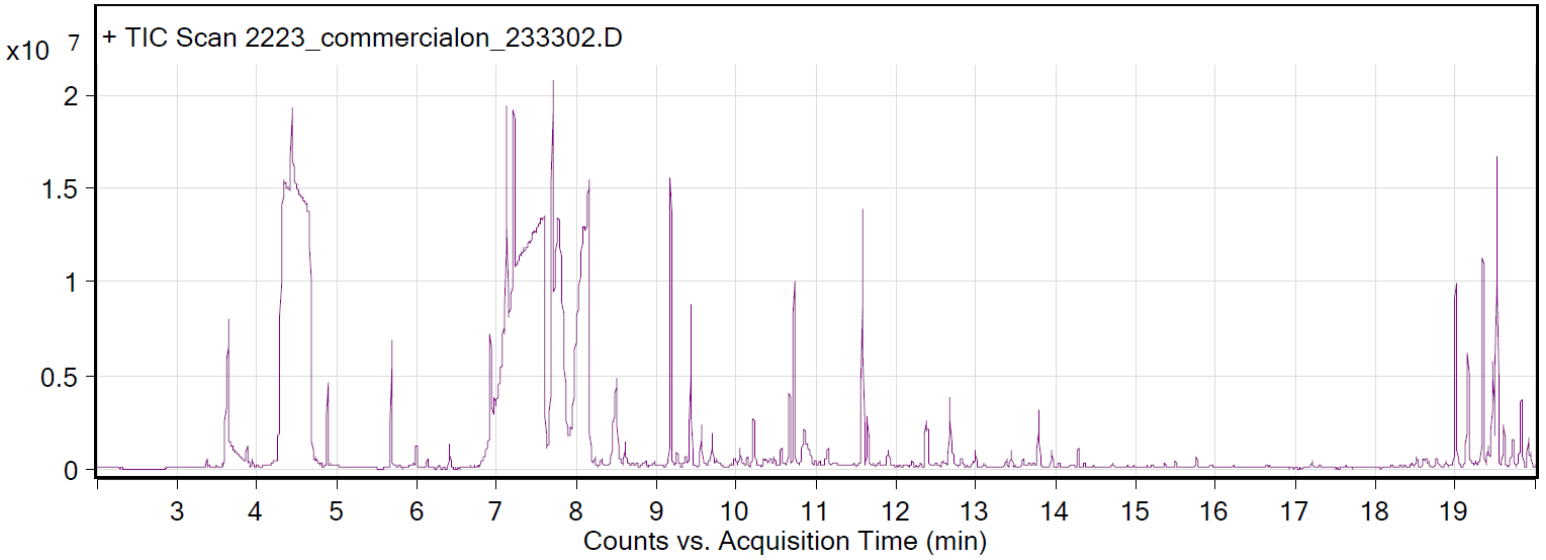
Halogenated compounds – can become reactive with exposure to heat and UV light

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

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

Sample: Commercialon Acrylic-latex pressure sensitive carpet adhesive for PVC backed tiles
Oddy test result: unsuitable
Date collected: 6/29/2018
Technique used: SPME with a PDMS/DVB 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: (1) 12.7 min: 2-methyl-, 3-hydroxyl-2,4,4-trimethylpentyl ester propanoic acid



Compound Table

RT	Score (Lib)	Area	Name	Formula
3.64	98.54	24421185	Acetic acid	C2H4O2
4.33	90.16	79762815	Methanamine, N-methyl-	C2H7N
4.88	92.47	3190989	Cyclotrisiloxane, hexamethyl-	C6H18O3Si3
5.68	90.02	6304123	n-Butyl ether	C8H18O
6.92	96.08	4794991	Cyclotetrasiloxane, octamethyl-	C8H24O4Si4
6.94	93.31	2316880	Bicyclo[3.1.1]heptane, 2,6,6-trimethyl-	C10H18
6.97	91.53	1323296	Bicyclo[2.2.1]heptane, 2,2,3-trimethyl-	C10H18
7.09	93.15	1588172	Bicyclo[2.2.1]heptane, 2,2,3-trimethyl-	C10H18
7.12	96.17	19907143	Bicyclo[3.1.1]heptane, 2,6,6-trimethyl-	C10H18
7.22	91.8	39016613	1,3,6-Trioxa-2-silacyclooctane, 2,2,-dimethylsilyl-	C6H14O3Si
7.59	85.85	123549020	Ethanol, 2,2'-oxybis-	C4H10O3
7.7	94.8	23130511	1-Hexanol, 2-ethyl-	C8H18O
7.78	93.59	96978350	2-Propanol, 1,1'-oxybis-	C6H14O3
8.15	97.34	82916169	2-Propanol, 1,1'-oxybis-	C6H14O3
8.5	97.55	14915163	2-Propanol, 1,1'-oxybis-	C6H14O3
9.18	95.54	17826177	Cyclopentasiloxane, decamethyl-	C10H30O5Si5
9.43	96.51	10499828	Acetic acid, 2-ethylhexyl ester	C10H20O2
9.56	92.84	3007346	cis-2-Pinanol	C10H18O
10.04	94.99	1435688	Ethanol, 2-(2-butoxyethoxy)-	C8H18O3
10.21	86.57	3242068	1-Butoxy-2-ethylhexane	C12H26O
10.73	91.54	11716170	2-Ethyl-1-hexyl propionate	C11H22O2
10.85	91.06	8274920	Methenamine	C6H12N4
11.15	94.41	1849632	Nonanoic acid	C9H18O2
11.58	96.01	17395866	Cyclohexasiloxane, dodecamethyl-	C12H36O6Si6
11.64	94.53	3579980	Tridecane	C13H28
12.67	93.68	5150630	Propanoic acid, 2-methyl-, 3-hydroxy-2,4,4-trimethylpentyl ester	C12H24O3
12.99	93.35	1293293	Tetradecane	C14H30
14.28	91.43	1287345	Sulfurous acid, 2-ethylhexyl nonyl ester	C17H36O3S