Supporting Information For:

Heterogeneous Oxidation of Catechol

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Table S1. Vibrational assignment for catechol film

Wavenumber (cm^{-1})	**Intensity**[a]	**Assignment**[b]
3450	s	ν(O-H)
3323	s	ν(O-H)
3051	m	ν(C-H)
1618, 1595	m, m	ν(C=C)
1512	s	ν(C=C)
1471	s	ν(C=C)
1363	s	ν(C=C)
1255	s	δ(C-H)
1190	s	δ(O-H)
1095	s	δ(C-H)
1041	s	δ(C-H)
918	w	ρ(C-H)
849	m	ρ(C-H)
769	s	ν(C=C)
741	s	ρ(C-H)

[a] w = weak; m = medium; s = strong.
[b] ν = stretching; δ = in plane bending; ρ = out of plane bending.
All assignments are based on theoretical and experimental studies.[1]

Table S2. Vibrational assignments for oxidized film

Wavenumber (cm^{-1})	**Intensity**[a]	**Assignment**[b]
3393	m	ν(O-H)
3100 - 2500	w,b	ν(O-H)
1737	sh	ν(C=O)
1694	sh	ν(C=O)
1679	s	ν(C=O)
1632	w	ν(C=C)
1594	s	ν(C=C)
1520	w	ν(C=C)
1408	m	δ(C=C)
1355,1315	m, m	δ(C=C-H)
1262, 1197	s, s	ν(C-O)
1216	w	δ(C=C-H)
1118	w	ν(C-O)
835	m	ρ(C=C-H)

[a] w = weak; m = medium; s = strong; sh = shoulder; b = broad.
[b] ν = stretching; δ = in plane bending; ρ = out of plane bending.

Table S3. Vibrational assignment of *cis,cis*-muconic acid

Wavenumber (cm^{-1})	**Intensity**[a]	**Assignment**[b]
3300 - 2200	m, br	ν(O-H)
1680	s	ν(C=O)
1635	sh	ν(C=C)
1591	s	ν(C=C)
1408	m	δ(C=C)
1355,1316	m, m	δ(C=C-H)
1258, 1197	s, s	ν(C-O)
914	w	ρ(O-H)

[a] w = weak; m = medium; s = strong; sh = shoulder; br = broad.
[b] ν = stretching; δ = in plane bending; ρ = out of plane bending.
Assignments based on experimental results.[2]

Table S4. Vibrational assignment of maleic acid

Wavenumber (cm^{-1})	**Intensity**[a]	**Assignment**[b]
3059	m	ν(C-H)
3200 - 2100	m, b	ν(O-H)
1708	s	ν(C=O)
1637	w	ν(C=C)
1579	s	ν(C=C)
1461	m	δ(C-O-H)
1436	m	δ(C=C-H)
1264	s	ν(C-O)
1221	m	δ(C=C-H)
950	w	ν(C=C)
871	m	ρ(C-H)

[a] w = weak; m = medium; s = strong; b = broad.
[b] ν = stretching; δ = in plane bending; ρ = out of plane bending.
Assignments based on experimental and theoretical results.[3]

Table S5. Vibrational assignment of glyoxylic acid.

Wavenumber (cm^{-1})	**Intensity**[a]	**Assignment**[b]
3700-2250	vs, br	ν(O-H)
1727	vs	ν(C=O)
1630	m	ν_{as}(O-C-O)
1231	s	ν(C-O) + δ(O-H)
1087, 1043	s, vs	δ(C-C-H)

[a] w = weak; m = medium; s = strong; br = broad.
[b] ν = stretching; δ = in plane bending; ρ = out of plane bending.
Assignments based on experimental results.[4]

Table S6. Vibrational assignment of oxalic acid

Wavenumber (cm^{-1})	**Intensity**[a]	**Assignment**[b]
3458	vs	ν(O-H)
1684	vs	ν_{as}(O-C-O)
1251	vs	ν_s(C-O) + δ(O-C-O)
1133	m	ν(C-OH)
725	s	δ(O-C-O)

[a] w = weak; m = medium; s = strong.
[b] ν = stretching; δ = in plane bending; ρ = out of plane bending.
Assignments based on experimental results.[4]

Table S7. Vibrational assignment of 1,2,3-trihydroxybenzene

Wavenumber (cm^{-1})	**Intensity**[a]	**Assignment**[b]
3375	s	ν(O-H)
3245	s	ν(O-H)
3056	w	ν(C-H)
1633	sh	ν(C=C)
1622	s	ν(C=C)
1525	s	ν(C=C)
1488	s	δ(C-O-H)
1363	s	δ(O-H)
1290	s	δ(C-O-H)
1243	s	δ(C-H)
1190	s	δ(C=C-H)
1061	m	ν(C=C)
1004	s	ρ (C=C-H)
847	w	ρ (C=C-H)
830	w	ρ(C=C-O)
764	m	ν(C=C)
805	s	ρ(=C-O-H)

[a] w = weak; m = medium; s = strong; sh = shoulder.
[b] ν = stretching; δ = in plane bending; ρ = out of plane bending.
Assignments based on experimental and theoretical results.[5]

Table S8. Vibrational assignment of 1,2,4-trihydroxybenzene

Wavenumber (cm^{-1})	**Intensity**[a]	**Assignment**[b]
3256	s	ν(O-H)
1622	m	ν(C=C)
1577	sh	ν(C=C)
1514	sh	ν(C=C)
1386	s	δ(O-H)
1300	s	δ(C-O-H)
839	m	δ(C-O-H)
790	s	ρ(C-H)

[a] w = weak; m = medium; s = strong; sh = shoulder.
[b] ν = stretching; δ = in plane bending; ρ = out of plane bending.
Assignments based on experimental and theoretical results.[6]

Table S9. Pseudo-first order rate constants (k) and associated standard deviations (s) for the decay of catechol and production of *cis,cis*-muconic acid at variable RH extracted from the equations $[\text{catechol}] = [catechol]_0 + e^{-k_{catechol+O_3}\, t}$ and $\left[cis,cis\text{-muconic acid}\right]/\left[cis,cis\text{-muconic acid}\right]_{inf} = \left(1 - e^{-k_{cis,cis\text{-muconic acid}}\, t}\right)$.

RH (%)	$k_{catechol+O_3}$ (s^{-1})	$k_{cis,cis\text{-muconic acid}}$ (s^{-1})
0	2.156×10^{-8}	1.958×10^{-10}
29	3.260×10^{-8}	3.057×10^{-9}
48	5.471×10^{-5}	1.105×10^{-4}
71	4.863×10^{-4}	3.867×10^{-4}
90	8.183×10^{-4}	4.133×10^{-4}

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