# Halloysite clay nanotubes with Fe-Al deposits for oxidation of benzyl alcohol

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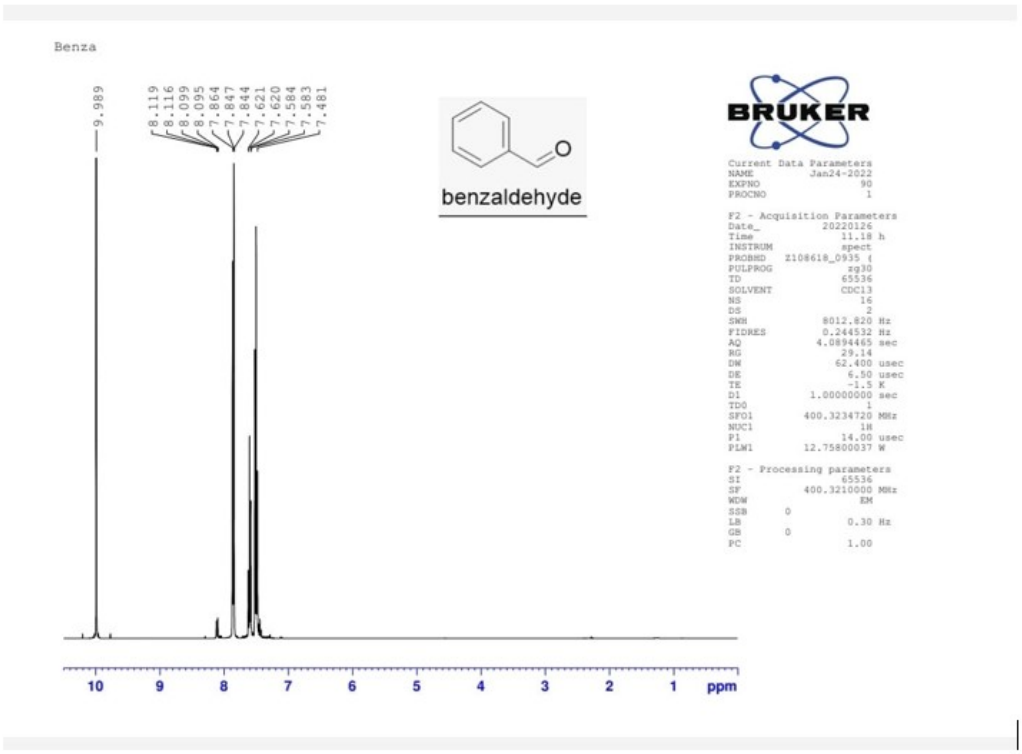
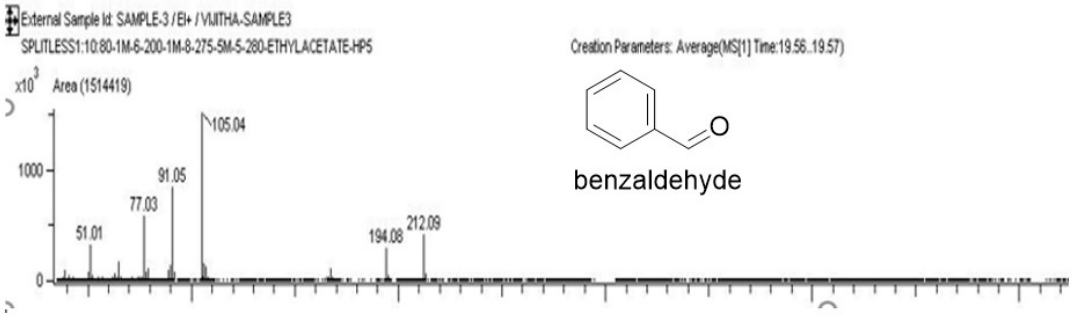



Fig.S1 NMR of benzaldehyde

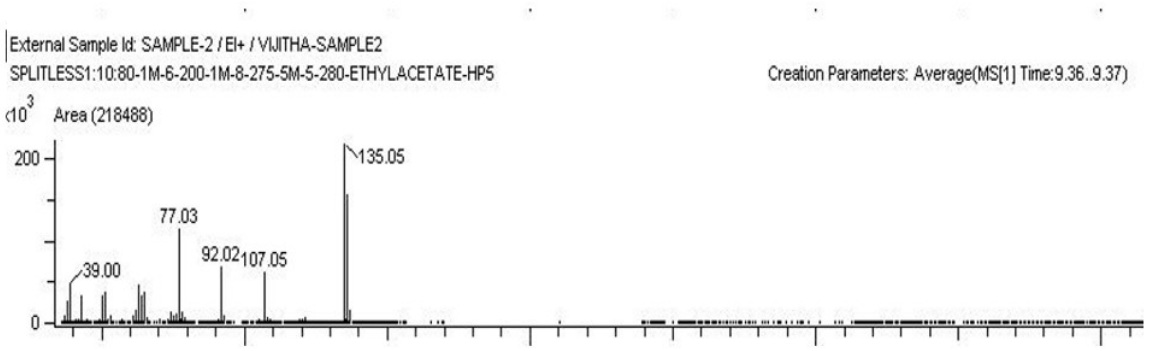
**BENZALDEHYDE MW=106.12**




| m/z of fragment | 106 | 105 | 91 | 78 | 77 | 51 |
|---|---|---|---|---|---|---|

Fig S2: Mass Spectrum of Benzaldehyde

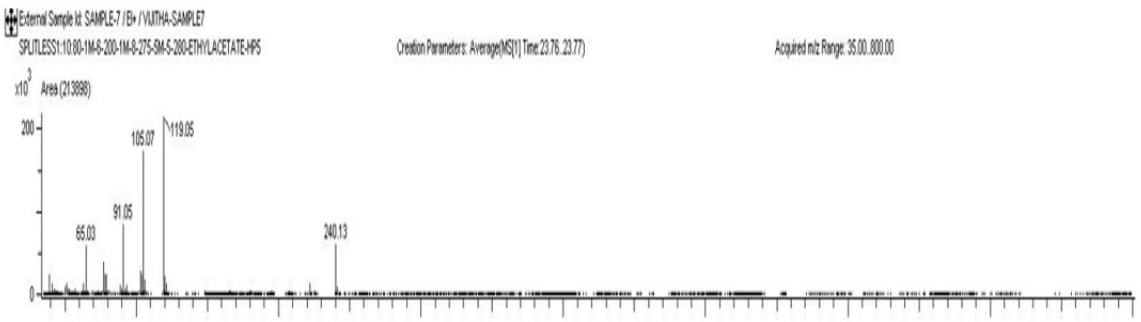
**METHOXY BENZALDEHYDE, MW=136.150**




| m/z of fragment | 135 | 107 | 92 | 77 |
|---|---|---|---|---|

Fig. S3: Mass Spectrum of Methoxy Benzaldehyde

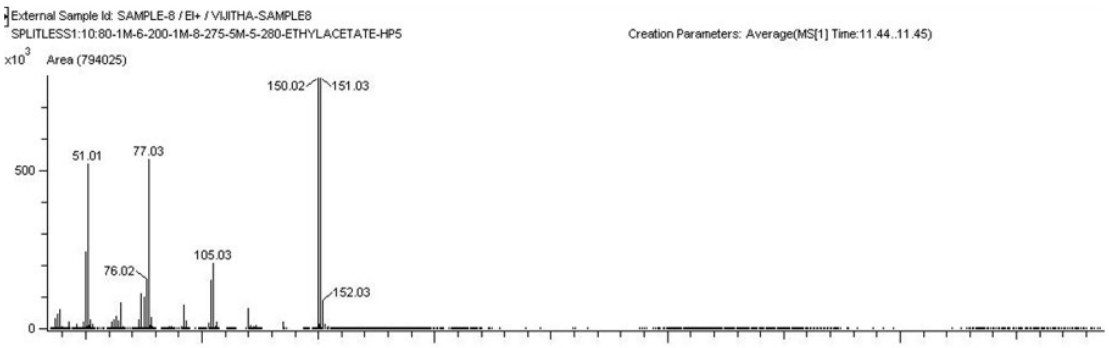
**METHYL BENZALDEHYDE, MW=120.148**




| m/z of fragment | 120 | 119 | 91 | 65 |
|---|---|---|---|---|

Fig S4: Mass Spectrum of Methyl Benzaldehyde

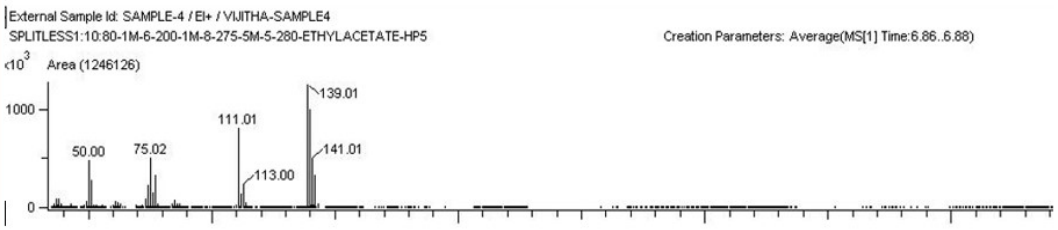
**NITRO BENZALDEHYDE, MW =151.12**




| m/z of fragment | 150 | 77 | 51 | 50 |
|---|---|---|---|---|

Fig.S5: Mass Spectrum of Nitro Benzaldehyde

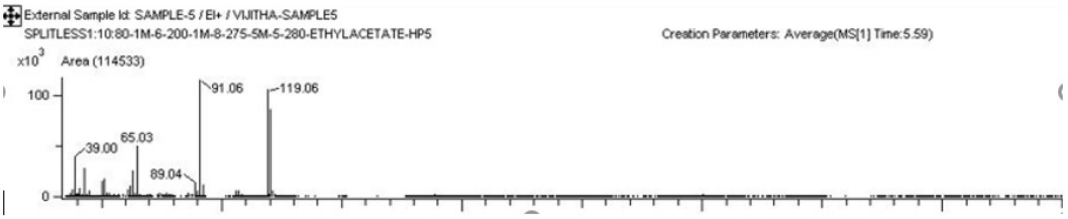
**CHLORO BENZALDEHYDE, MW =140.56**




| m/z of fragment | 139 | 113 | 111 | 75 | 51 | 50 |
|---|---|---|---|---|---|---|

Fig.S6 Mass Spectrum of Chloro Benzaldehyde

**AMINO BENZALDEHYDE, MW =121.14**




| m/z of fragment | 119 | 91 | 89 | 65 | 39 |
|---|---|---|---|---|---|

Fig. S7: Mass Spectrum of Amino Benzaldehyde

**Table S1: ICP-OES data for Fe-Al@ HNT**

| Sr.No | Parameter | Test Method | Unit | Results |
|---|---|---|---|---|
| | **Instrumental** | | | |
| 1 | Iron (as Fe) | ICP-OES | mg/kg | 70130.0 |
| 2 | Aluminium | ICP-OES | mg/kg | 57677.0 |

**Table S2: Catalytic activity for benzyl alcohol oxidation using different catalysts**

| SR. No. | Catalyst | TON | TOF($^{h-1}$) |
|---|---|---|---|
| 1 | Fe-Al/HNT | 0.01765 | 0.01765 |
| 2 | Al/HNT | 0.00765 | 0.00765 |
| 3 | Fe/HNT | 0.00236 | 0.00236 |
| 4 | HNT | 0.00147 | 0.00147 |

Reaction Conditions: 100mg of catalyst, 50 mmoles of BA, 15ml $H_2O_2$, reaction run for 1hour at 80$^{o}$C

| Table S3: TON for Catalyst Fe-Al/HNT | | | |
|---|---|---|---|
| SR. No. | YIELD | TON | TOF($h^{-1}$) [a] |
| 1 | 94 | 134 | 22 |
| 2 | 93 | 132 | 26 |
| 3 | 88 | 125 | 25 |
| 4 | 82 | 117 | 29 |

Reaction Conditions: BA=10mmol, Catalyst=2%, time =6h, peroxide=2ml

[a]TOF=TON per time in h

The TOF of the catalyst were calculated on basis of metal loading in moles and was under different time conditions