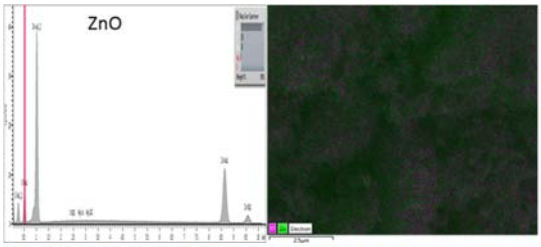
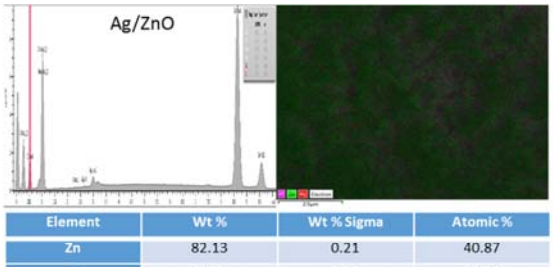
SUPPLEMENTARY DATA

EDX Characterisation

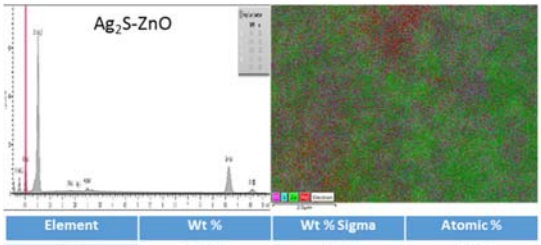
The images in Fig. 1 show the EDS spectra, the elemental mappings and percentage weight of various individual elemental constituents (Zn, O, Ag, and S) in each of the synthesised catalysts. Images (a) and (b) confirms the atomic percentage of ZnO and Ag2S which almost corresponds to a 1:1 and 2:1 composition, respectively. Ag2S/ZnO and Ag/Ag2S/ZnO had similar percentage compositions however a slight decrease of about 2 % is noticed in the ternary. The decrease can be attributed the reduction of Ag+ by photo-deposition and loss of oxygen atoms by drying the sample.



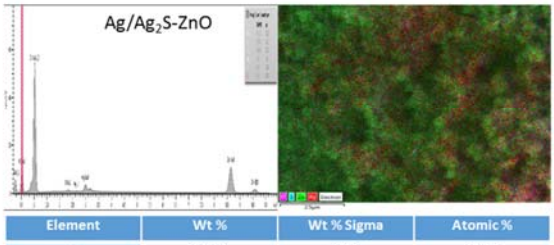
Element	Wt %	Wt % Sigma	Atomic %
Zn	83.56	0.25	54.73
O	16.44	0.17	45.27



Element	Wt %	Wt % Sigma	Atomic %
Zn	82.13	0.21	40.87
Ag	2.95	0.20	13.52
O	14.92	0.16	45.61



Element	Wt %	Wt % Sigma	Atomic %
Zn	80.57	0.19	43.51
Ag	3.07	0.18	12.28
O	16.02	0.15	42.83
S	0.34	0.08	1.38



Element	Wt %	Wt % Sigma	Atomic %
Zn	81.34	0.20	47.39
Ag	2.83	0.18	10.77
O	15.52	0.16	40.12
S	0.31	0.09	1.72

Fig. 1. EDS spectra of ZnO, Ag/ZnO, Ag_2S-ZnO and Ag/Ag_2S-ZnO

TGA Characterisation

The thermal analysis curves for all the synthesised catalysts after undergoing heating from 0 – 1000 °C at a rate of 10 °C/min is shown in Fig 2. The initial mass loss at 100 °C that occurred in all the catalyst samples is due to the release of water molecules and solvents absorbed during synthesis. ZnO showed a three step weight loss at about 200, 520 and 920 °C which can be attributed to the gradual removal of volatile combustible compounds. Results showed that, both the primary catalyst and all the composite catalysts exhibits high thermal stability with progressive minimal weight losses ranging between 1 – 3 wt%.

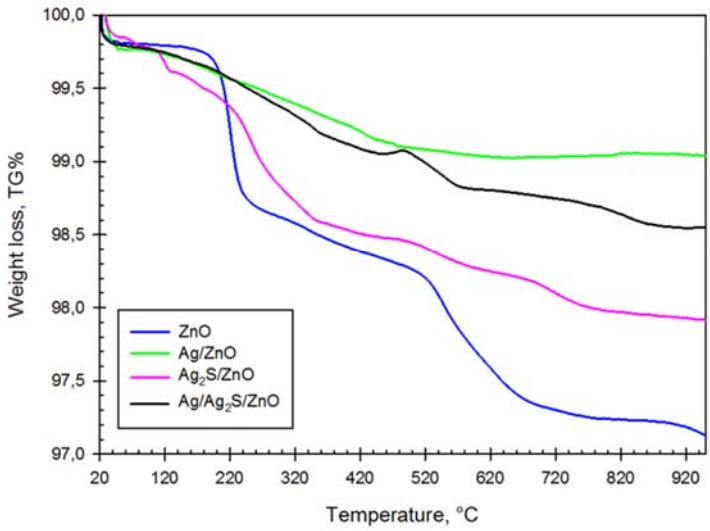


Fig. 2. TGA curves of ZnO, Ag/ZnO, Ag_2S-ZnO and Ag/Ag_2S-ZnO

Identification of degradation intermediates by GC-MS analysis

Three early intermediates that appeared after the first 3 minutes of the retention time were identified in the order of hydroquinone<resorcinol<catechol. Trace amounts of benzoquinone, formic and succinic where also identified but not consistently present in all the samples. The peak at 3.28 minute could not be specifically identified as any of the early intermediates, however, peaks at 3.41, 4.03. 4.62, and 5.72 minutes corresponds accurately

with those identified in methanol (the reagent used for the extraction process). The highest peak at 4.37 minutes is identified to have traces of mainly oxalic acid and some acyclic compounds such as acetic, carboxylic, glyoxalin and maleic acid.

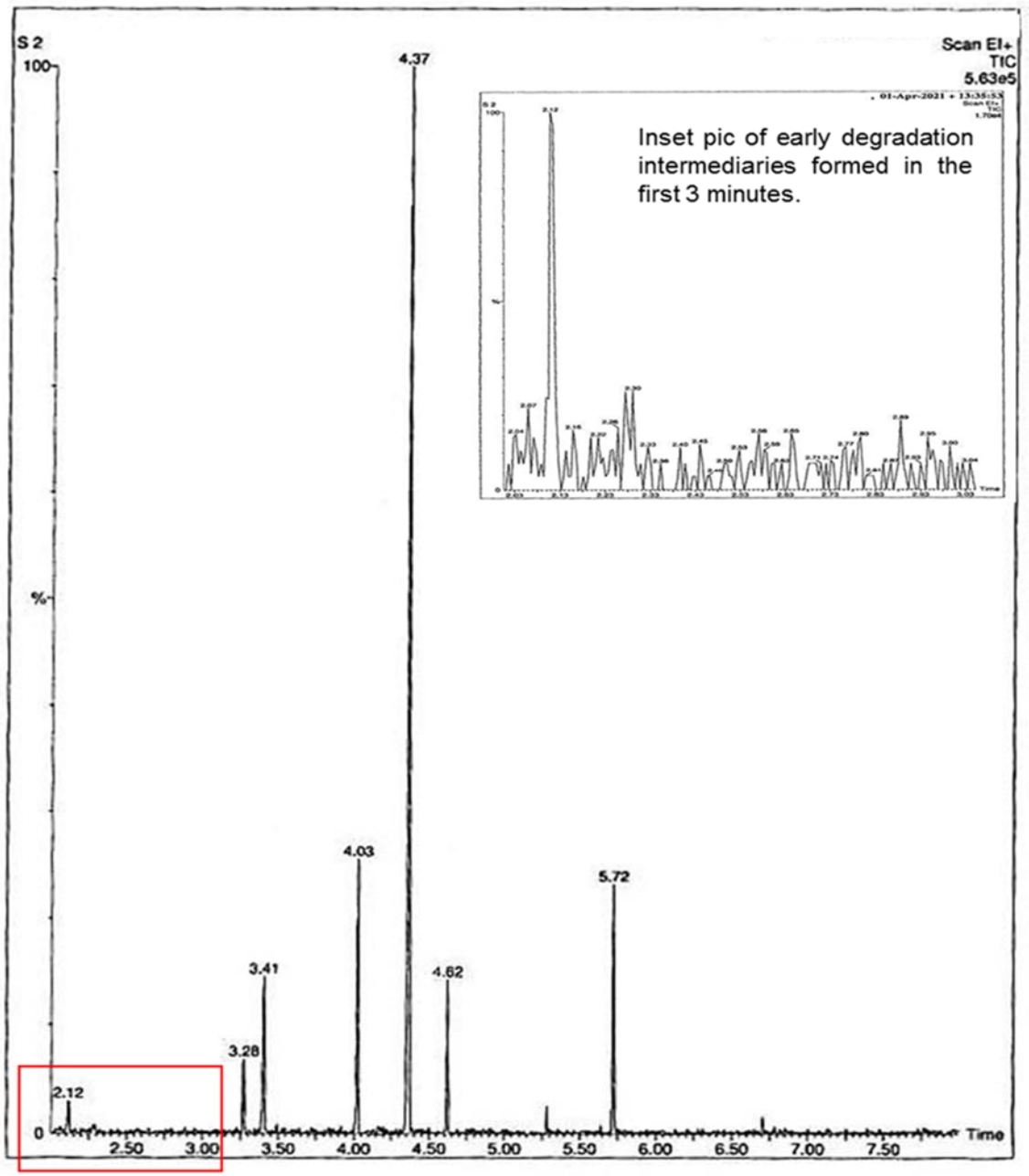


Fig. 3. Phenol degradation intermediates peaks identified by GC-MS