Electronic Supplementary Material (ESI) for RSC Advances

Preparation of potential biofuel 5-ethoxymethylfurfural and other 5-alkoxymethylfurfurals in the presence of oil shale ash

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Supporting Information

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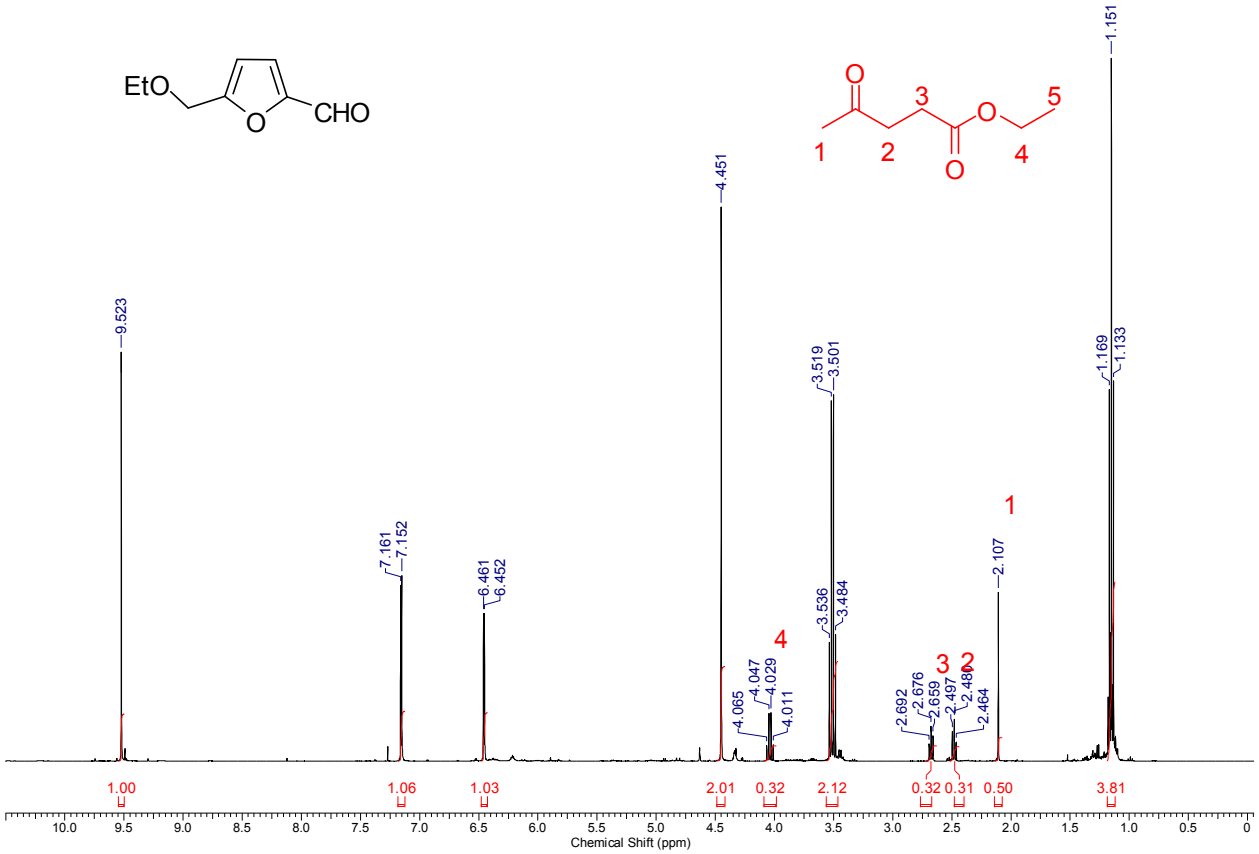
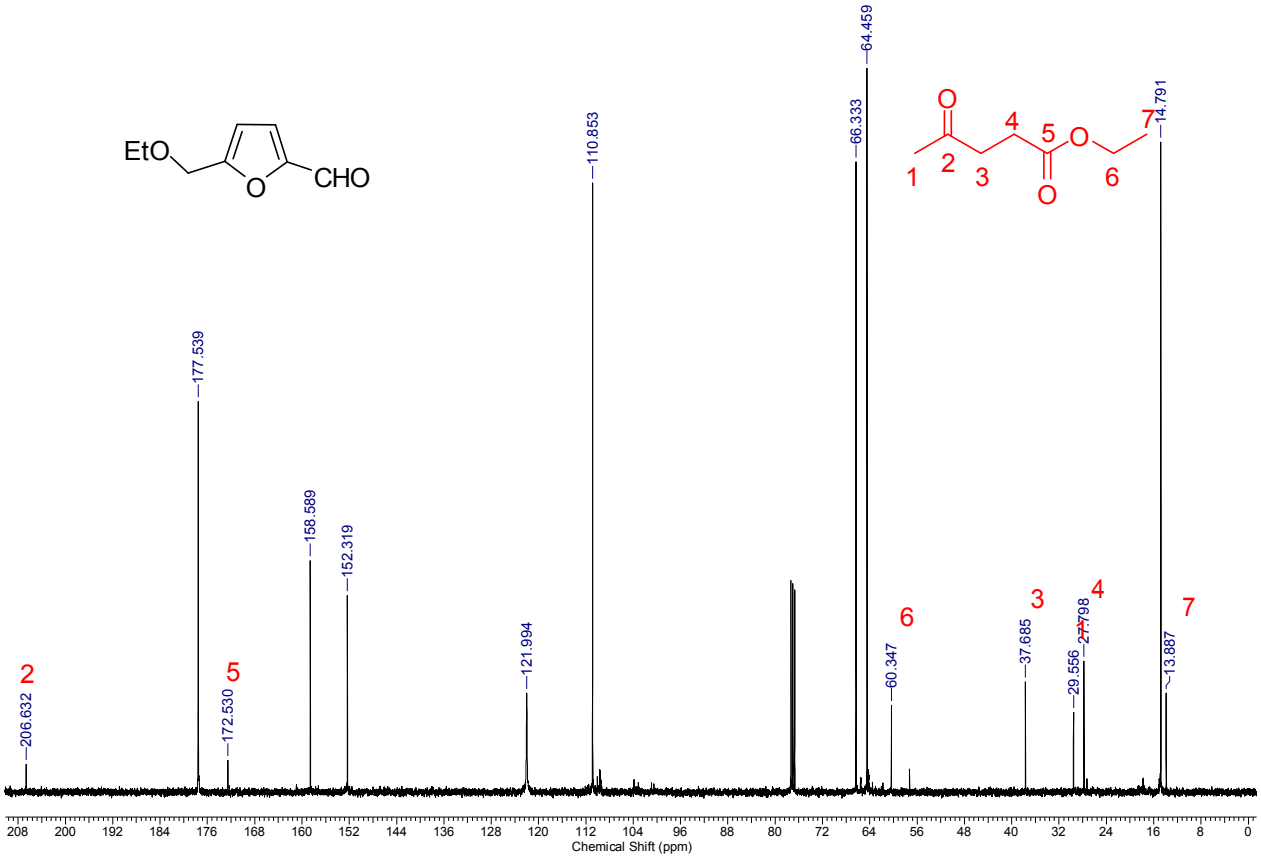
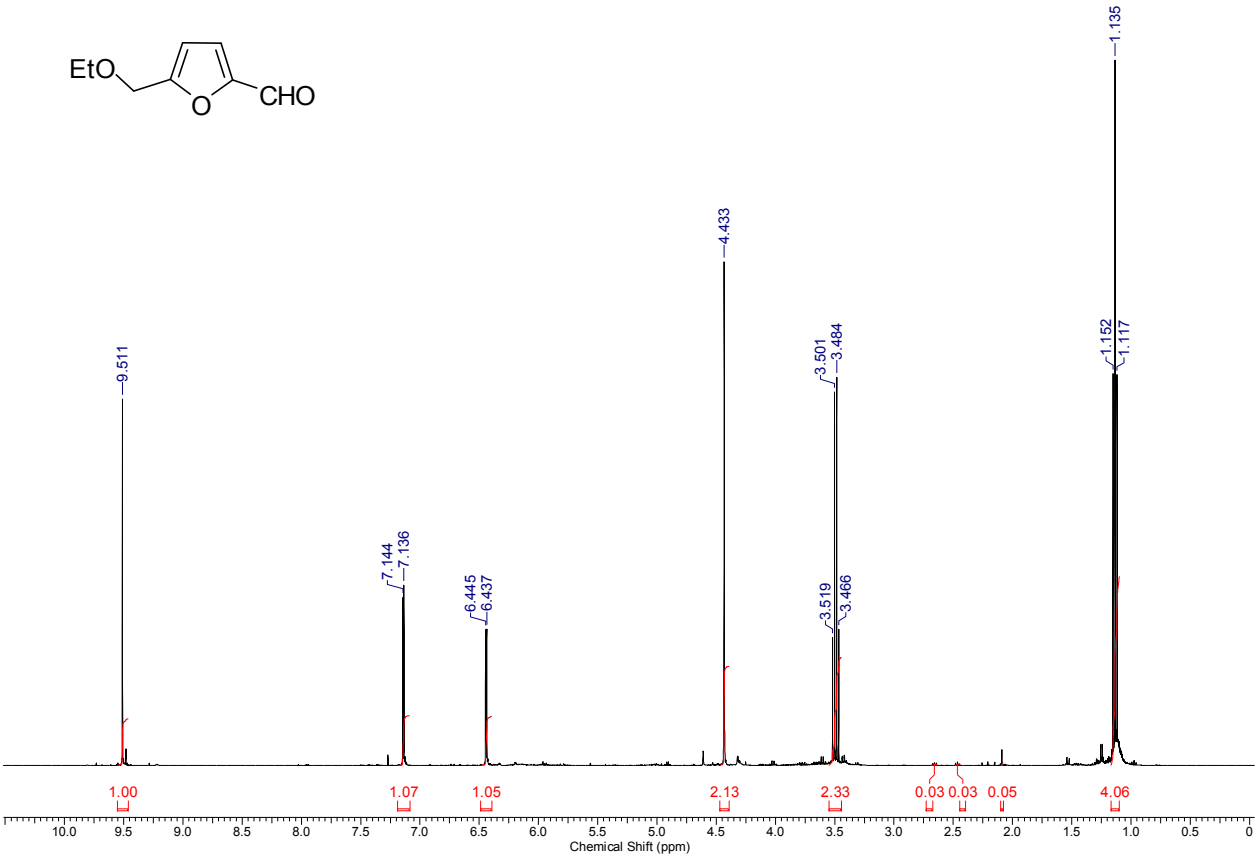
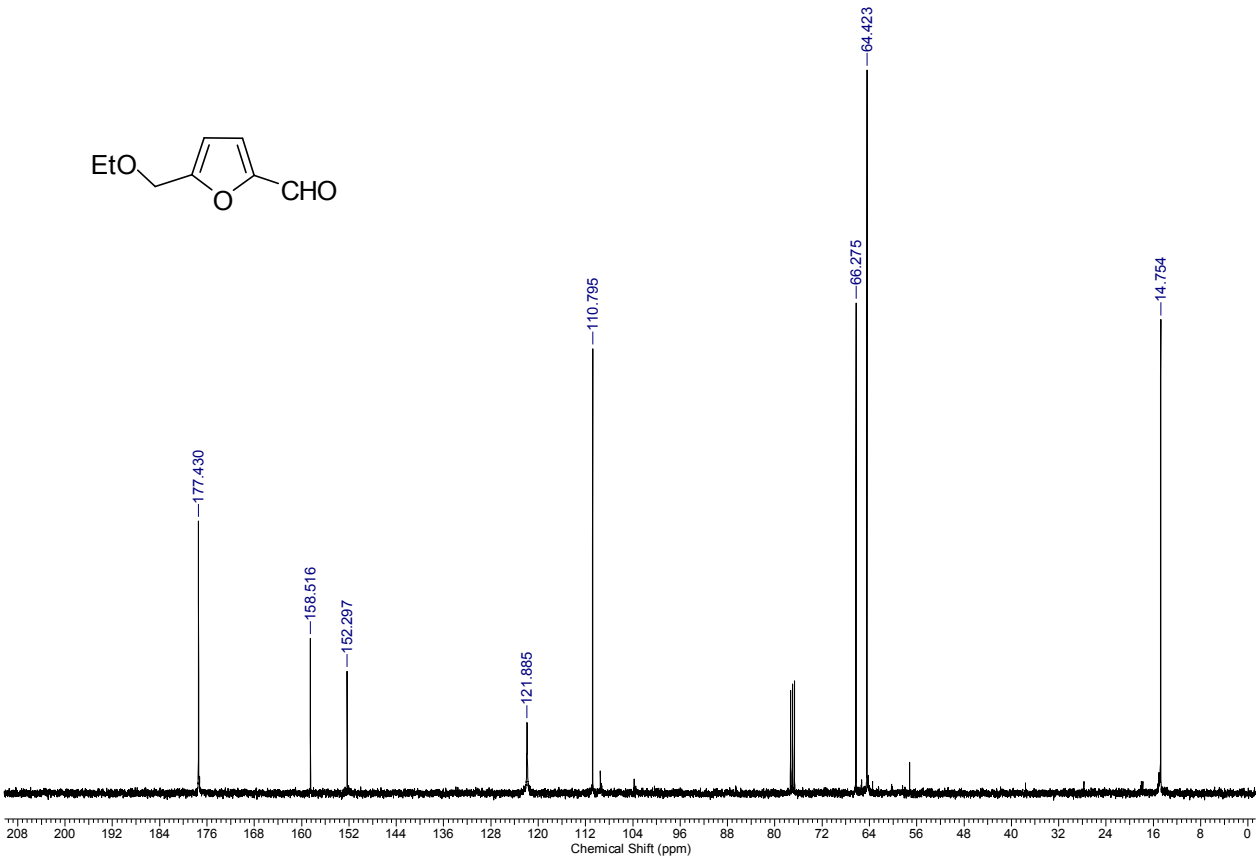
EMF from BMF without oil shale ash, 0.5 h, 70 °C (Table 1, entry 1), *unpurified*
(signals by-product ethyl levulinate shown in red)



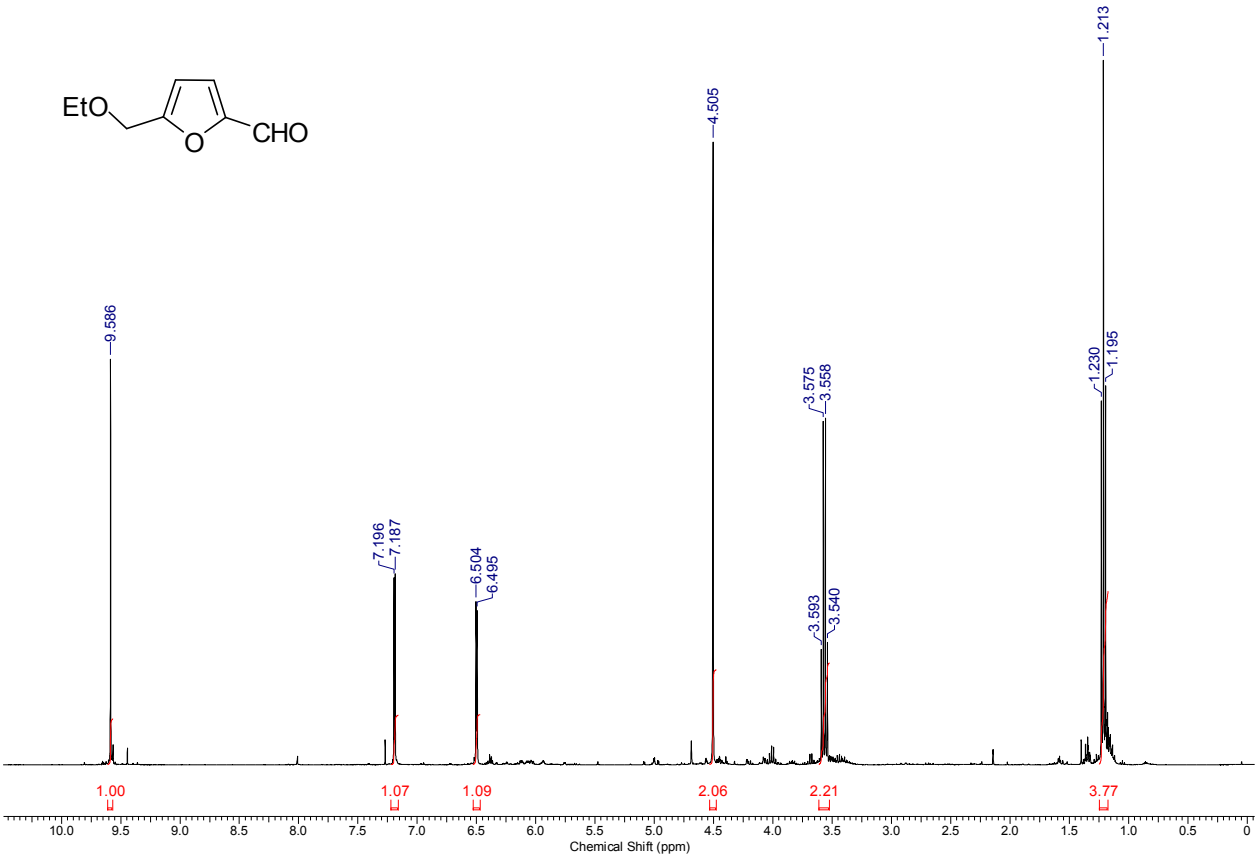


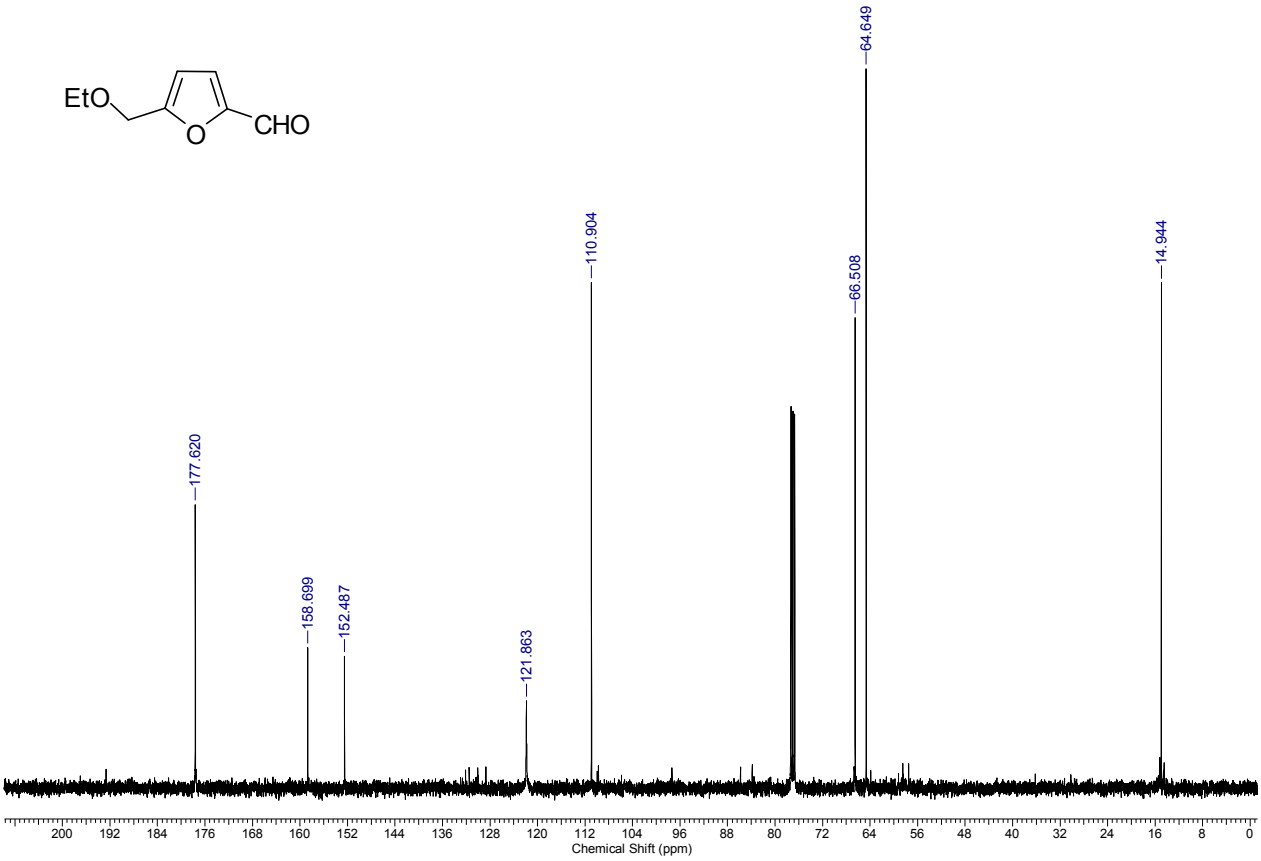
5-ethoxymethylfurfural from BMF with oil shale ash A, 0.5 h, 70 °C (Table 1, entry 2), *unpurified*





5-ethoxymethylfurfural from BMF with oil shale ash A, 16 h, rt (Table 1, entry 8), *unpurified*



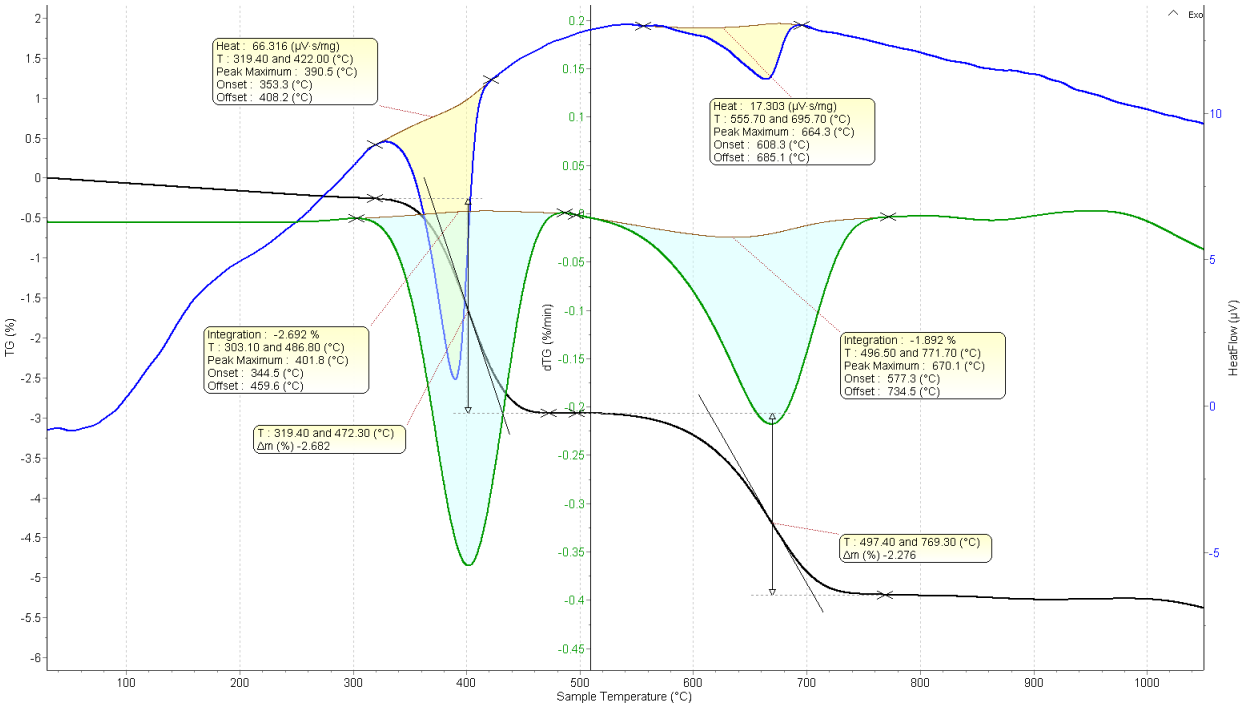


Thermal analyses of oil-shale ashes used.

Thermoanalyzer: Linseis PTA ST1600

General analysis conditions: 1050°C, 10°C/min, Ar atmosphere (50 mL/min, in weighing chamber 60 mL/min), sample weight 30.5±0.5 mg, TG/HDSC thermocouple.
It can be seen that in both samples the decomposition of $Ca(OH)_2$ takes place between 370…430°C and the decomposition of carbonates (Ca and Mg) starts roughly at 600°C. The moisture content is below the detection limit.

Thermogram for ash A (taken from pulverized-fired boiler):



Sample mass: 30.9 mg

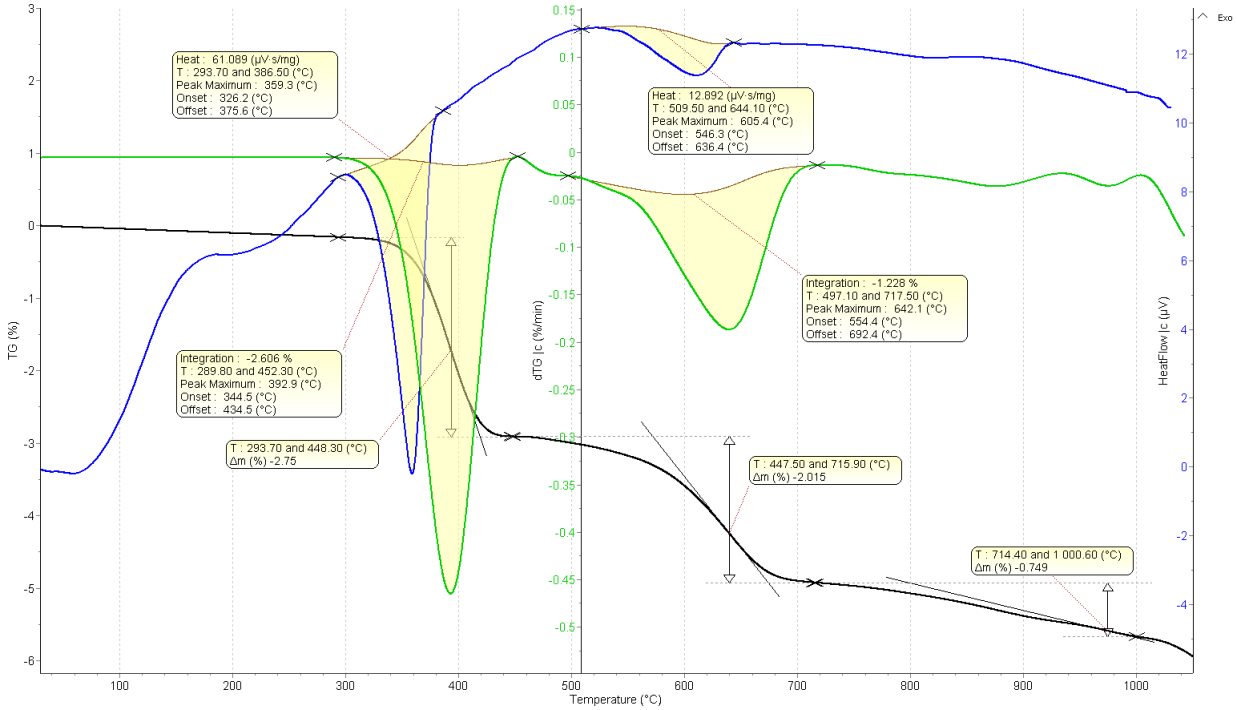
1-st weight loss: 2.68%

$Ca(OH)_2$ content: 11.0% (calculation is based on expelled H_2O)

2-nd weight loss: 2.28%

The approximate content of mineral CO_2: 2.28%

Thermogram for ash B (taken from electrostatic presipitator):



Sample mass: 30.6 mg

1-st weight loss: 2.75%

$Ca(OH)_2$ content: 11.3% (calculation is based on expelled H_2O)

2-nd weight loss: 2.015%

The approximate content of mineral CO_2: 2.02%