Supplementary information for

# Oxygenate formation over K/β-$Mo_2C$ catalyst in the Fischer-Tropsch synthesis

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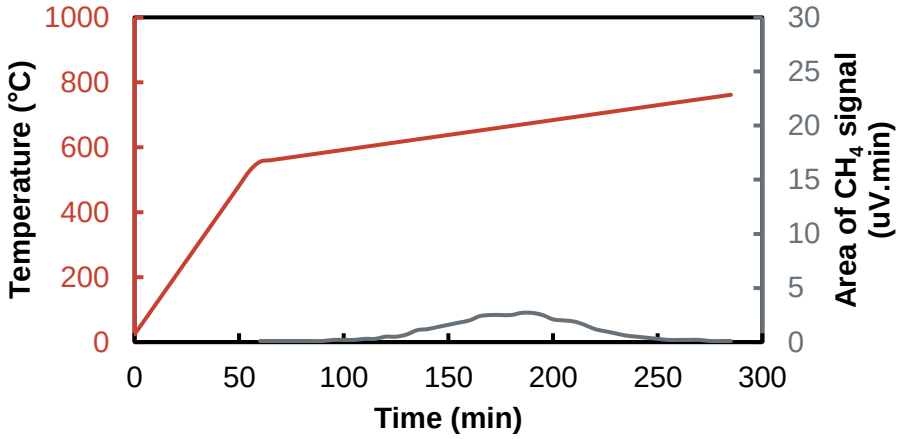


Figure S 1: TPH profile of sample prepared at 760°C. Red line is the temperature program and the grey line is the formation of $CH_4$ indicated with the area obtained from the GC-TCD. $T_{final}$ = 800°C, ramp rate <550°C = 10°C/min; >550°C = 1°C/min, $H_2$ SV ~ 9 L/h/$g_{cat}$.

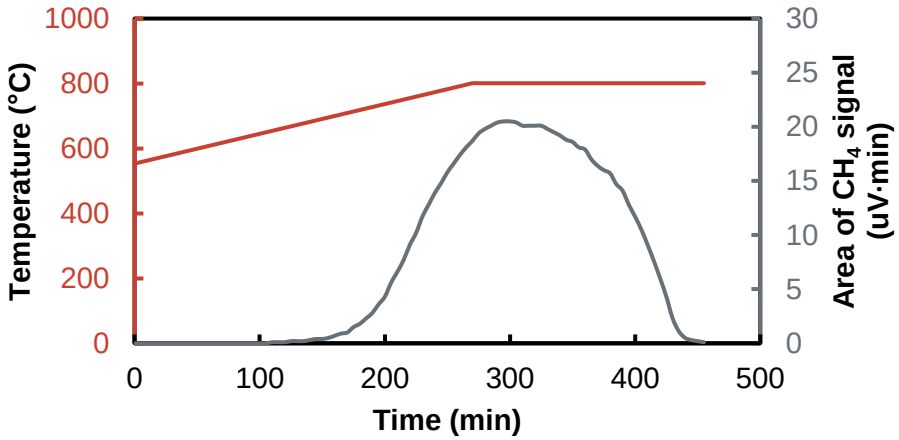


Figure S 2: TPH profile of sample prepared at 1000°C. Red line is the temperature program and the grey line is the formation of $CH_4$ indicated with the area obtained from the GC-TCD. $T_{final}$ = 800°C, ramp rate = 1°C/min, $H_2$ SV ~ 9 L/h/$g_{cat}$.

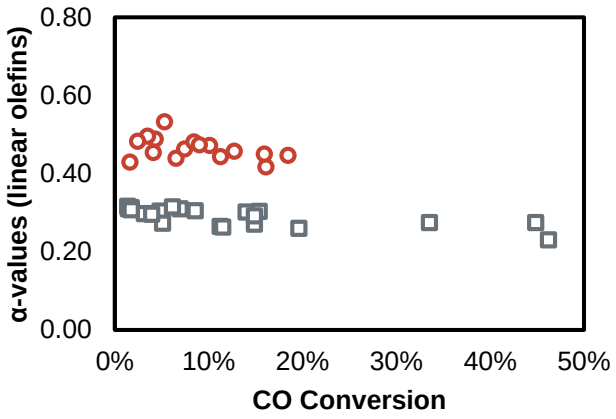


Figure S 3: Chain growth probability as a function of CO conversion towards linear olefins for promoted (red circles) and unpromoted (grey squares) samples.

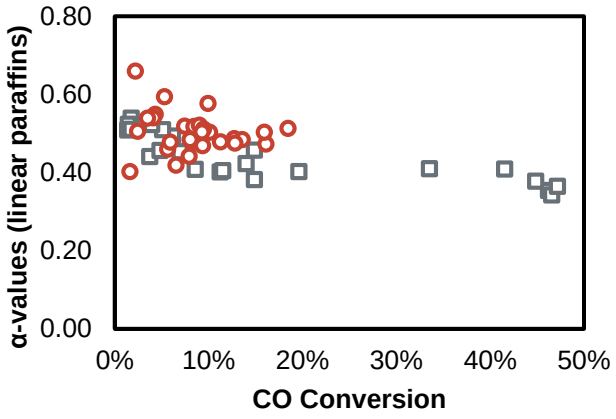


Figure S 4: Chain growth probability as a function of CO conversion towards linear paraffins for promoted (red circles) and unpromoted (grey squares) samples.

Table S 1: GC-TCD operating settings

Model: GC-Model Varian CP-4900

| | Channel 1 | Channel 2 | Channel 3 |
|---|---|---|---|
| Column | molesieve (MS5A) | PorapakQ | molesieve (MS5A) |
| Column length | 20 m | 10 m | 10 m |
| Carrier gas | H2 | H2 | Ar |
| Injection time | 350 ms | 350 ms | 350 ms |
| Injector temperature | - | 80°C | - |
| Column oven temperature | 80°C | 60°C | ` |
| Column pressure | 1.5 bar | 1 bar | 1.5 bar |
| Stabilization time | | 5 s | |
| Sampling time | | 35 s | |

Table S 2: GC-FID operating settings

| | | | |
|---|---|---|---|
| Model: GC-Model Varian 3900 | | | |
| Detector | Flame ionization detector (FID) | | |
| Detector temperature | | | 200°C |
| Injector temperature | | | 200°C |
| Split ratio | | | 7 |
| Column | | | |
| Column pressure | | | 1.72 bar |
| Flame gas | H2 | | 30 ml/min |
| Makeup gas | N2 | | 25 ml/min |
| Air flow | | | 300 ml/min |
| Temperature program | Ramp (°C/min) | Step (°C) | Time (min) |
| | - | -55 | 1.5 |
| | 9 | 0 | 0 |
| | 4 | 100 | 1 |
| | 4 | 200 | 2 |
| | 10 | 280 | 5 |
| | 20 | 150 | - |
| Total time | | | 80 min |
| Coolant | | | CO2 (liquid) |