Supporting Information for Article

Combustion Kinetics of Biomass Materials in the Kinetic Regime

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Keywords: Wheat straw, willow; wood; sewage sludge; thermogravimetry; distributed activation energy model; combustion; char burn-off; pyrolysis; kinetic regime.

Scope of this document: The kinetic evaluation was illustrated by two experiments for each sample in the figures of our article. **Figures S1 - S6** of the present *Supporting Information* show series of 10 experiments that were evaluated simultaneously. Besides, details are given on the autocatalytic (self-accelerating) kinetics of the oxidative decomposition of the cellulose in the wood sample of the study in **Figure S7** and **Table S1**.

Textual information in Figures S1 - S6: The first row below each figure contains the name of the sample and a brief description of the experimental conditions. The second row lists the fit quality for the given experiment (fit_1) and for the whole series (fit_{10}). The further rows display parameters for the partial processes.

Colors and line types in Figures S1 - S6:

○○○○	DTG curves normalized by the initial sample mass
——	normalized mass loss rate curves calculated from the model ($-dm^{calc}/dt$)
——	rate of the biomass devolatilization ($-dm_{ur}/dt$ or $c_{other}\, d\alpha_{other}/dt$)
- - - -	rate of the cellulose devolatilization (when present in the model, $c_{cell}\, d\alpha_{cell}/dt$)
·······	rate of the char formation and/or char burn-off ($-dm_{char}/dt$ or $c_{char}\, d\alpha_{char}/dt$)
×××××	ash formation rate

The last figure (**Figure S7**) displays $f(\alpha_{cell})$ functions, where α_{cell} is the reacted fraction of the cellulose in the wood sample and $f(\alpha_{cell})$ is an empirical function describing an autocatalytic oxidative devolatilization. The notations of Figure S7 are explained in the table of parameters (**Table S1**) in the same page.

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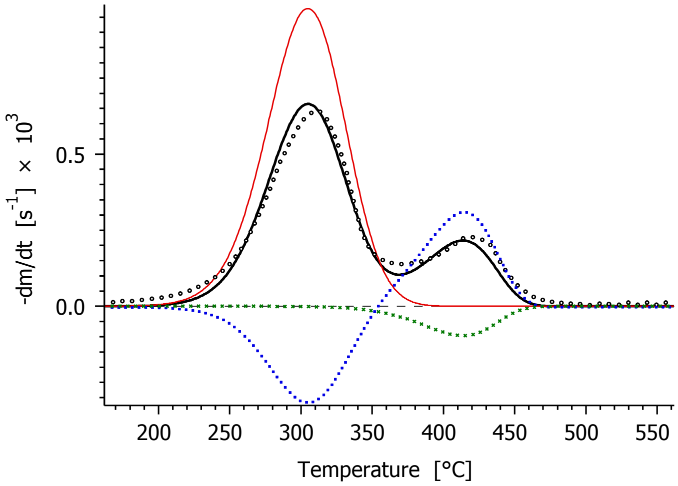
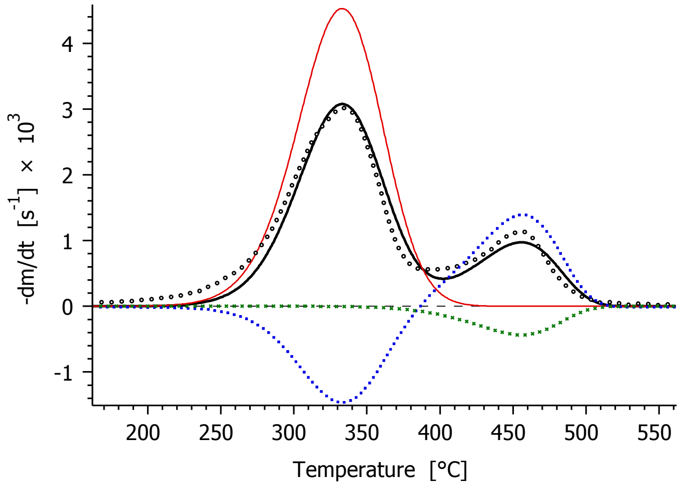


Wheat straw, 4°C/min, [O2]=0.04
fit_1=4.16%, fit_{10}=3.99%
1: E_0=157.0 $\log_{10}A$=12.24 σ(E)=5.55 ν=0.431 yield=0.323
2: E_0=151.0 $\log_{10}A$=9.56 σ(E)=0 ν=0.498 yield=0.309



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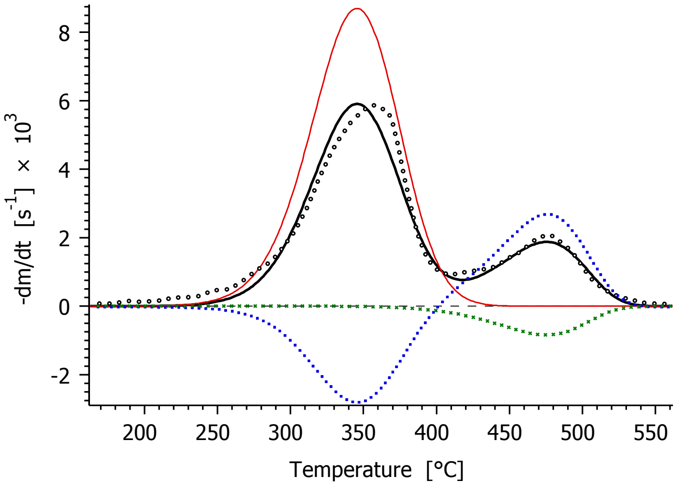
2: E_0=151.0 $\log_{10}A$=9.56 σ(E)=0 ν=0.498 yield=0.309



Wheat straw, 40°C/min, [O2]=0.04
fit_1=5.25%, fit_{10}=3.99%
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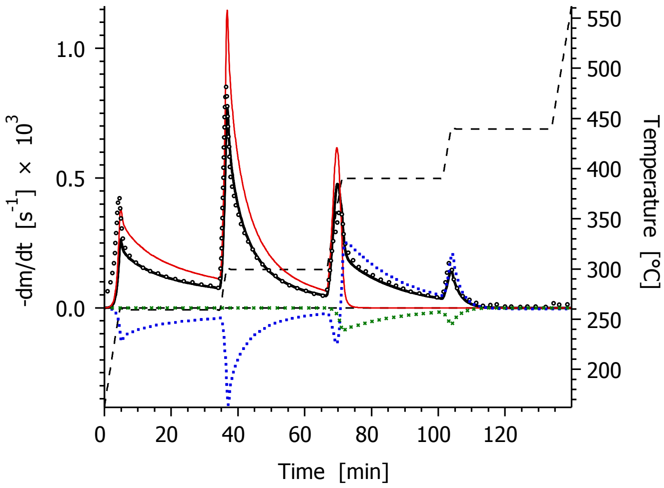
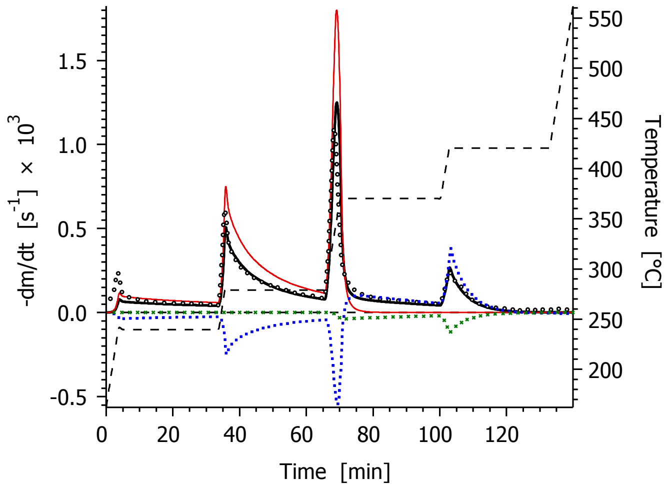
2: E_0=151.0 $\log_{10}A$=9.56 σ(E)=0 ν=0.498 yield=0.309

Figure S1. Evaluation of the wheat straw experiments by a model of successive devolatilization and char burn-off reactions

Figure S1. Evaluation of the wheat straw experiments by a model of successive devolatilization and char burn-off reactions



Wheat straw, stepwise 1, [O2]=0.04
fit_1=3.95%, fit_{10}=3.99%
1: E_0=157.0 $\log_{10} A$=12.24 σ(E)=5.55 ν=0.431 yield=0.323
2: E_0=151.0 $\log_{10} A$=9.56 σ(E)=0 ν=0.498 yield=0.309



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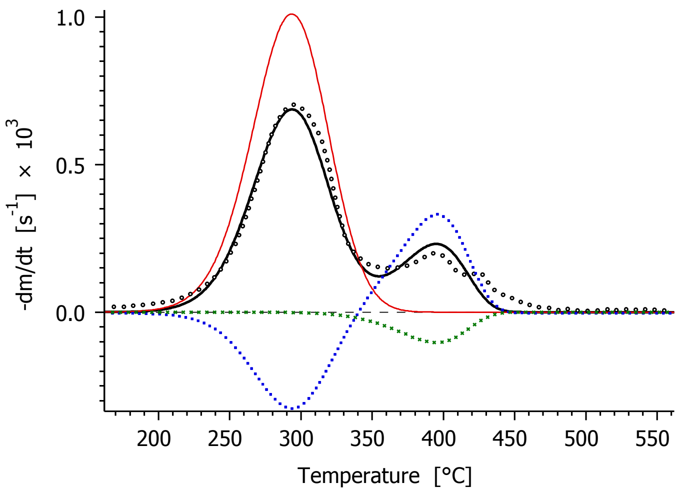
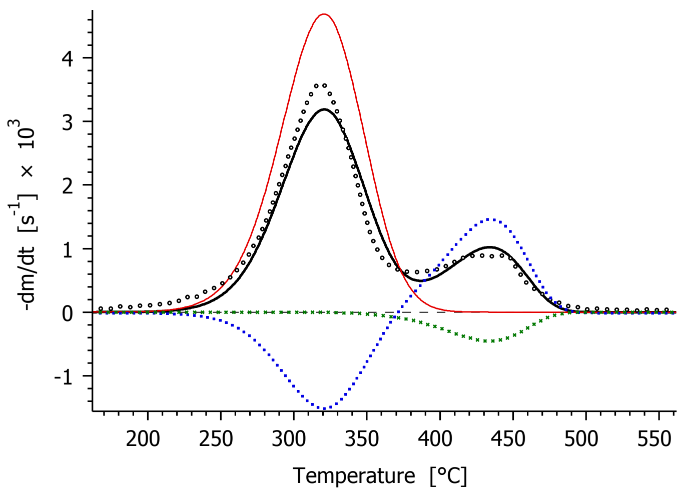
2: E_0=151.0 $\log_{10} A$=9.56 σ(E)=0 ν=0.498 yield=0.309

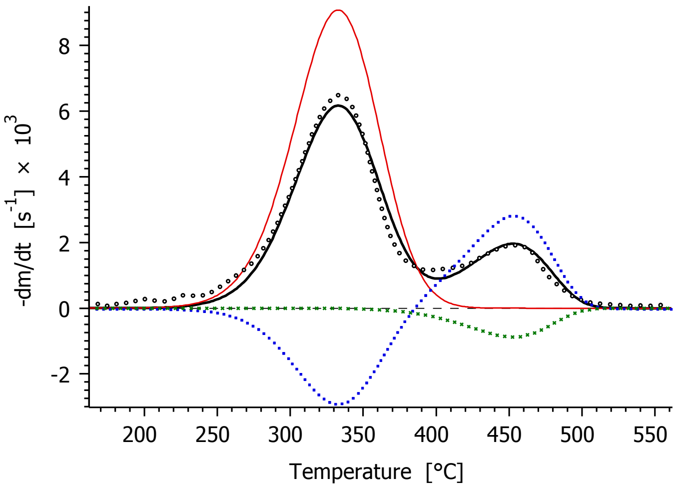


Wheat straw, 4°C/min, [O2]=0.2
fit_1=4.19%, fit_{10}=3.99%
1: E_0=157.0 $\log_{10} A$=12.24 σ(E)=5.55 ν=0.431 yield=0.323
2: E_0=151.0 $\log_{10} A$=9.56 σ(E)=0 ν=0.498 yield=0.309



Wheat straw, 20°C/min, [O2]=0.2
fit_1=3.98%, fit_{10}=3.99%
1: E_0=157.0 $\log_{10} A$=12.24 σ(E)=5.55 ν=0.431 yield=0.323
2: E_0=151.0 $\log_{10} A$=9.56 σ(E)=0 ν=0.498 yield=0.309

Figure S1. *(Continued)*



Wheat straw, 40°C/min, [O2]=0.2
fit_1=3.02%, fit_{10}=3.99%
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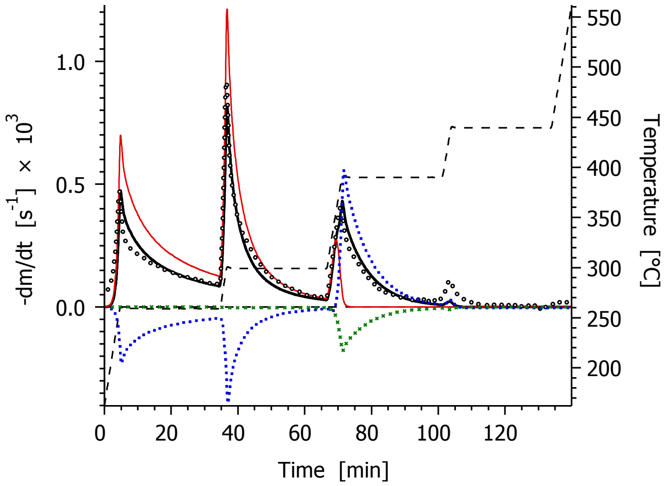
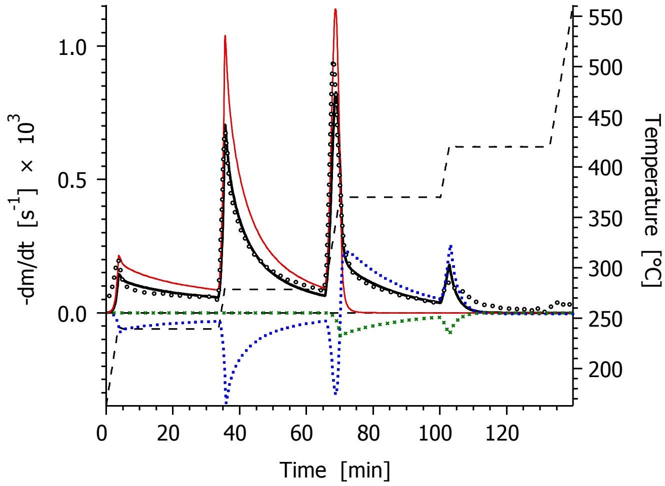
2: E_0=151.0 $\log_{10}$A=9.56 σ(E)=0 ν=0.498 yield=0.309

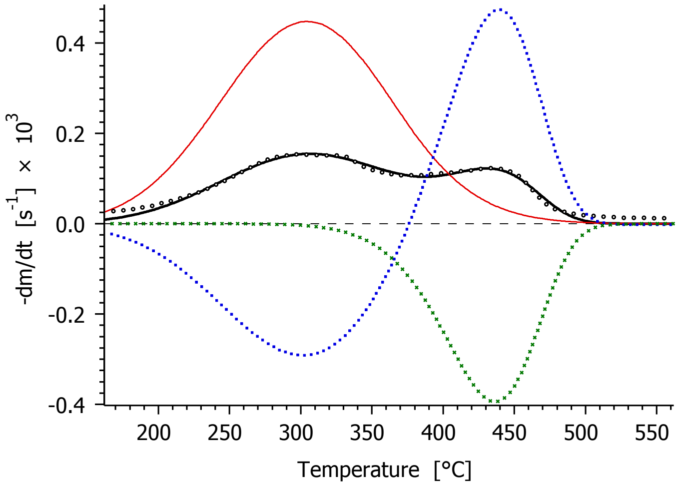


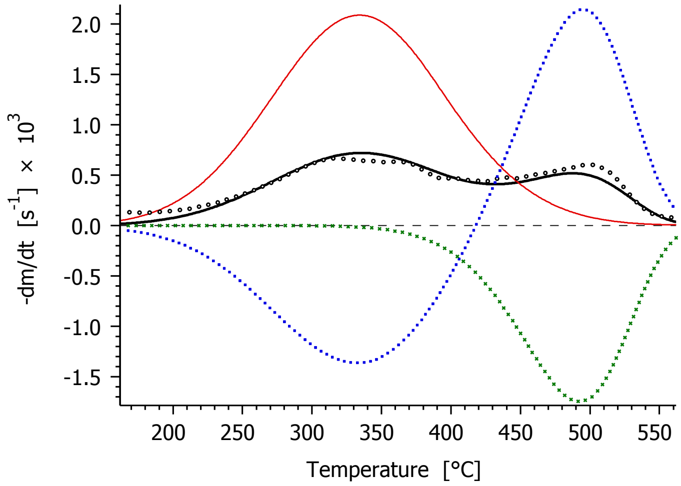
Wheat straw, stepwise 1, [O2]=0.2
fit_1=3.14%, fit_{10}=3.99%
1: E_0=157.0 $\log_{10}$A=12.24 σ(E)=5.55 ν=0.431 yield=0.323
2: E_0=151.0 $\log_{10}$A=9.56 σ(E)=0 ν=0.498 yield=0.309



Wheat straw, stepwise 2, [O2]=0.2
fit_1=3.15%, fit_{10}=3.99%
1: E_0=157.0 $\log_{10}$A=12.24 σ(E)=5.55 ν=0.431 yield=0.323
2: E_0=151.0 $\log_{10}$A=9.56 σ(E)=0 ν=0.498 yield=0.309

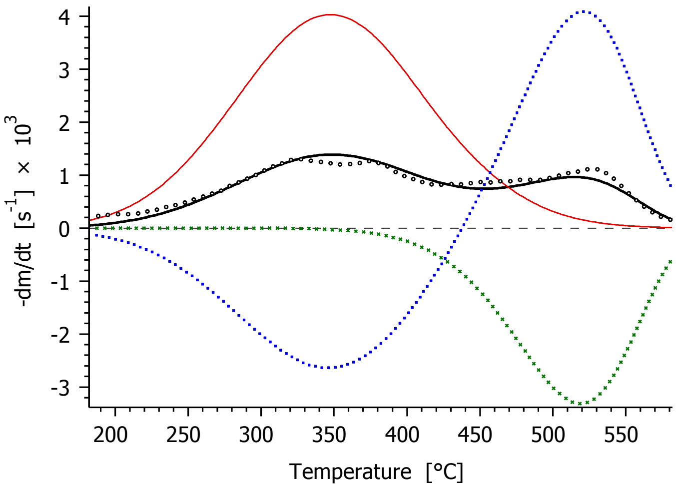
Figure S1. *(Continued)*





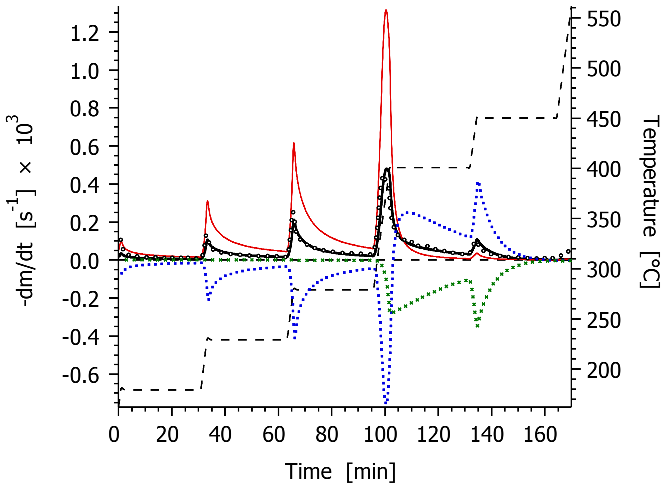
Sewage sludge, 4°C/min, [O2]=0.04
fit_1=4.30%, fit_{10}=6.08%
1: E_0=142.8 $\log_{10} A$=10.98 σ(E)=14.3 ν=0.541 yield=0.657
2: E_0=120.2 $\log_{10} A$=7.03 σ(E)=0 ν=0.646 yield=0.785

Sewage sludge, 20°C/min, [O2]=0.04
fit_1=7.88%, fit_{10}=6.08%
1: E_0=142.8 $\log_{10} A$=10.98 σ(E)=14.3 ν=0.541 yield=0.657
2: E_0=120.2 $\log_{10} A$=7.03 σ(E)=0 ν=0.646 yield=0.785

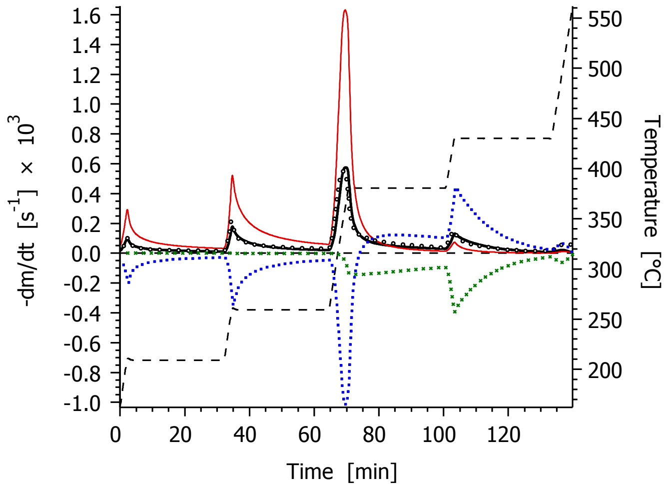


Sewage sludge, 40°C/min, [O2]=0.04
fit_1=7.20%, fit_{10}=6.08%
1: E_0=142.8 $\log_{10} A$=10.98 σ(E)=14.3 ν=0.541 yield=0.657
2: E_0=120.2 $\log_{10} A$=7.03 σ(E)=0 ν=0.646 yield=0.785

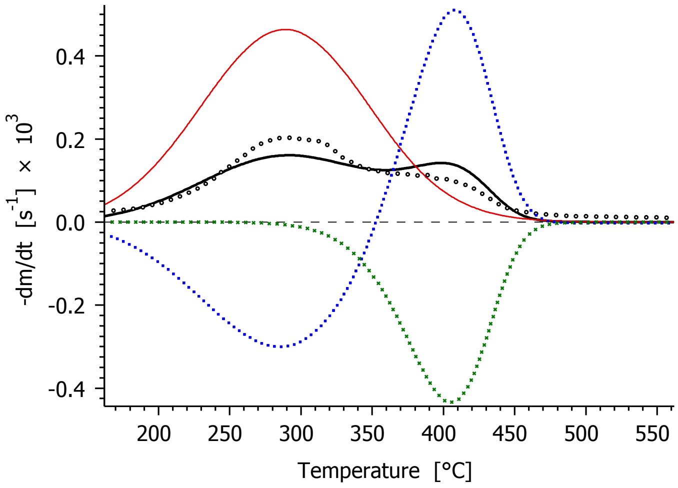
Figure S2. Evaluation of the sewage sludge experiments by a model of successive devolatilization and char burn-off reactions



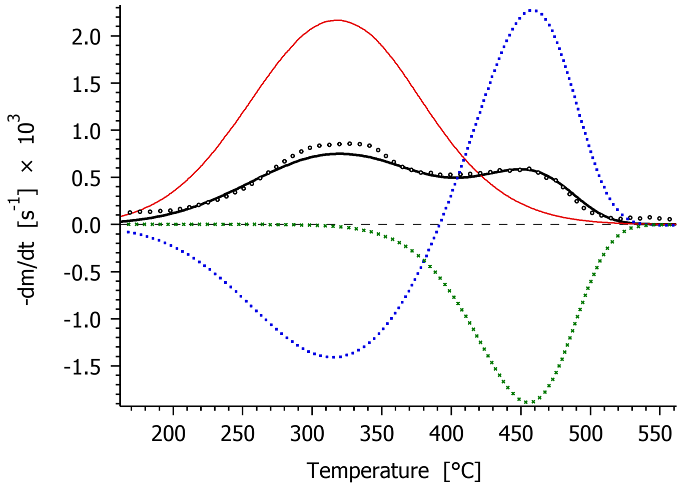
Sewage sludge, stepwise 1, [O2]=0.04
fit$_1$=3.50%, fit$_{10}$=6.08%
1: E_0=142.8 $\log_{10}A$=10.98 σ(E)=14.3 ν=0.541 yield=0.657
2: E_0=120.2 $\log_{10}A$=7.03 σ(E)=0 ν=0.646 yield=0.785



Sewage sludge, stepwise 2, [O2]=0.04
fit$_1$=2.77%, fit$_{10}$=6.08%
1: E_0=142.8 $\log_{10}A$=10.98 σ(E)=14.3 ν=0.541 yield=0.657
2: E_0=120.2 $\log_{10}A$=7.03 σ(E)=0 ν=0.646 yield=0.785

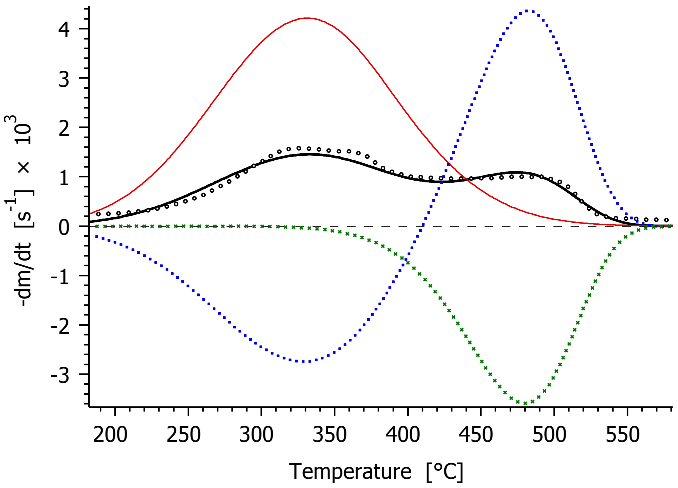


Sewage sludge, 4°C/min, [O2]=0.2
fit$_1$=10.50%, fit$_{10}$=6.08%
1: E_0=142.8 $\log_{10}A$=10.98 σ(E)=14.3 ν=0.541 yield=0.657
2: E_0=120.2 $\log_{10}A$=7.03 σ(E)=0 ν=0.646 yield=0.785

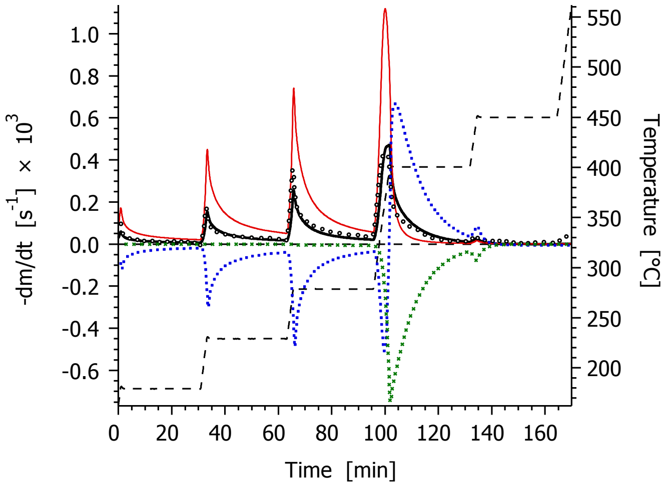


Sewage sludge, 20°C/min, [O2]=0.2
fit$_1$=5.83%, fit$_{10}$=6.08%
1: E_0=142.8 $\log_{10}A$=10.98 σ(E)=14.3 ν=0.541 yield=0.657
2: E_0=120.2 $\log_{10}A$=7.03 σ(E)=0 ν=0.646 yield=0.785

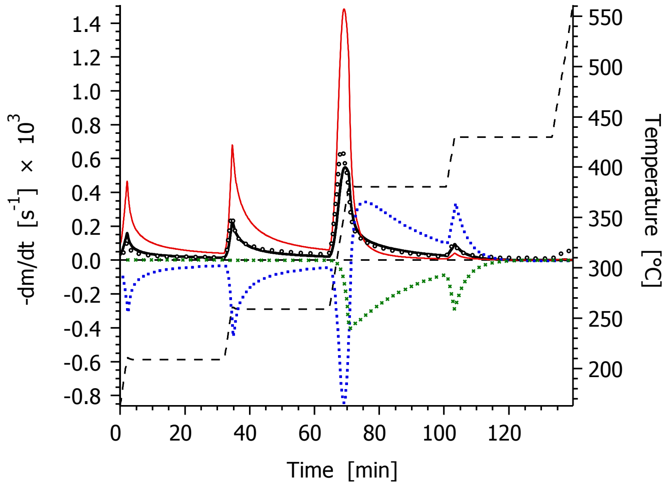
Figure S2. *(Continued)*



Sewage sludge, 40°C/min, [O2]=0.2
fit_1=5.86%, fit_{10}=6.08%
1: E_0=142.8 $\log_{10} A$=10.98 σ(E)=14.3 ν=0.541 yield=0.657
2: E_0=120.2 $\log_{10} A$=7.03 σ(E)=0 ν=0.646 yield=0.785

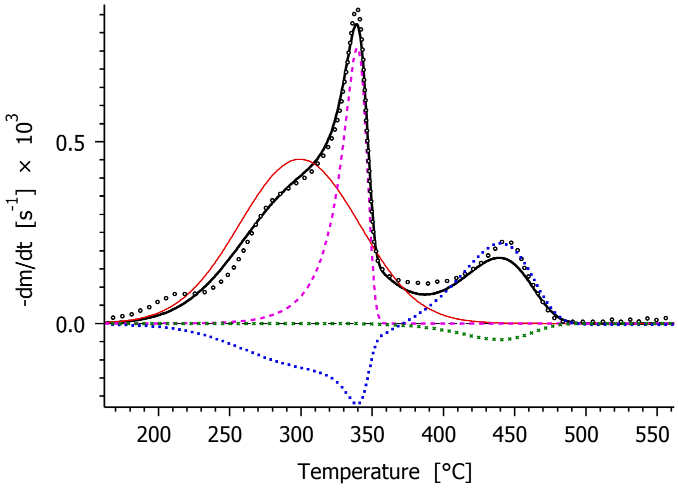


Sewage sludge, stepwise 1, [O2]=0.2
fit_1=4.95%, fit_{10}=6.08%
1: E_0=142.8 $\log_{10} A$=10.98 σ(E)=14.3 ν=0.541 yield=0.657
2: E_0=120.2 $\log_{10} A$=7.03 σ(E)=0 ν=0.646 yield=0.785

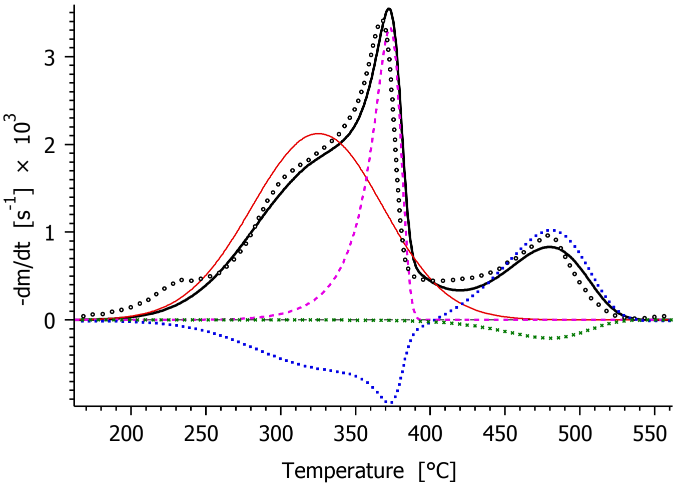


Sewage sludge, stepwise 2, [O2]=0.2
fit_1=3.68%, fit_{10}=6.08%
1: E_0=142.8 $\log_{10} A$=10.98 σ(E)=14.3 ν=0.541 yield=0.657
2: E_0=120.2 $\log_{10} A$=7.03 σ(E)=0 ν=0.646 yield=0.785

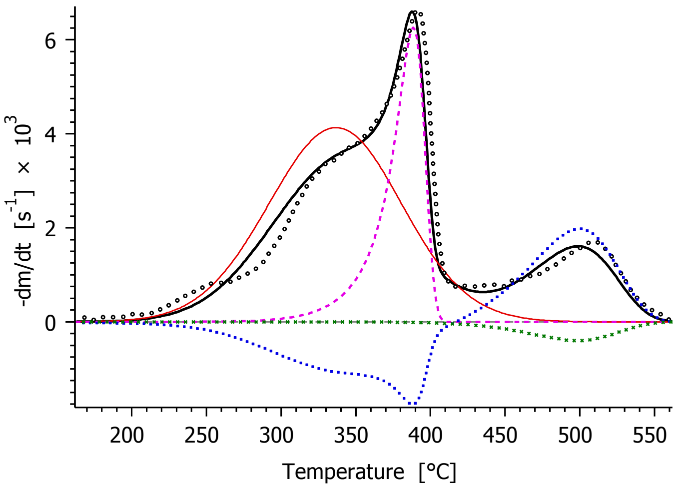
Figure S2. *(Continued)*



Willow, 4°C/min, [O2]=0.04
fit_1=2.58%, fit_{10}=4.21%
1: E_0=165.9 $\log_{10}A$=13.05 σ(E)=11.2 ν=0.366 yield=0.231
2: E_0=145.0 $\log_{10}A$=10.66 σ(E)=0 ν=0.611 yield=0.208
3: E_0=168.9 $\log_{10}A$=10.66 σ(E)=0 ν=0.624 yield=0.200

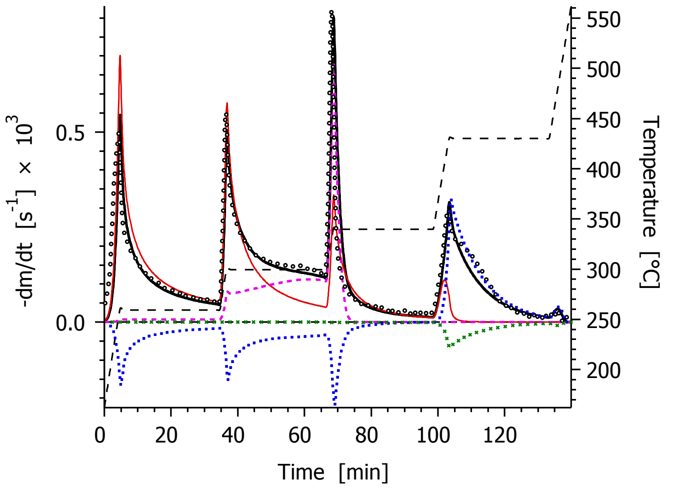


Willow, 20°C/min, [O2]=0.04
fit_1=6.15%, fit_{10}=4.21%
1: E_0=165.9 $\log_{10}A$=13.05 σ(E)=11.2 ν=0.366 yield=0.231
2: E_0=145.0 $\log_{10}A$=10.66 σ(E)=0 ν=0.611 yield=0.208
3: E_0=168.9 $\log_{10}A$=10.66 σ(E)=0 ν=0.624 yield=0.200

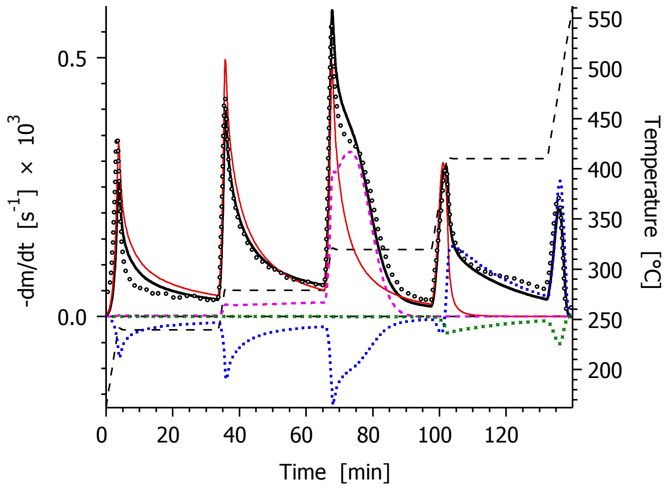


Willow, 40°C/min, [O2]=0.04
fit_1=5.65%, fit_{10}=4.21%
1: E_0=165.9 $\log_{10}A$=13.05 σ(E)=11.2 ν=0.366 yield=0.231
2: E_0=145.0 $\log_{10}A$=10.66 σ(E)=0 ν=0.611 yield=0.208
3: E_0=168.9 $\log_{10}A$=10.66 σ(E)=0 ν=0.624 yield=0.200

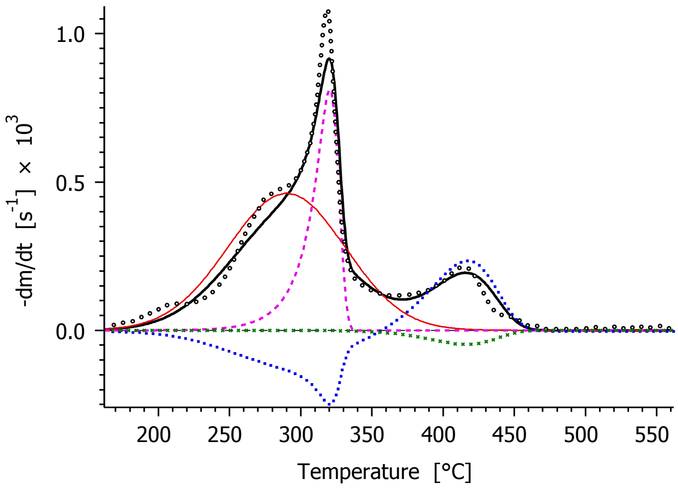
Figure S3. Evaluation of the willow experiments assuming two devolatilization reactions and a successive devolatilization and char burn-off



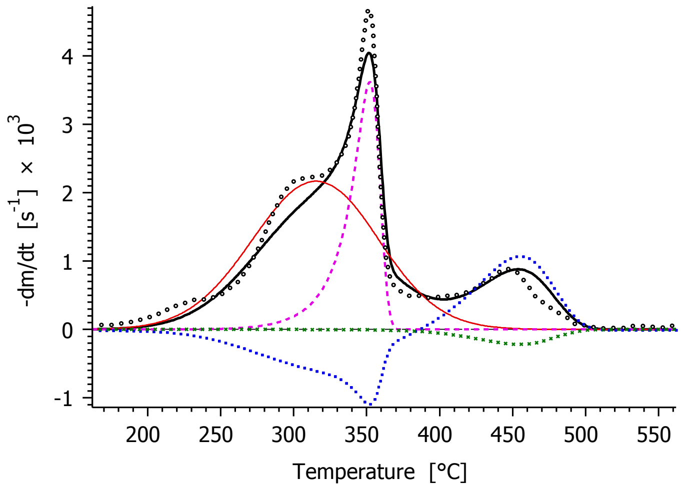
Willow, stepwise 1, [O2]=0.04
fit_1=4.64%, fit_{10}=4.21%
1: E_0=165.9 $\log_{10}A$=13.05 σ(E)=11.2 ν=0.366 yield=0.231
2: E_0=145.0 $\log_{10}A$=10.66 σ(E)=0 ν=0.611 yield=0.208
3: E_0=168.9 $\log_{10}A$=10.66 σ(E)=0 ν=0.624 yield=0.200



Willow, stepwise 2, [O2]=0.04
fit_1=4.03%, fit_{10}=4.21%
1: E_0=165.9 $\log_{10}A$=13.05 σ(E)=11.2 ν=0.366 yield=0.231
2: E_0=145.0 $\log_{10}A$=10.66 σ(E)=0 ν=0.611 yield=0.208
3: E_0=168.9 $\log_{10}A$=10.66 σ(E)=0 ν=0.624 yield=0.200

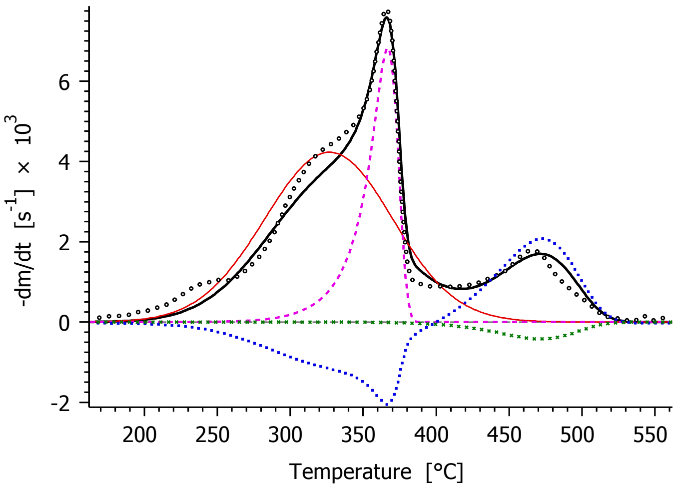


Willow, 4°C/min, [O2]=0.2
fit_1=2.88%, fit_{10}=4.21%
1: E_0=165.9 $\log_{10}A$=13.05 σ(E)=11.2 ν=0.366 yield=0.231
2: E_0=145.0 $\log_{10}A$=10.66 σ(E)=0 ν=0.611 yield=0.208
3: E_0=168.9 $\log_{10}A$=10.66 σ(E)=0 ν=0.624 yield=0.200



Willow, 20°C/min, [O2]=0.2
fit_1=3.49%, fit_{10}=4.21%
1: E_0=165.9 $\log_{10}A$=13.05 σ(E)=11.2 ν=0.366 yield=0.231
2: E_0=145.0 $\log_{10}A$=10.66 σ(E)=0 ν=0.611 yield=0.208
3: E_0=168.9 $\log_{10}A$=10.66 σ(E)=0 ν=0.624 yield=0.200

Figure S3. *(Continued)*



Willow, 40°C/min, [O2]=0.2
fit_1=3.11%, fit_{10}=4.21%
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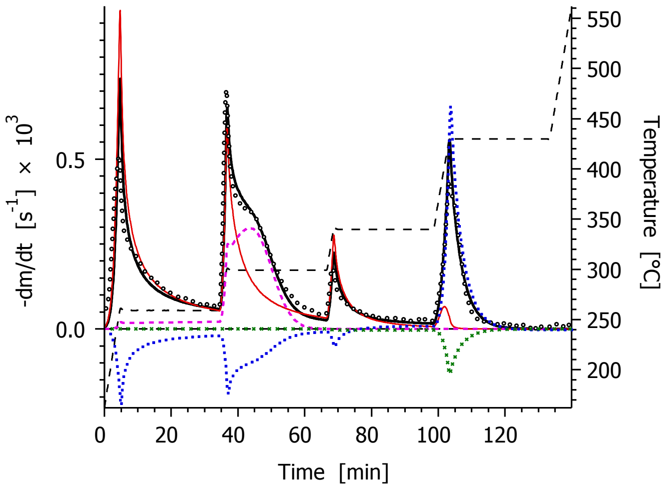
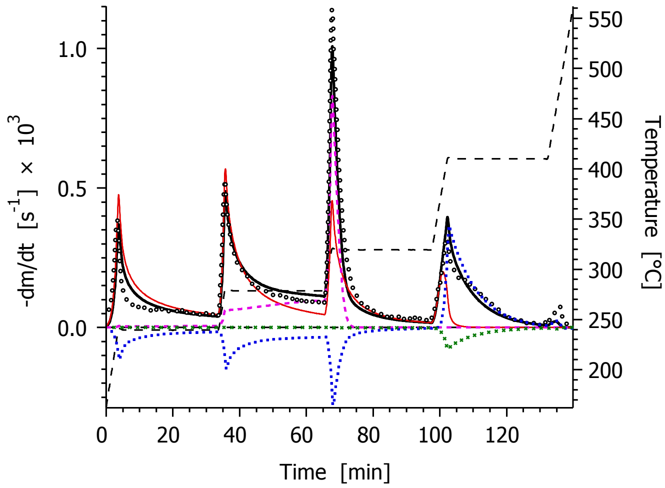
2: E_0=145.0 $\log_{10}A$=10.66 σ(E)=0 ν=0.611 yield=0.208
3: E_0=168.9 $\log_{10}A$=10.66 σ(E)=0 ν=0.624 yield=0.200

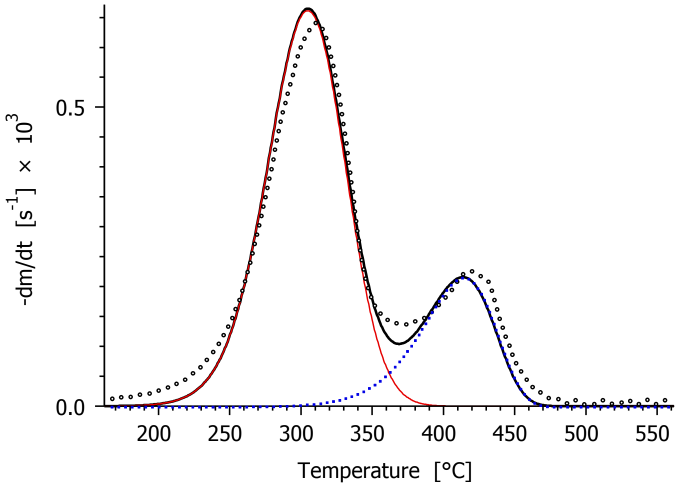


Willow, stepwise 1, [O2]=0.2
fit_1=4.26%, fit_{10}=4.21%
1: E_0=165.9 $\log_{10}A$=13.05 σ(E)=11.2 ν=0.366 yield=0.231
2: E_0=145.0 $\log_{10}A$=10.66 σ(E)=0 ν=0.611 yield=0.208
3: E_0=168.9 $\log_{10}A$=10.66 σ(E)=0 ν=0.624 yield=0.200

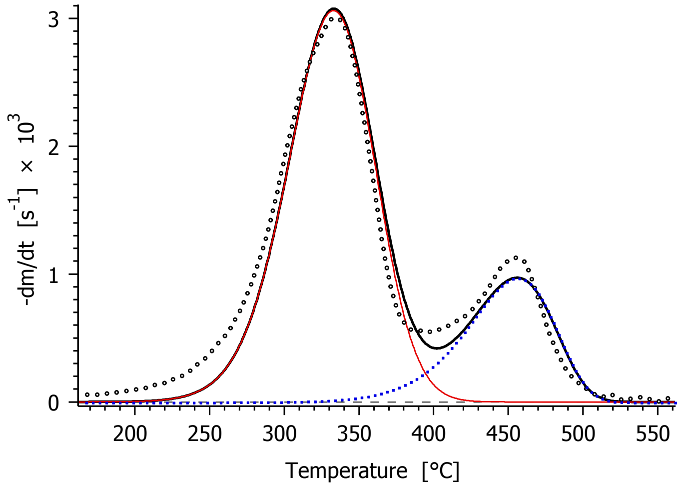


Willow, stepwise 2, [O2]=0.2
fit_1=3.81%, fit_{10}=4.21%
1: E_0=165.9 $\log_{10}A$=13.05 σ(E)=11.2 ν=0.366 yield=0.231
2: E_0=145.0 $\log_{10}A$=10.66 σ(E)=0 ν=0.611 yield=0.208
3: E_0=168.9 $\log_{10}A$=10.66 σ(E)=0 ν=0.624 yield=0.200

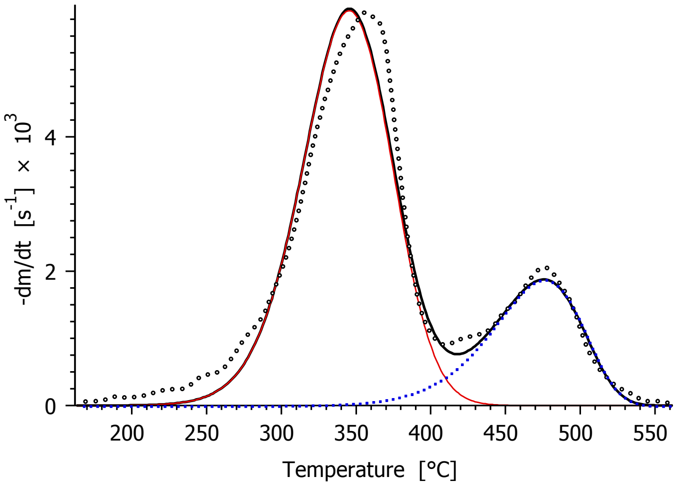
Figure S3. *(Continued)*



Wheat straw, 4°C/min, [O2]=0.04
fit_1=4.16%, fit_{10}=3.99%
1: E_0=156.9 $\log_{10}A$=12.23 σ(E)=5.53 ν=0.431
2: E_0=150.5 $\log_{10}A$=9.53 σ(E)=0 ν=0.502

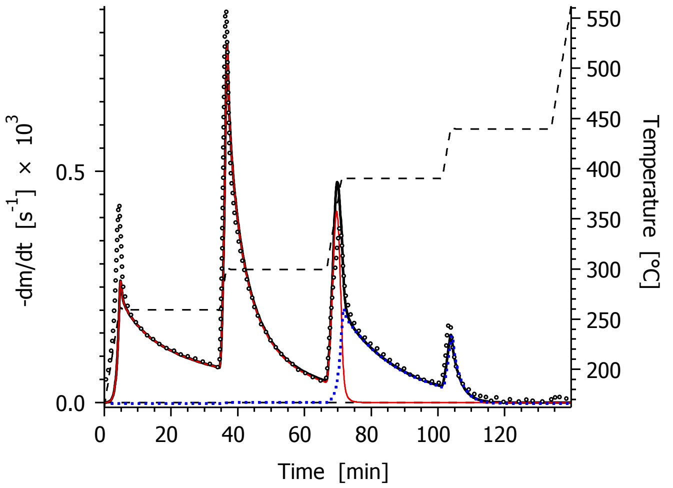


Wheat straw, 20°C/min, [O2]=0.04
fit_1=4.53%, fit_{10}=3.99%
1: E_0=156.9 $\log_{10}A$=12.23 σ(E)=5.53 ν=0.431
2: E_0=150.5 $\log_{10}A$=9.53 σ(E)=0 ν=0.502



Wheat straw, 40°C/min, [O2]=0.04
fit_1=5.25%, fit_{10}=3.99%
1: E_0=156.9 $\log_{10}A$=12.23 σ(E)=5.53 ν=0.431
2: E_0=150.5 $\log_{10}A$=9.53 σ(E)=0 ν=0.502

Figure S4. Evaluation of the wheat straw experiments by an approximate model of two parallel reactions

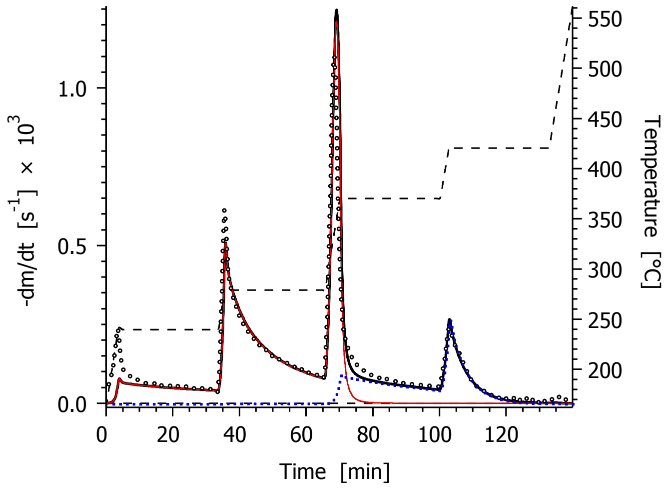


Wheat straw, stepwise 1, [O2]=0.04

fit_1=3.94%, fit_{10}=3.99%

1: E_0=156.9 $\log_{10} A$=12.23 $\sigma(E)$=5.53 ν=0.431

2: E_0=150.5 $\log_{10} A$=9.53 $\sigma(E)$=0 ν=0.502

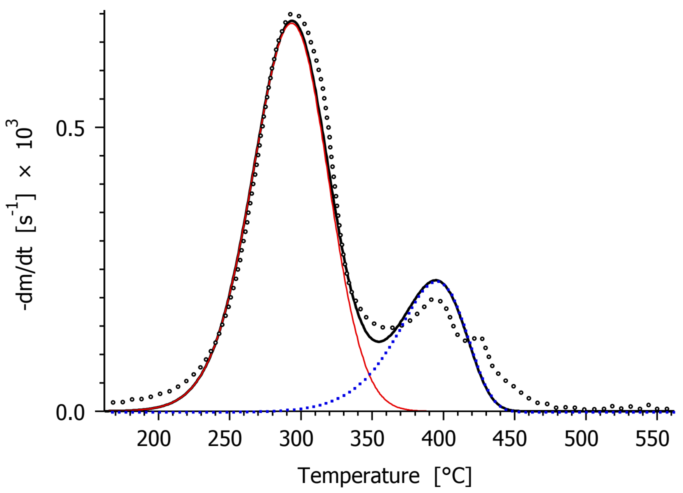


Wheat straw, stepwise 2, [O2]=0.04

fit_1=4.00%, fit_{10}=3.99%

1: E_0=156.9 $\log_{10} A$=12.23 $\sigma(E)$=5.53 ν=0.431

2: E_0=150.5 $\log_{10} A$=9.53 $\sigma(E)$=0 ν=0.502

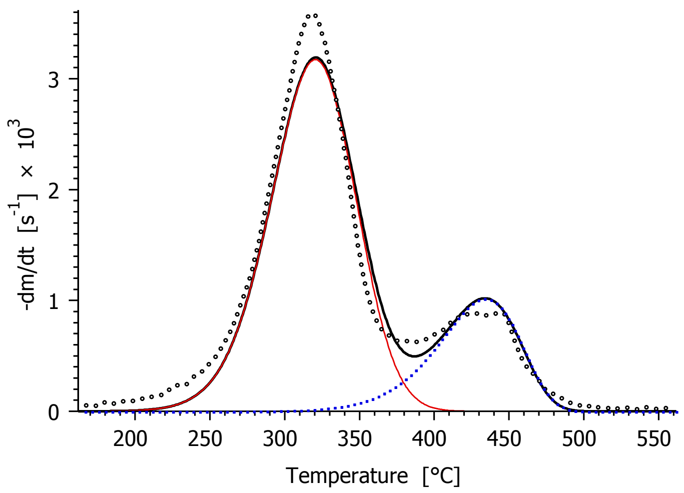


Wheat straw, 4°C/min, [O2]=0.2

fit_1=4.19%, fit_{10}=3.99%

1: E_0=156.9 $\log_{10} A$=12.23 $\sigma(E)$=5.53 ν=0.431

2: E_0=150.5 $\log_{10} A$=9.53 $\sigma(E)$=0 ν=0.502



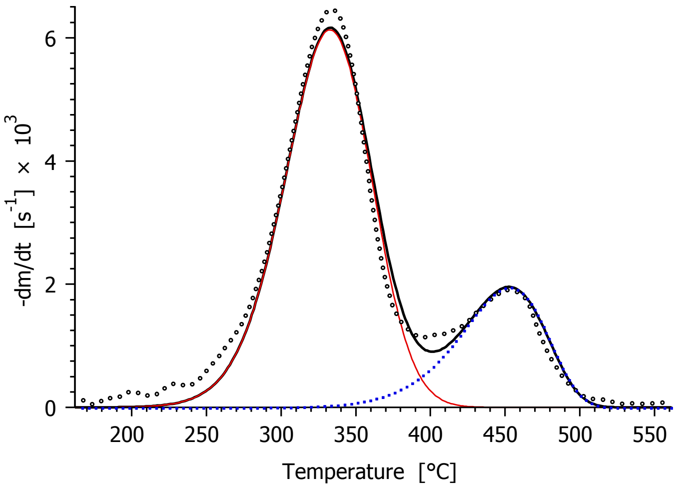
Wheat straw, 20°C/min, [O2]=0.2

fit_1=3.97%, fit_{10}=3.99%

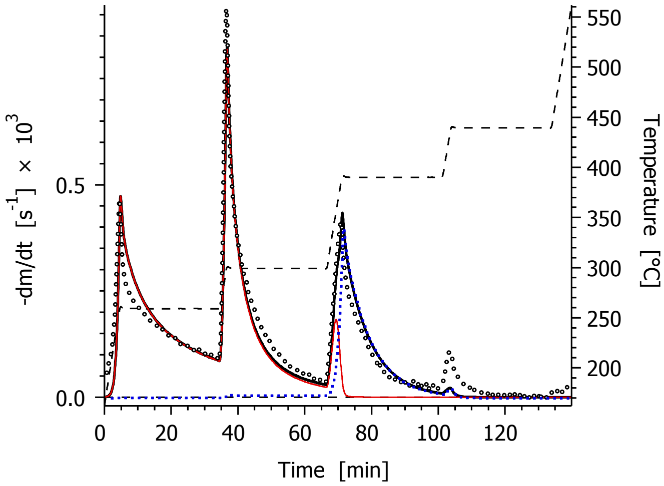
1: E_0=156.9 $\log_{10} A$=12.23 $\sigma(E)$=5.53 ν=0.431

2: E_0=150.5 $\log_{10} A$=9.53 $\sigma(E)$=0 ν=0.502

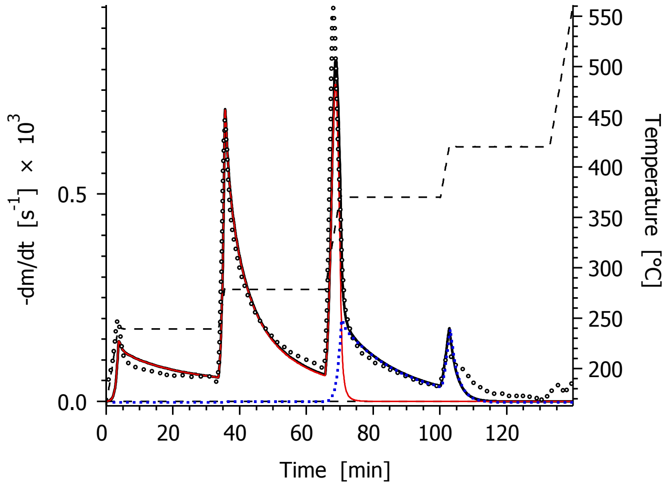
Figure S4. *(Continued)*



Wheat straw, 40°C/min, [O2]=0.2
fit_1=3.01%, fit_{10}=3.99%
1: E_0=156.9 $\log_{10}$ A=12.23 σ(E)=5.53 ν=0.431
2: E_0=150.5 $\log_{10}$ A=9.53 σ(E)=0 ν=0.502

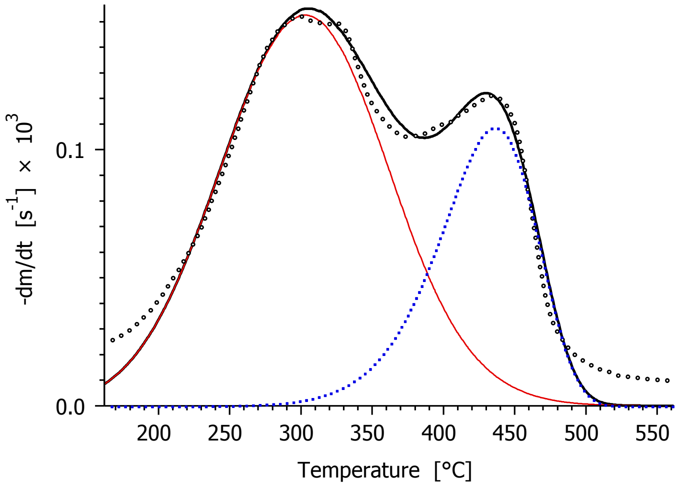


Wheat straw, stepwise 1, [O2]=0.2
fit_1=3.14%, fit_{10}=3.99%
1: E_0=156.9 $\log_{10}$ A=12.23 σ(E)=5.53 ν=0.431
2: E_0=150.5 $\log_{10}$ A=9.53 σ(E)=0 ν=0.502

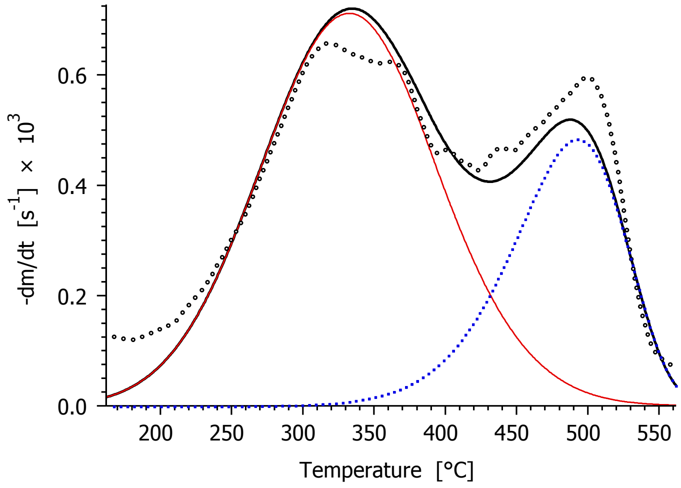


Wheat straw, stepwise 2, [O2]=0.2
fit_1=3.15%, fit_{10}=3.99%
1: E_0=156.9 $\log_{10}$ A=12.23 σ(E)=5.53 ν=0.431
2: E_0=150.5 $\log_{10}$ A=9.53 σ(E)=0 ν=0.502

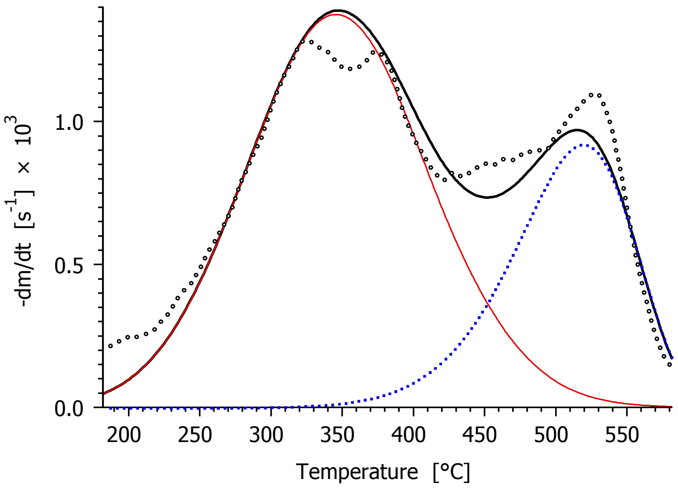
Figure S4. *(Continued)*



Sewage sludge, 4°C/min, [O2]=0.04
fit_1=4.41%, fit_{10}=6.01%
1: E_0=143.1 $\log_{10}A$=11.00 $\sigma(E)$=14.1 ν=0.520
2: E_0=120.3 $\log_{10}A$=7.03 $\sigma(E)$=0 ν=0.646



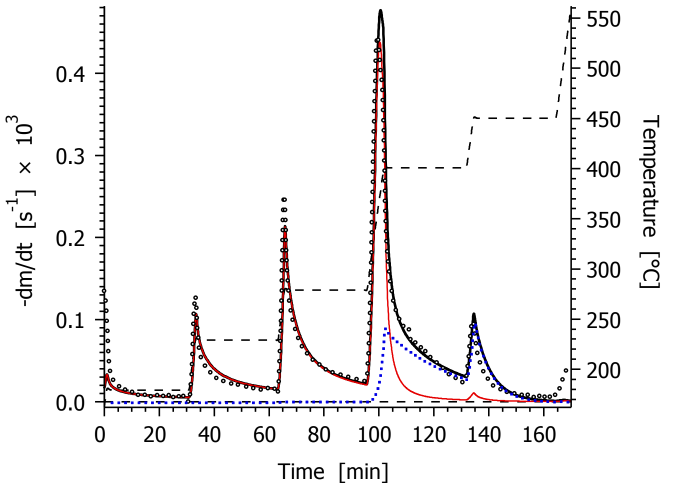
Sewage sludge, 20°C/min, [O2]=0.04
fit_1=7.85%, fit_{10}=6.01%
1: E_0=143.1 $\log_{10}A$=11.00 $\sigma(E)$=14.1 ν=0.520
2: E_0=120.3 $\log_{10}A$=7.03 $\sigma(E)$=0 ν=0.646



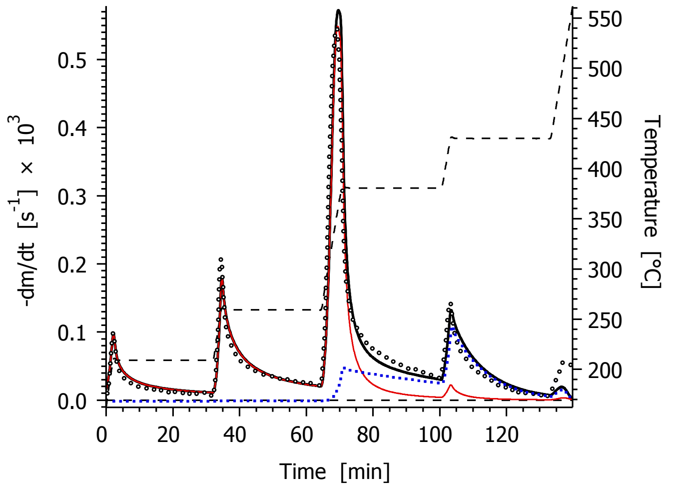
Sewage sludge, 40°C/min, [O2]=0.04
fit_1=7.10%, fit_{10}=6.01%
1: E_0=143.1 $\log_{10}A$=11.00 $\sigma(E)$=14.1 ν=0.520
2: E_0=120.3 $\log_{10}A$=7.03 $\sigma(E)$=0 ν=0.646

Figure S5. Evaluation of the sewage sludge experiments by an approximate model of two parallel reactions

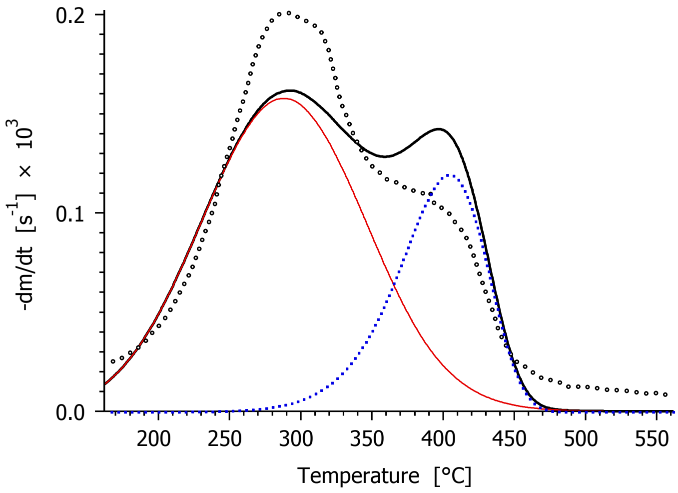
Figure S5. Evaluation of the sewage sludge experiments by an approximate model of two parallel reactions



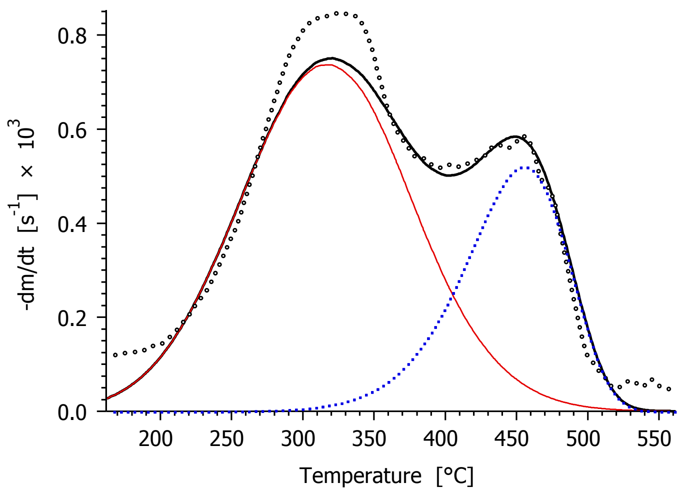
Sewage sludge, stepwise 1, [O2]=0.04
fit_1=3.45%, fit_{10}=6.01%
1: E_0=143.1 $\log_{10} A$=11.00 σ(E)=14.1 ν=0.520
2: E_0=120.3 $\log_{10} A$=7.03 σ(E)=0 ν=0.646



Sewage sludge, stepwise 2, [O2]=0.04
fit_1=2.69%, fit_{10}=6.01%
1: E_0=143.1 $\log_{10} A$=11.00 σ(E)=14.1 ν=0.520
2: E_0=120.3 $\log_{10} A$=7.03 σ(E)=0 ν=0.646

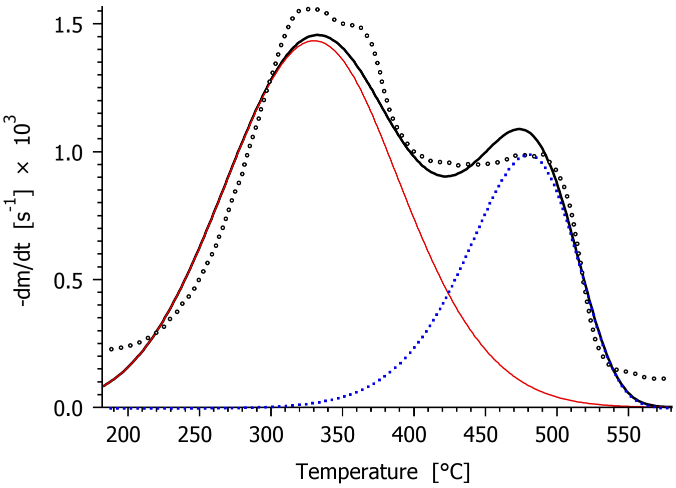


Sewage sludge, 4°C/min, [O2]=0.2
fit_1=10.29%, fit_{10}=6.01%
1: E_0=143.1 $\log_{10} A$=11.00 σ(E)=14.1 ν=0.520
2: E_0=120.3 $\log_{10} A$=7.03 σ(E)=0 ν=0.646

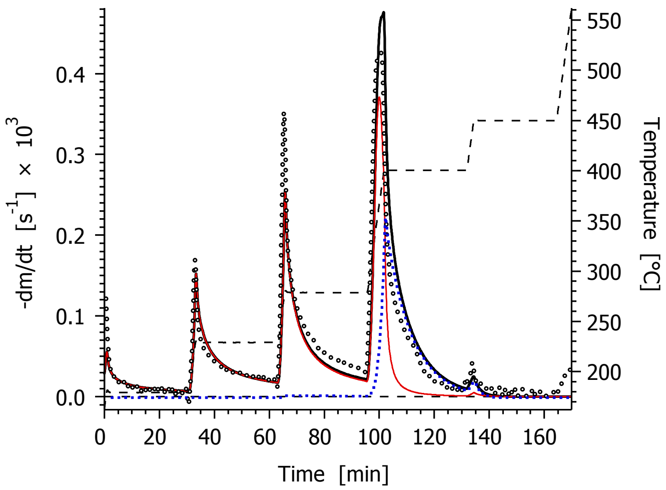


Sewage sludge, 20°C/min, [O2]=0.2
fit_1=5.76%, fit_{10}=6.01%
1: E_0=143.1 $\log_{10} A$=11.00 σ(E)=14.1 ν=0.520
2: E_0=120.3 $\log_{10} A$=7.03 σ(E)=0 ν=0.646

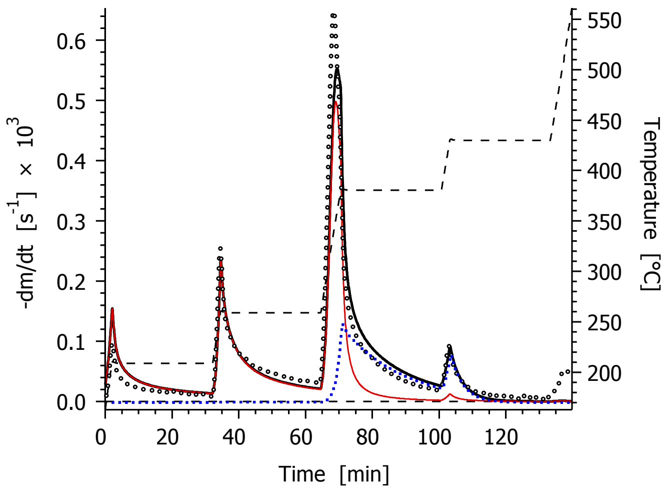
Figure S5. *(Continued)*



Sewage sludge, 40°C/min, [O2]=0.2
fit_1=5.79%, fit_{10}=6.01%
1: E_0=143.1 $\log_{10}A$=11.00 σ(E)=14.1 ν=0.520
2: E_0=120.3 $\log_{10}A$=7.03 σ(E)=0 ν=0.646

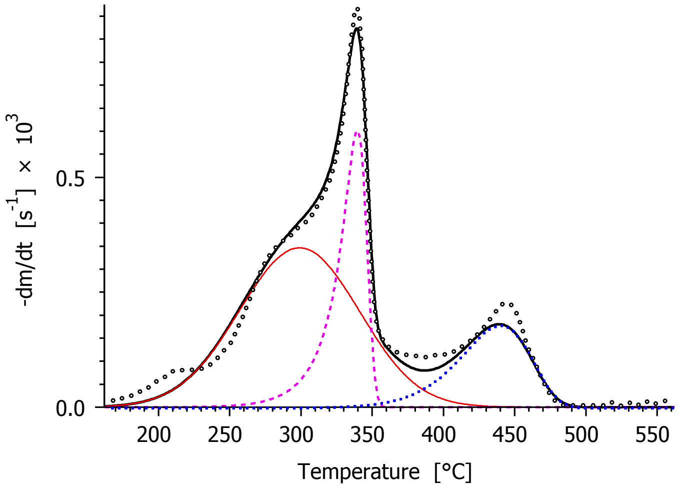


Sewage sludge, stepwise 1, [O2]=0.2
fit_1=4.99%, fit_{10}=6.01%
1: E_0=143.1 $\log_{10}A$=11.00 σ(E)=14.1 ν=0.520
2: E_0=120.3 $\log_{10}A$=7.03 σ(E)=0 ν=0.646



Sewage sludge, stepwise 2, [O2]=0.2
fit_1=3.63%, fit_{10}=6.01%
1: E_0=143.1 $\log_{10}A$=11.00 σ(E)=14.1 ν=0.520
2: E_0=120.3 $\log_{10}A$=7.03 σ(E)=0 ν=0.646

Figure S5. *(Continued)*



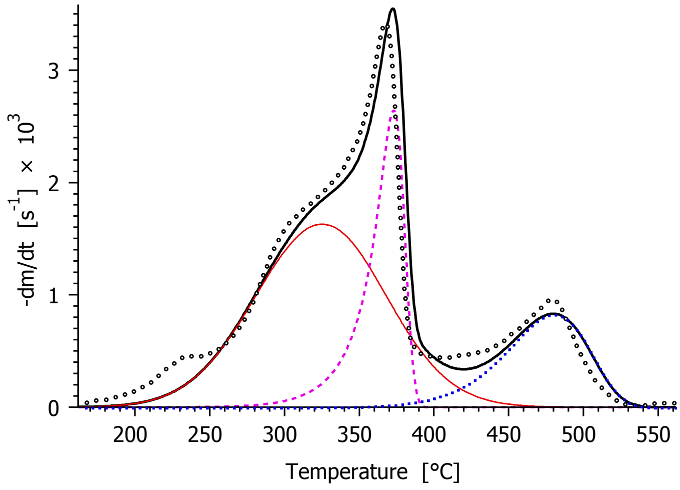
Willow, 4°C/min, [O2]=0.04

fit_1=2.57%, fit_{10}=4.20%

1: E_0=165.9 $\log_{10}A$=13.06 σ(E)=11.2 ν=0.366

2: E_0=145.0 $\log_{10}A$=10.66 σ(E)=0 ν=0.611

3: E_0=168.9 $\log_{10}A$=10.66 σ(E)=0 ν=0.625



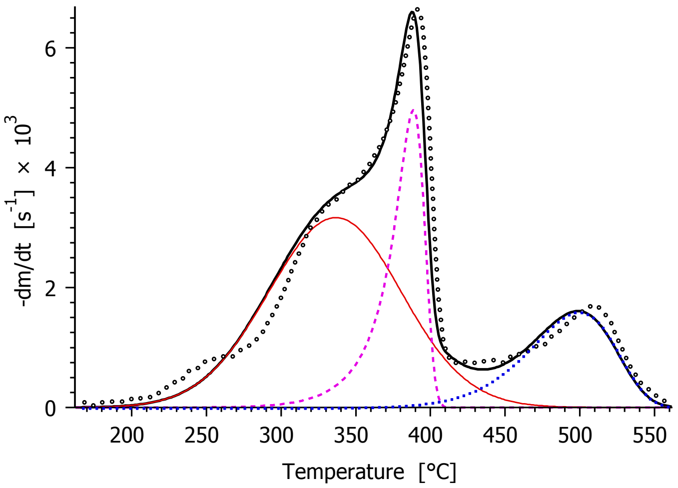
Willow, 20°C/min, [O2]=0.04

fit_1=6.15%, fit_{10}=4.20%

1: E_0=165.9 $\log_{10}A$=13.06 σ(E)=11.2 ν=0.366

2: E_0=145.0 $\log_{10}A$=10.66 σ(E)=0 ν=0.611

3: E_0=168.9 $\log_{10}A$=10.66 σ(E)=0 ν=0.625



Willow, 40°C/min, [O2]=0.04

fit_1=5.65%, fit_{10}=4.20%

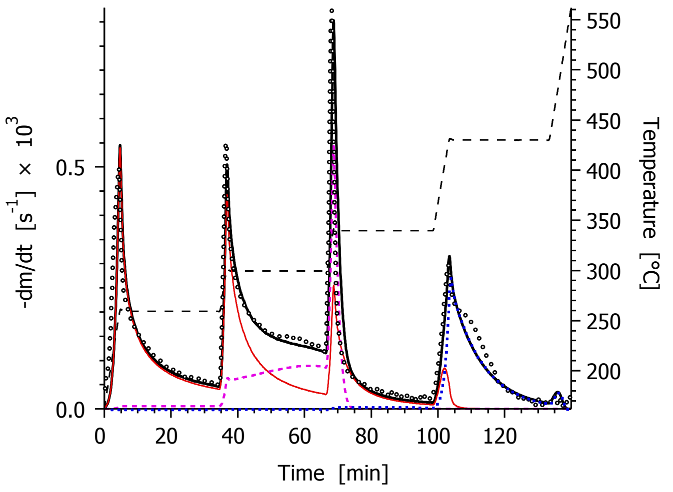
1: E_0=165.9 $\log_{10}A$=13.06 σ(E)=11.2 ν=0.366

2: E_0=145.0 $\log_{10}A$=10.66 σ(E)=0 ν=0.611

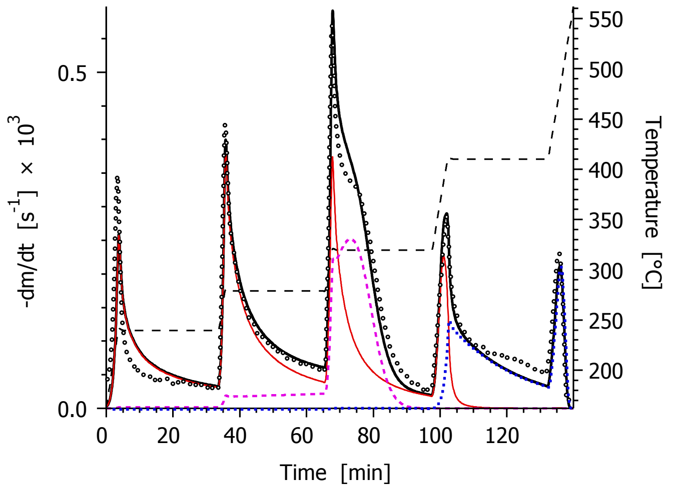
3: E_0=168.9 $\log_{10}A$=10.66 σ(E)=0 ν=0.625

Figure S6. Evaluation of the willow experiments by an approximate model of three parallel reactions

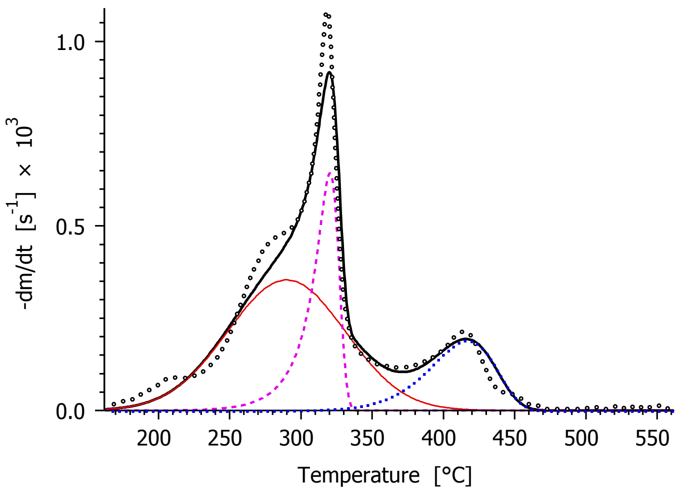
Figure S6. Evaluation of the willow experiments by an approximate model of three parallel reactions



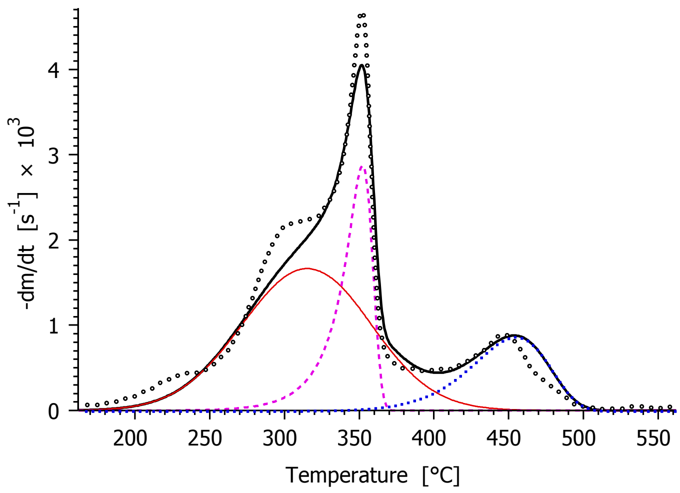
Willow, stepwise 1, [O2]=0.04
fit$_1$=4.63%, fit$_{10}$=4.20%
1: E_0=165.9 $\log_{10}A$=13.06 $\sigma(E)$=11.2 ν=0.366
2: E_0=145.0 $\log_{10}A$=10.66 $\sigma(E)$=0 ν=0.611
3: E_0=168.9 $\log_{10}A$=10.66 $\sigma(E)$=0 ν=0.625



Willow, stepwise 2, [O2]=0.04
fit$_1$=4.03%, fit$_{10}$=4.20%
1: E_0=165.9 $\log_{10}A$=13.06 $\sigma(E)$=11.2 ν=0.366
2: E_0=145.0 $\log_{10}A$=10.66 $\sigma(E)$=0 ν=0.611
3: E_0=168.9 $\log_{10}A$=10.66 $\sigma(E)$=0 ν=0.625

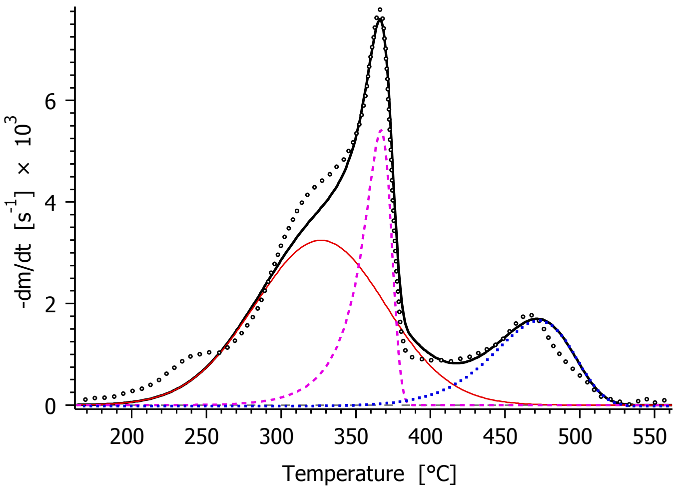


Willow, 4°C/min, [O2]=0.2
fit$_1$=2.87%, fit$_{10}$=4.20%
1: E_0=165.9 $\log_{10}A$=13.06 $\sigma(E)$=11.2 ν=0.366
2: E_0=145.0 $\log_{10}A$=10.66 $\sigma(E)$=0 ν=0.611
3: E_0=168.9 $\log_{10}A$=10.66 $\sigma(E)$=0 ν=0.625

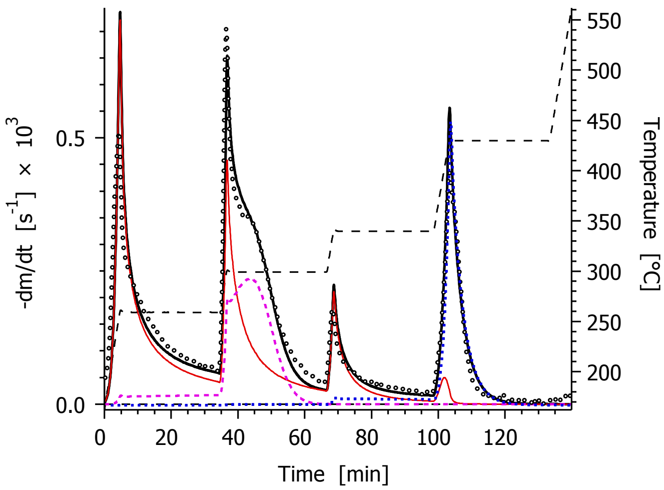


Willow, 20°C/min, [O2]=0.2
fit$_1$=3.49%, fit$_{10}$=4.20%
1: E_0=165.9 $\log_{10}A$=13.06 $\sigma(E)$=11.2 ν=0.366
2: E_0=145.0 $\log_{10}A$=10.66 $\sigma(E)$=0 ν=0.611
3: E_0=168.9 $\log_{10}A$=10.66 $\sigma(E)$=0 ν=0.625

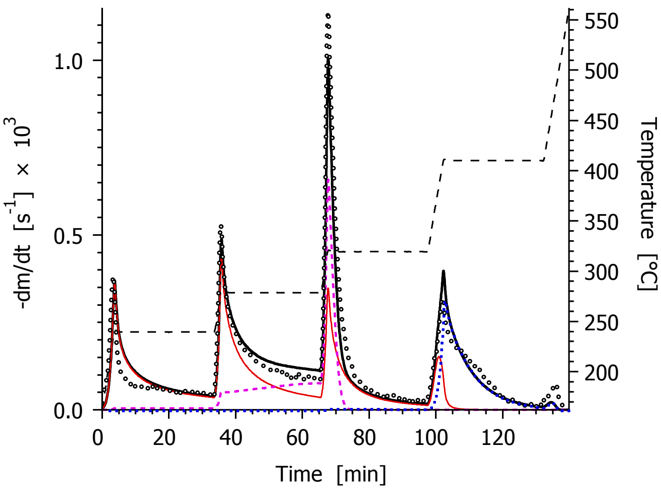
Figure S6. *(Continued)*



Willow, 40°C/min, [O2]=0.2
fit_1=3.10%, fit_{10}=4.20%
1: E_0=165.9 $\log_{10}A$=13.06 σ(E)=11.2 ν=0.366
2: E_0=145.0 $\log_{10}A$=10.66 σ(E)=0 ν=0.611
3: E_0=168.9 $\log_{10}A$=10.66 σ(E)=0 ν=0.625



Willow, stepwise 1, [O2]=0.2
fit_1=4.26%, fit_{10}=4.20%
1: E_0=165.9 $\log_{10}A$=13.06 σ(E)=11.2 ν=0.366
2: E_0=145.0 $\log_{10}A$=10.66 σ(E)=0 ν=0.611
3: E_0=168.9 $\log_{10}A$=10.66 σ(E)=0 ν=0.625



Willow, stepwise 2, [O2]=0.2
fit_1=3.81%, fit_{10}=4.20%
1: E_0=165.9 $\log_{10}A$=13.06 σ(E)=11.2 ν=0.366
2: E_0=145.0 $\log_{10}A$=10.66 σ(E)=0 ν=0.611
3: E_0=168.9 $\log_{10}A$=10.66 σ(E)=0 ν=0.625

Figure S6. *(Continued)*

Table S1. Parameters of the $f(\alpha_{cell})$ functions[a]

Devolatilization of the non-cellulosic part	DAEM	DAEM	DAEM	DAEM	DAEM	n-order
Char burn-off	successive 1st order[a]	successive n order[a]	parallel 1st order[b]	parallel n order	parallel DAEM[b]	successive 1st order[a]
Line style and color of the corresponding curve in Figure S7	—— black	—— red	—— blue	—— green	—— blue	- - - - dark magenta
n	0.87	0.87	0.88	0.88	0.88	0.86
a	2.89	2.98	3.21	3.24	3.21	4.86
z	1.02	1.06	1.16	1.18	1.16	2.55

[a] The parameters of the $f(\alpha_{cell})$ functions do not have physical meaning of their own. Their physical meaning lies in the shape of the corresponding $f(\alpha_{cell})$ curves, which are shown in Figure S7, below. The maximum curves shown there correspond to self-accelerating (autocatalytic) kinetics. The curves practically coincide with each other; only the dashed dark magenta curve (belonging to the last column in the table) differs from the others.

[b] The two evaluations denoted by blue color gave identical results because the DAEM for char burn-off converged to a simple first order reaction (σ_{char}=0).

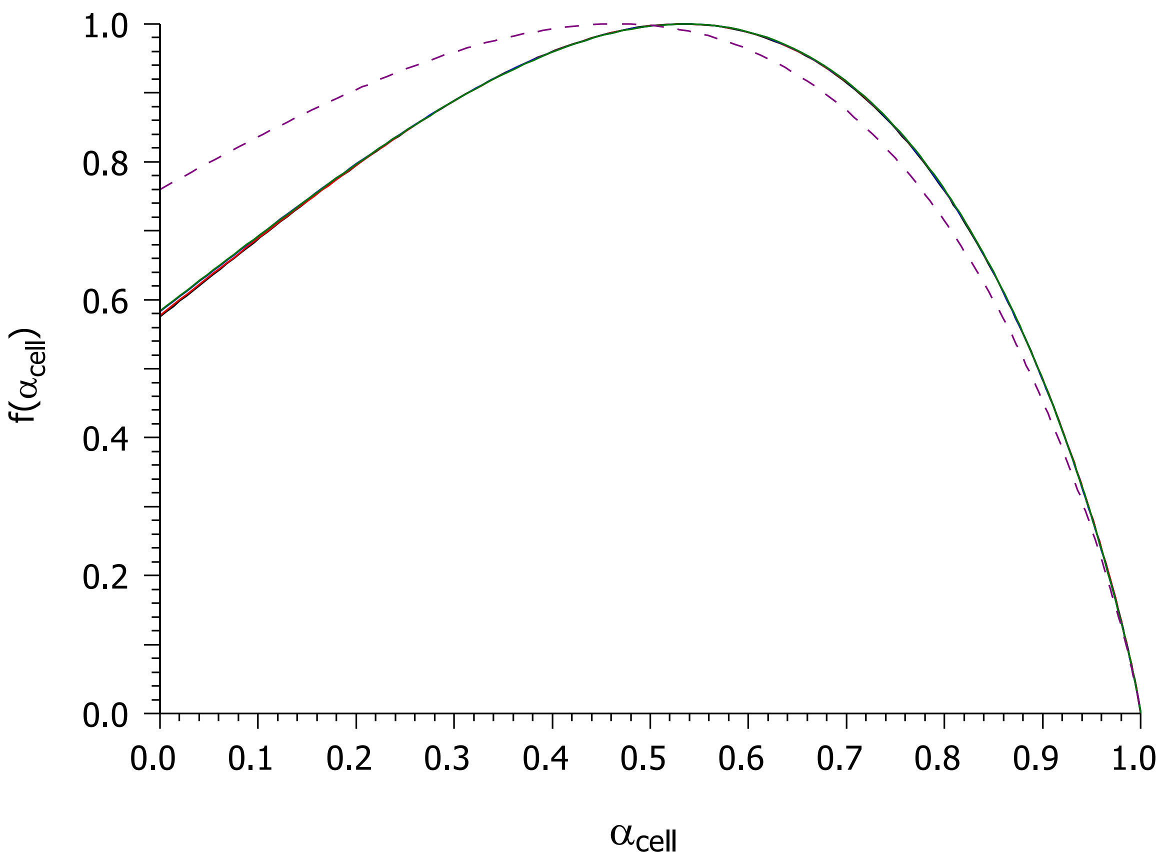


Figure S7. $f(\alpha_{cell})$ functions. (See the explanation in the footnotes of Table S1.)