**Supplementary materials**

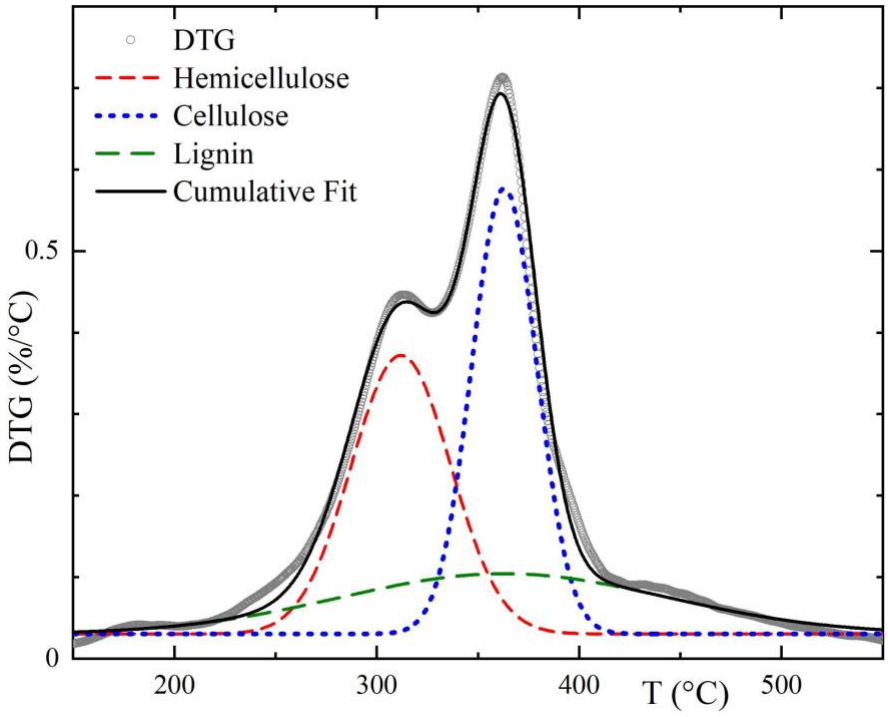


**Fig. S1**: DTG curves fitted with nonlinear least squares method for PEFB at 50 °C/min

**Table S1**: Linear regression equations at different heating rates using the CR method for n=1; 1.5; 2

| Coats - Redfern method | | | | | | | |
|---|---|---|---|---|---|---|---|
| Heating rate | Conversion rates | Equation of the regression line $n = 1$ | | Equation of the regression line $n = 1.5$ | | Equation of the regression line $n = 2$ | |
| | | slope | y-intercept | slope | y-intercept | slope | y-intercept |
| 10°C/min | $\alpha = [0\,;1]$ | -1842 | - 9.7688 | -2926.6 | - 4.2194 | -3374.5 | - 5.8295 |
| | [0 ; 0.2] | -857.58 | - 12.361 | 509.27 | - 13.003 | -910.48 | - 12.177 |
| | [0.2 ; 0.8] | -6146.6 | - 2.5963 | -7306.7 | 1.4335 | -8735.6 | 2.2604 |
| | $\alpha > 0{,}8$ | -1183.3 | - 10.425 | -12200 | 9.246 | -7981.7 | 1.0395 |
| 20°C/min | $\alpha = [0\,;1]$ | -1970.4 | - 9.5847 | -2991.6 | - 4.1995 | -3525.6 | - 5.6489 |
| | [0 ; 0.2] | -1116.3 | - 11.796 | 481.03 | - 12.936 | -1175.2 | - 11.597 |
| | [0.2 ; 0.8] | -6002.3 | - 2.9155 | -7027.3 | 0.8658 | -8492.7 | 1.7439 |
| | $\alpha > 0.8$ | -1181.9 | - 10.438 | -12206 | 9.1877 | -7985.2 | 0.9992 |
| 30°C/min | $\alpha = [0\,;1]$ | -2098.4 | - 9.4961 | -2791.2 | - 4.731 | -3551.4 | - 5.8125 |
| | [0 ; 0.2] | -1148 | - 11.958 | 507.35 | - 13.055 | -1203.9 | - 11.777 |
| | [0.2 ; 0.8] | -6316.4 | - 2.6063 | -7593.3 | 1.5707 | -9010.6 | 2.3217 |
| | $\alpha > 0.8$ | -1548.1 | - 9.9805 | -13908 | 11.31 | -9178.2 | 2.4878 |
| 40°C/min | $\alpha = [0\,;1]$ | -2087.4 | - 9.5282 | -2682.3 | - 5.0213 | -3481.8 | - 5.9935 |
| | [0 ; 0.2] | -992.42 | - 12.345 | 530.8 | - 13.118 | -1045.3 | - 12.172 |
| | [0.2 ; 0.8] | -6316 | - 2.723 | -7525.3 | 1.314 | -8981.5 | 2.1119 |
| | $\alpha > 0.8$ | -1914.7 | - 9.396 | -16035 | 14.616 | -10633 | 4.7548 |
| 50°C/min | $\alpha = [0\,;1]$ | -2103.8 | - 9.5155 | -2377.3 | - 5.5444 | -3381.1 | - 6.1749 |
| | [0 ; 0.2] | -1568.1 | - 10.92 | 498.53 | - 13.01 | -1623.1 | - 10.736 |
| | [0.2 ; 0.8] | -5900.9 | - 3.5198 | -7133.2 | 0.5508 | -8464.8 | 1.1141 |
| | $\alpha > 0.8$ | -1959 | - 9.4514 | -16187 | 14.254 | -10743 | 4.5085 |

**Table S2**: Linear regression equations at different conversion rates using the KAS and OFW iso conversion method

| | OFW | | KAS | |
|---|---|---|---|---|
| Conversion rates ($\alpha$) | Equation of the regression line | | Equation of the regression line | |
| | slope | y-intercept | slope | y-intercept |
| 0.2 | -16816 | 21.63 | -17900 | 36.221 |
| 0.3 | -19472 | 24.956 | -20604 | 39.633 |
| 0.4 | -19704 | 24.305 | -20870 | 39.041 |
| 0.5 | -19452 | 22.88 | -20652 | 37.674 |
| 0.6 | -18925 | 21.294 | -20151 | 36.131 |
| 0.7 | -18445 | 19.995 | -19691 | 34.864 |
| 0.8 | -17344 | 17.695 | -18614 | 32.603 |

**Table S3**: Kinetic parameters of PEFB by Coast-Redfern method

| Conversion rates | Coats - Redfern Method | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Heating rate | | | | | | | | | | | | | | |
| | 10°C/min | | | 20°C/min | | | 30°C/min | | | 40°C/min | | | 50°C/min | | |
| | Ea (kJ/mol) | A ($min^{-1}$) | $R^2$ | Ea (kJ/mol) | A ($min^{-1}$) | $R^2$ | Ea (kJ/mol) | A ($min^{-1}$) | $R^2$ | Ea (kJ/mol) | A ($min^{-1}$) | $R^2$ | Ea (kJ/mol) | A ($min^{-1}$) | $R^2$ |
| For n=1 | $\ln\left[-\frac{ln(1-\alpha)}{T^2}\right] = \ln\frac{AR}{\beta E_a} - \frac{E_a}{RT}$ | | | | | | | | | | | | | | |
| $\alpha$ | 16.531 | 1.3484 | 0.8714 | 14.738 | 1.6935 | 0.8225 | 17.437 | 4.7183 | 0.8819 | 17.346 | 6.0612 | 0.843 | 17.506 | 8.3325 | 0.8429 |
| [0 ; 0,2] | 8.639 | 0.060851 | 0.4566 | 7.504 | 0.090451 | 0.3631 | 9.603 | 0.2259 | 0.6234 | 8.331 | 0.1785 | 0.5567 | 11.823 | 0.8436 | 0.5248 |
| [0,2 ; 0,8] | 48.355 | 2 337.5 | 0.9875 | 46.275 | 2 451.1 | 0.9836 | 52.538 | 14 098 | 0.9916 | 52.569 | 16 855 | 0.9926 | 51.080 | 11 919 | 0.9898 |
| $\alpha > 0{,}8$ | 12.979 | 0.7230 | 0.9338 | 12.347 | 1.2410 | 0.8954 | 12.695 | 2.0590 | 0.8692 | 15.639 | 20.017 | 0.8474 | 14.733 | 5.2781 | 0.8653 |
| For n=1.5 | $\ln\left\{\frac{2[(1-\alpha)^{1.5}-1]}{T^2}\right\} = \ln\frac{AR}{\beta E_a} - \frac{E_a}{RT}$ | | | | | | | | | | | | | | |
| $\alpha$ | 24.917 | 420.07 | 0.8320 | 22.655 | 453.51 | 0.8580 | 23.027 | 700.33 | 0.8338 | 22.062 | 657.93 | 0.8503 | 20.195 | 461.76 | 0.8613 |
| [0 ; 0,2] | 4.076 | 0.011306 | 0.5351 | 4.073 | 0.023564 | 0.8164 | 4.213 | 0.032591 | 0.8537 | 4.406 | 0.042707 | 0.859 | 4.180 | 0.054814 | 0.8419 |
| [0,2 ; 0,8] | 60.517 | 2.7978e+05 | 0.9938 | 53.941 | 1.0338e+05 | 0.9892 | 63.352 | 1.1550e+06 | 0.9943 | 62.912 | 1.2138e+06 | 0.9924 | 60.196 | 6.3889e+05 | 0.993 |
| $\alpha > 0{,}8$ | 113,571 | 8.4579e+09 | 0.8549 | 112.212 | 1.1642e+10 | 0.8322 | 113.853 | 2.7350e+10 | 0.8022 | 129.992 | 7.8435e+11 | 0.7529 | 125.841 | 2.4239e+11 | 0.8029 |
| For n=2 | $\ln\left\{\frac{[1/(1-\alpha)]-1}{T^2}\right\} = \ln\frac{AR}{\beta E_a} - \frac{E_a}{RT}$ | | | | | | | | | | | | | | |

| | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| $\alpha$ | 29,460 | 119.12 | 0.7896 | 26.701 | 121.41 | 0.7465 | 29.424 | 309.26 | 0.7819 | 28.812 | 333.63 | 0.7336 | 28.251 | 323.90 | 0.7633 |
| [0 ; 0,2] | 9,128 | 0.078064 | 0.4834 | 7.989 | 0.1176 | 0.3904 | 10.069 | 0.2838 | 0.646 | 8,771 | 0.2234 | 0.5809 | 12.301 | 1.0581 | 0.5448 |
| [0,2 ; 0,8] | 70,240 | 4.6591e+05 | 0.9632 | 65.627 | 2.6397e+05 | 0.9568 | 75.034 | 2.8394e+06 | 0.9721 | 74,877 | 3.1170e+06 | 0.9731 | 72.505 | 1.6920e+06 | 0.9674 |
| $\alpha > 0,8$ | 75,106 | 8.6393e+05 | 0.8618 | 73.982 | 1.3849e+06 | 0.8372 | 75.121 | 2.6625e+06 | 0.62868 | 86,189 | 3.2854e+07 | 0.7573 | 83/281 | 1.5328e+07 | 0.8075 |

**Table S4**: Kinetic parameters of PEFB by KAS method

| Conversion rates | KAS Method | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Heating rate | | | | | | | | | | | | | | |
| | 10°C/min | | | 20°C/min | | | 30°C/min | | | 40°C/min | | | 50°C/min | | |
| | Ea (kJ/mol) | A ($min^{-1}$) | $R^2$ | Ea (kJ/mol) | A ($min^{-1}$) | $R^2$ | Ea (kJ/mol) | A ($min^{-1}$) | $R^2$ | Ea (kJ/mol) | A ($min^{-1}$) | $R^2$ | Ea (kJ/mol) | A ($min^{-1}$) | $R^2$ |
| $\alpha$ | 8.272 | 4.87E-03 | 0.981 | 8.323 | 9.84E-03 | 0.980 | 8.282 | 1.48E-02 | 0.981 | 8.162 | 1.98E-02 | 0.981 | 8.07 | 2.49E-02 | 0.981 |
| [0 ; 0.2] | 6.527 | 1.47E-03 | 0.994 | 6.56 | 2.96E-03 | 0.994 | 6.670 | 4.38E-03 | 0.993 | 6.732 | 5.78E-03 | 0.993 | 6.563 | 7.23E-03 | 0.993 |
| [0.2 ; 0.8] | 9.547 | 7.52E-03 | 0.999 | 9.588 | 1.49E-02 | 0.999 | 9.797 | 2.21E-02 | 0.999 | 9.886 | 2.92E-02 | 0.999 | 9.973 | 3.59E-02 | 0.999 |
| $\alpha > 0.8$ | 12.280 | 4.18E-02 | 0.998 | 12.304 | 8.35E-02 | 0.998 | 12.251 | 1.26E-01 | 0.998 | 12.064 | 1.68E-01 | 0.998 | 12.409 | 2.07E-01 | 0.998 |