Supplementary Information

Isoconversional analysis of solid state transformations: a critical review. III isothermal and non isothermal predictions.

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Single step transformations with constant activation energy

Isothermal predictions for single-step transformations with constant activation energy:

![Graph 1D diffusion](image1)

Fig. S1. 1D diffusion: \( f(\alpha) = (2\alpha)^{-1} \). T=250ºC, \( E=75 \) kJ/mol and \( A=10^4 \) 1/s.

![Graph 2D diffusion](image2)

Fig. S2. 2D diffusion: \( f(\alpha) = 1/[\ln(1-\alpha)] \). T=190ºC, \( E=200 \) kJ/mol and \( A=10^{19} \) 1/s.
Fig. S3. Jander’s equation: \[ f(\alpha) = \frac{3(1-\alpha)^{\frac{3}{5}}}{2\left[1-(1-\alpha)^{\frac{1}{5}}\right]} \]. T=230ºC, \( E=150 \text{ kJ/mol} \) and \( A=10^{12} \text{ 1/s} \).

Fig. S4. Ginstling and Brounshtein equation: \[ f(\alpha) = \frac{3}{2}\left[(1-\alpha)^{-\frac{1}{3}} - 1\right]^{-1} \]. T=230ºC, \( E=300 \text{ kJ/mol} \) and \( A=10^{27} \text{ 1/s} \).
**Fig. S5.** 2\textsuperscript{nd} order reaction: \( f(\alpha) = (1 - \alpha)^2 \). \( T=500^\circ\text{C}, \ E=50 \text{ kJ/mol and } A=10^1 \text{ 1/s} \).

**Fig. S6.** 2D reaction: \( f(\alpha) = (1 - \alpha)^{1/2} \). \( T=400^\circ\text{C}, \ E=150 \text{ kJ/mol and } A=10^8 \text{ 1/s} \).

**Numerical data: parallel reactions**

We have analyzed two equally weighted first order reactions:

\[
\frac{d\alpha_i}{dt} = A_i \exp \left[ -\frac{E_i}{RT} \right] (1 - \alpha_i), \ i = 1, 2 \text{ and } \alpha = \frac{1}{2} (\alpha_1 + \alpha_2)
\]

where \( E_1=80 \text{ kJ/mol}^{-1}, \ A_1=10^{10} \min^{-1}, \ E_2=120 \text{ kJ/mol}^{-1} \text{ and } A_2=10^{15} \min^{-1} \).
Fig. S7. Isothermal predictions for T=60ºC.

Fig. S8. Isothermal predictions for T=100ºC.

Numerical data: crystallization with mixed nucleation mechanisms

We have analyzed solid-phase crystallization driven by homogeneous nucleation plus pre-existing nuclei. To calculate the evolution of the transformed fraction we have applied the Kolmogorov-Johnson-Mehl-Avrami theory. Model parameters correspond to those determined experimentally for the crystallization of amorphous silicon (see Table 1 in the manuscript).
We have analyzed the thermogravimetric curves of the thermal decomposition of CaCO$_3$.
Fig. S11. Isothermal and non-isothermal predictions. The sample is heated up to 640°C at 10 K/min and then is held at 640°C. Dashed line: experimental evolution of the sample temperature. Dotted line: onset of the isothermal period.

Fig. S12. Isothermal and non-isothermal predictions. The sample is heated up to 660°C at 10 K/min and then is held at 660°C. Dashed line: experimental evolution of the sample temperature. Dotted line: onset of the isothermal period.
Fig. S13. Isothermal and non-isothermal predictions. The sample is heated up to 680°C at 10 K/min and then is held at 680°C. Dashed line: experimental evolution of the sample temperature. Dotted line: onset of the isothermal period.

Fig. S14. Isothermal and non-isothermal predictions. The sample is heated up to 720°C at 10 K/min and then is held at 720°C. Dashed line: experimental evolution of the sample temperature. Dotted line: onset of the isothermal period.