

Coincidences in chemical kinetics

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New properties of intersections and coincidences of transient concentration curves were discovered and are presented analytically using classical mechanisms, in particular the consecutive mechanism, as examples. We identify six different special points, and analyze and classify the 6 possible (out of 612 combinations) patterns of concentration peak and intersection times and values that distinguish the parameter subdomains and sometimes can eliminate the mechanism. This developed theory is tested on examples (multi-step radioactive decay, isomerization reaction). The mathematical analysis relies on a combination of elementary and symbolic techniques, special functions and numerical approximations.