This web subsite is intended as a facilitator for calculating decomposition kinetics. There are different approaches to using the most common equations. We give three, namely the first-order kinetics function proposed by Jenny et al. (1949), and elaborated by Olson (1963), the double exponential suggested by Lousier and Parlinson (1976) and Bunell et al. (1977) and an asymptotic function suggested by Howard and Howard (1978). The functions are discussed more closely by Berg and Laskowski (2005; 2006) and by Berg and McClaugherty (2003).

Attention: in functions describing litter decomposition, *k* is sometimes given as negative (*-k*). This is only a matter of convention; herein we use the more proper scientific notation, resulting in estimating negative *k* values (see the Excel spreadsheet).

The first order kinetics function may be written;

$$W_t = W_0 e^{kt}$$

and is often used in the following form

$$\ln(W_t / W_0) = kt$$

where t is time, W_0 is the initial litter mass, W_t is the litter mass at time t, and k is the decay rate constant.

The double exponential model is a development of the single exponential, and describes the decomposition of litter that has two main substrates decomposing at different rates. Each constant thus describes the decomposition of a different substrate:

$$W_t = W_1 e^{k_1 t} + W_2 e^{k_2 t}$$

where t is time, W_t is the litter mass at time t, and k_1 and k_2 are rate constants for fast and slowly decomposing litter fractions. The percentage of each fraction at t = 0 is given by W_1 and W_2 respectively. The model was proposed about simultaneously by Lousier and Parkinson (1976) and by Bunell et al. (1977).

The asymptotic model as used here connects to the equation discussed by Berg and Laskowski (2005; 2006) and Berg and McClaugherty (2003), and was developed by Berg and Ekbohm (1991).

$$L_t = A(1 - e^{kt/A})$$

where L_t is the accumulated mass loss (in percent), t is time in days, k is the decomposition rate at the beginning of the decay, and A represents the asymptotic level that the accumulated mass loss will ultimately reach, normally not 100% and often considerably less. The k of this function is the derivative of the function at t = 0 and should not be directly compared to rate constants estimated with other models.