Summary of General 4-parameter Response Function with different skewness controls

$$R(T) = \alpha \frac{f(T,s)\left(T_{pk}^{*} - T\right)}{\sigma}\left[2 - \frac{\left(T_{pk}^{*} - T\right)}{\sigma}\right]$$

α = height of response

σ = breadth of response

s = skewness control

T_{pk}^{*} = shifted peak temperature.

3 good examples/ choices:

(Power Law):

① $f(T,s) = T^{s} \Rightarrow T_{pk}^{*} = T_{pk}\left(\frac{s+1}{s}\right)$ (T_{pk}: true peak temperature) ($s = n$ in earlier notes)

$$\Rightarrow R(T) = \alpha \frac{T^{s}\left[T_{pk}\left(\frac{s+1}{s}\right) - T\right]}{\sigma}\left[2 - \frac{\left(T_{pk}\left(\frac{s+1}{s}\right) - T\right)}{\sigma}\right]$$

② Q10 exponential:

$$f(T,s) = e^{sT} \Rightarrow T_{pk}^{*} = T_{pk} + \frac{1}{s}$$

$$\Rightarrow R(T) = \alpha \frac{e^{sT}\left[\left(T_{pk} + \frac{1}{s}\right) - T\right]}{\sigma}\left[2 - \frac{\left(\left(T_{pk} + \frac{1}{s}\right) - T\right)}{\sigma}\right]$$

③ Boltzmann-Arrhenius expression:

$$f(T,s) = e^{-\frac{s}{T}} \Rightarrow T_{pk}^{*} = T_{pk}\left(1 - \frac{T_{pk}}{s}\right) \quad \left(s = \frac{E}{k} \text{ for Boltzmann}\right)$$

$$\Rightarrow R(T) = \alpha \frac{e^{-\frac{s}{T}}\left[T_{pk}\left(1 - \frac{T_{pk}}{s}\right) - T\right]}{\sigma}\left[2 - \frac{\left(T_{pk}\left(1 - \frac{T_{pk}}{s}\right) - T\right)}{\sigma}\right]$$