

Adding "Noise" to a Signal Generated by a Formula

One of the simplest uses for the RAND function is to add noise to a theoretical curve generated by means of a formula, so as to simulate a real signal. In other words, we want to modify our worksheet formula $F(x)$ by adding a random quantity δ . The δ must be scaled to produce a noise term of suitable magnitude and the δ terms must be equally distributed between positive and negative. Remember that RAND always returns a number greater than or equal to 0 and less than 1. There are several ways that you can add such a random quantity, for example,

$$(\text{original worksheet formula}) + \text{scale_factor} * (\text{RAND}() - 0.5)$$

to produce a noise term of constant magnitude (scale_factor determines the magnitude of the noise term) or

$$(\text{original worksheet formula}) * (1 + \text{scale_factor} * (\text{RAND}() - 0.5))$$

to produce a noise term of constant signal-to-noise ratio. Some people use the expression $\text{RAND}() - \text{RAND}()$ instead of $\text{RAND}() - 0.5$ to produce equal probability of positive or negative noise terms.

Figure 15-1 shows an example of a calculated curve with simulated experimental data points.

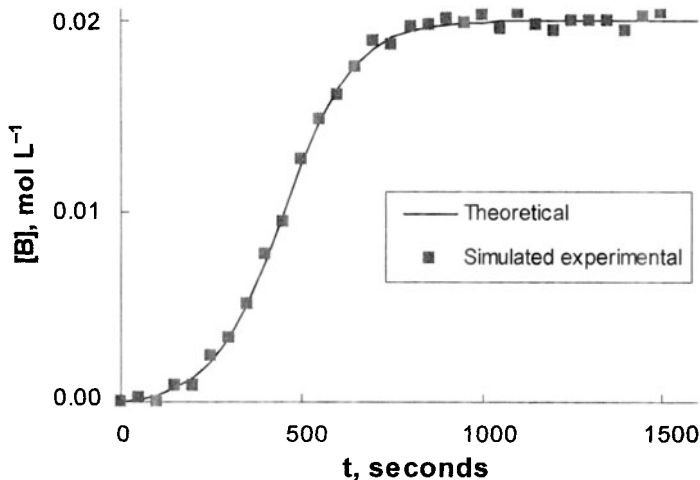


Figure 15-1. Experimental data simulated by using the RAND function.