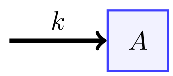
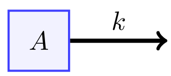
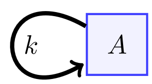
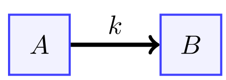
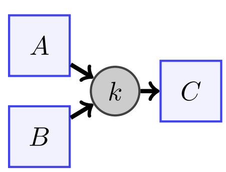
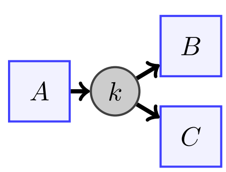
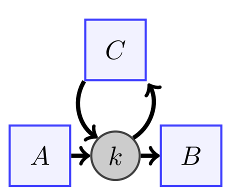
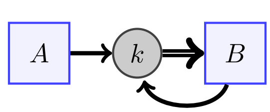
Compartmental Modelling and Mass Action Kinetics

The following rules apply for the most common forms of reactions used in compartmental modelling.

- Every reaction has a set of input types called "reactants" and a set of output types called "products".
- The reaction rate is proportional to the concentration of the product of reactant concentrations. The concentration of a type A is often denoted $[A]$, but sometimes we leave the bracket's off to save space.
- Each reactant is decreased at the rate of its reaction.
- Each product is increased at the rate of its reaction.
- The net rate of change for each type is equal to the sum of rates from all reactions.

	$\emptyset \xrightarrow{k} A$	$\frac{dA}{dt} = k$
	$A \xrightarrow{k} \emptyset$	$\frac{dA}{dt} = -k[A]$
	$A \xrightarrow{k} 2A$	$\frac{dA}{dt} = k[A]$
	$A \xrightarrow{k} B$	$\frac{dA}{dt} = -k[A],$ $\frac{dB}{dt} = k[A],$
	$A + B \xrightarrow{k} C$	$\frac{d[A]}{dt} = -k[A][B],$ $\frac{d[B]}{dt} = -k[A][B],$ $\frac{d[C]}{dt} = k[A][B].$
	$A \xrightarrow{k} B + C$	$\frac{d[A]}{dt} = -k[A],$ $\frac{d[B]}{dt} = k[A],$ $\frac{d[C]}{dt} = k[A].$
	$A + C \xrightarrow{k} B + C$	$\frac{d[A]}{dt} = -k[A][C],$ $\frac{d[B]}{dt} = k[A][C],$ $\frac{d[C]}{dt} = 0.$
	$A + B \xrightarrow{k} 2B$	$\frac{d[A]}{dt} = -k[A][B],$ $\frac{d[B]}{dt} = k[A][B].$