15.2. A mutant SFV has values of $k_{fus}\eta = 8.3 \times 10^{-3}$ min^{-1} and $k_{tran} = 1.8 \times 10^{-2}$ min^{-1}. The wild-type virus has values of $k_{fus}\eta = 6.4 \times 10^{-2}$ min^{-1} and $k_{tran} = 1.1 \times 10^{-1}$ min^{-1}. For both wild-type and mutant SFV the value of $k_e = 0.074$ min^{-1}. Prebound virus were used (see Problem 15.1) and V_{s0} was the same for both cases. At 20 min what is the ratio of uncoated virus for the wild-type virus to the mutant.

15.3. A value of k_aC is measured as 0.021 min^{-1}. Assume $k_{fus}\eta = k_{tran} = 0.14$ min^{-1} and $k_e = 0.04$ min^{-1}. The initial inoculum was 500 viruses/cell. At two hours after inoculation unbound virus was removed. Calculate V_s, V_{cyt}, and V_{ene}.

15.4. You wish to produce active retrovirus, and you are investigating the effect of temperature on the process. Active virus is subject to decay with a rate constant, $k_d = 2.2$ day^{-1} at 37°C and 0.76 day^{-1} at 31°C. The production rate of virus from a packaging cell line is $k_p = 3.3$ virus/cell-day at 37°C and $k_p = 2.9$ virus/cell-day at 31°C. Assume that there are 1×10^6 cells and the volume of liquid medium is 2 ml. The initial number of virus in solution is zero. How many viruses are there per ml 12 hours after initiation of virus production?

15.5. Mass transfer limitations are often critical in design of devices such as the hollow-fiber bioartificial liver for use as an extracorporeal assist device. Consider removal (detoxification) of a slightly hydrophobic compound in a patient's blood. Draw a diagram and describe potential mass transfer limitations on the rate of detoxification by intracellular enzymes.