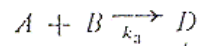
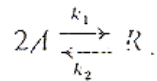


A method of separating cyclopentadiene from a stream containing other C₅ hydrocarbons has been proposed in which the cyclopentadiene is dimerized to dicyclopentadiene and the C₁₀'s separated from the C₅'s by distillation. The kinetics for this reaction can be represented as follows:



A = cyclopentadiene

R = dicyclopentadiene

B = *t*-1, 3, pentadiene

D = codimer

$$r_A = 2k_1C_A^2 - k_2C_R + k_3C_AC_B$$

$$r_B = k_3C_AC_B$$

Develop the steady state mass balance equations for this system for

(a) continuous flow stirred tank reactor

(b) tubular plug flow reactor.

Express your answers in concentrations, recognizing that cyclopentadiene and dicyclopentadiene are liquids.

Also, do part c

(c) batch stirred tank reactor