AFCoKaRE Practice Problem 8.4 Solution

<u>Purpose</u>: This problem allows you to practice generating a rate expression for a nonelementary reaction when there is a rate-determining step in the mechanism.

<u>Problem Statement</u>: Phosgene formation, reaction (1), is non-elementary; it has been proposed to occur via the mechanism consisting of reactions (2) through (4). Generate a rate expression for the non-elementary reaction (1) assuming mechanistic step (4) to be ratedetermining.

$$CO + Cl_2 \rightleftharpoons COCl_2 \tag{1}$$

$$Cl_2 \rightleftharpoons 2 Cl$$
 (2)

$$CI + CI_2 \rightleftharpoons CI_3$$
 (3)

$$Cl_3 + CO \rightarrow COCl_2 + Cl$$
 (4)