the formation of urea (NH_4NOCNH_4) from the Ammonium isocyanate (CH_4N_2O) have been prepared(NH_4CNO------.>NH_2CONH_2).

at the begining 22.9 g from Ammonium isocyanate has been solved in water so 1.00 L (LITER) from the Solution prepared.

1) order of reaction?

2)rate constant (K)?

3)the mass of Ammonium isocyanate that has been remained after 300 minutes?

T/min	0	20	50	65	150
m(urea)	0	7	12.1	13.8	17.7

Solution:

$NH_4[O\text{-}C{\equiv}N] \xrightarrow{t} NH_3 + HOCN \xrightarrow{t} NH_2CONH_2$

1. The reaction is second order, $\upsilon = kC_{NH3}C_{HOCN}$.
2. For a second order reaction when $C_{NH3} = C_{HOCN}$ rate constant calculated for the formula:

$k = \frac{x}{c_0 \cdot t(c_0 - x)}$, where c_0 – concentration of ammonium isocyanate, M; x - concentration of urea, M. Because, M($NH_4[O\text{-}C{\equiv}N]$)=M($NH_2CONH_2$) we will use masses of these compounds.

$$k_1 = \frac{7}{22.9 \cdot 20 \cdot (22.9 - 7)} = 9.61 \cdot 10^{-4}\ l/mol \cdot min$$

$$k_2 = \frac{12.1}{22.9 \cdot 50 \cdot (22.9 - 12.1)} = 9.78 \cdot 10^{-4}\ l/mol \cdot min$$

$$k_3 = \frac{13.8}{22.9 \cdot 65 \cdot (22.9 - 13.8)} = 1.01 \cdot 10^{-3}\ l/mol \cdot min$$

$$k_4 = \frac{17.7}{22.9 \cdot 150 \cdot (22.9 - 17.7)} = 9.911 \cdot 10^{-4}\ l/mol \cdot min$$

So, during the reaction all constants are value equal, with corrected for experimental date.

3. The mass of Ammonium isocyanate that has been remained after 300 minutes calculated for the formula:

$$m = \frac{m_0}{1 + km_0 t} = \frac{22.9}{1 + 9.8 \cdot 10^{-4} \cdot 22.9 \cdot 300} = 3.40\,g$$

Answer:

1. The reaction is second order.

2. $k=9.8\cdot10^{-4}$ l/mol·min.

3. $m(NH_4[O\text{-}C\equiv N]) = 3.40$ g.

The rate constant is constant within experimental error inevitable, there-
Consequently, this reaction is the reaction of the first order.