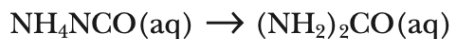


57. Ammonium cyanate, NH_4NCO , rearranges in water to give urea, $(\text{NH}_2)_2\text{CO}$.

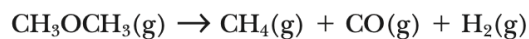


Time (min)	$[\text{NH}_4\text{NCO}]$ (mol/L)
0	0.458
4.50×10^1	0.370
1.07×10^2	0.292
2.30×10^2	0.212
6.00×10^2	0.114

Using the data in the table:

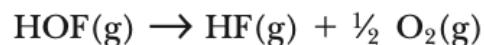
- Decide whether the reaction is first order or second order.
- Calculate k for this reaction.
- Calculate the half-life of ammonium cyanate under these conditions.
- Calculate the concentration of NH_4NCO after 12.0 hours.

63. The decomposition of gaseous dimethyl ether at ordinary pressures is first order. Its half-life is 25.0 minutes at 500 °C:



- Starting with 8.00 g of dimethyl ether, what mass remains (in grams) after 125 minutes and after 145 minutes?
- Calculate the time in minutes required to decrease 7.60 ng (nanograms) to 2.25 ng.
- What fraction of the original dimethyl ether remains after 150 minutes?

71. ▲ Hypofluorous acid, HOF, is very unstable, decomposing in a first-order reaction to give HF and O₂, with a half-life of 30. minutes at room temperature:



If the partial pressure of HOF in a 1.00-L flask is initially 1.00×10^2 mm Hg at 25 °C, what are the total pressure in the flask and the partial pressure of HOF after exactly 30 minutes? After 45 minutes?