(14.32) a

a) $\boxed{Rate = k\,[NO]^{\boxed{2}}\,[O_2]^{\boxed{1}}}$

$(1 \rightarrow 2)\ 2^2 = 4 \qquad (2 \rightarrow 3)\ 2^1 = 2$

b) k 3^{rd} order $\dfrac{1}{M^2 \cdot sec}$

$(3-1) = 2$

c)

d) $Rate = \underset{k}{(7.11 \times 10^3)}\ \underset{NO}{[0.075]}^2\ \underset{O_2}{(0.01)} = 0.4\ M/s$

Feb 1-7:49 AM

$2NO + O_2 \rightarrow 2NO_2$

$-\dfrac{1}{2}\boxed{\dfrac{\Delta[NO]}{\Delta t}} = -\boxed{\dfrac{\Delta[O_2]}{\Delta t}} = +\dfrac{1}{2}\dfrac{[NO_2]}{\Delta t}$

Rate

$\frac{1}{2}(0.4) = 0.2\ M/sec$

Feb 1-8:54 AM

40) 1° $K = 6.82\times10^{-3}\ \frac{1}{sec}$ $\left(\frac{1}{M^0 \cdot sec}\right)$

sec^{-1}

$2N_2O_5 \Rightarrow 4NO_2 + O_2$

$\frac{0.025\,mole}{2\,\ell} = 0.0125\,M$

after 5 min – Moles?

300 sec

K + t SAME UNITS!

a) $\ln[A_t] = -Kt + \ln[A_0]$

$\ln A_t = (-6.82\times10^{-3})(300) + \ln(0.0125)$

$\ln A_t = -6.428$

moles = M × ℓ

$3.2\times10^{-3}\,mole \xleftarrow{\times 2\ell} A_t = 1.62\times10^{-3}\,M$

Feb 1-8:56 AM

b) $\ln[A_t] = -Kt + \ln[A_0]$ M $\frac{moles}{\ell}$

$\frac{0.01}{2}$

$\ln(0.005) = (-6.82\times10^{-3}\ sec^{-1})\,t + \ln(0.0125)$

Feb 1-9:05 AM

Half life - time for ½ A_0 original

$[A_{t_{1/2}}] = \frac{1}{2}[A_0]$

half life

A_0 ← time = 0

½ (original amount)

$\ln A_t = -Kt + \ln A_0$

Feb 1-9:07 AM

$\ln A_t = -Kt + \ln A_0$

$-\ln A_0 \qquad -\ln A_0$

$A_{t_{1/2}} = \frac{1}{2} A_0$

$\ln A_t - \ln A_0 = -Kt_{1/2}$

$\ln \frac{A_t}{A_0} = -Kt$ ⇐ LOG RULZ

$\ln \frac{\frac{1}{2}(\cancel{A_0})}{(\cancel{A_0})} = -Kt_{1/2}$

$\ln \frac{1}{2} = -Kt_{1/2}$

$-0.693 = -Kt_{1/2}$

$\boxed{\frac{0.693}{K} = t_{1/2}}$ ← 1° rxn

Feb 1-9:09 AM

14 / 38+39

Feb 1-9:15 AM