

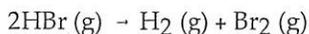
KEY

Name _____

MULTIPLE CHOICE. Choose the one alternative that best completes the statement or answers the question.

1) The rate of disappearance of HBr in the gas phase reaction

1) B



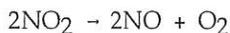
HBr Disappears 2x Faster than Br Emerges

is 0.301 M s^{-1} at 150°C . The rate of appearance of Br_2 is _____ M s^{-1} .

- A) 0.549 **B) 0.151** C) 1.66 D) 0.0906 E) 0.602

2) Nitrogen dioxide decomposes to nitric oxide and oxygen via the reaction:

2) A



4.5e-5 M/s Emerges 1/2 rate

In a particular experiment at 300°C , $[\text{NO}_2]$ drops from 0.0100 to 0.00550 M in 100 s . The rate of appearance of O_2 for this period is _____ M/s .

- A) 2.3×10^{-5}** B) 4.5×10^{-5} C) 9.0×10^{-5} D) 9.0×10^{-3} E) 4.5×10^{-3}

3) The isomerization of methylisonitrile to acetonitrile

3) D



is first order in CH_3NC . The rate constant for the reaction is $9.45 \times 10^{-5} \text{ s}^{-1}$ at 478 K . The half-life of the reaction when the initial $[\text{CH}_3\text{NC}]$ is 0.030 M is _____ s .

- A) 3.53×10^5
 B) 1.36×10^{-4}
 C) 1.06×10^4
D) 7.33×10^3
 E) 5.29×10^3

$$t = \frac{0.693}{9.45 \times 10^{-5}} = 7333$$

4) The decomposition of N_2O_5 in solution in carbon tetrachloride proceeds via the reaction

4) A



$$\ln[A_1] = -4.82 \times 10^{-3} [151] + \ln[0.058]$$

The reaction is first order and has a rate constant of $4.82 \times 10^{-3} \text{ s}^{-1}$ at 64°C . If the reaction is initiated with 0.058 mol in a 1.00-L vessel, how many moles remain after 151 s ?

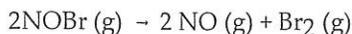
e^-3.49

- A) 0.028** B) 0.055 C) 2.0×10^3 D) 0.060 E) 12

5) The reaction

0.0304

5) C



is a second-order reaction with a rate constant of $0.80 \text{ M}^{-1}\text{s}^{-1}$ at 11°C . If the initial concentration of NOBr is 0.0440 M , the concentration of NOBr after 7.0 seconds is _____.

- A) 0.0276 M B) 0.0402 M **C) 0.0353 M** D) 0.0324 M E) 0.0480 M

$$\frac{1}{A_1} = k t + \frac{1}{A_0} \quad \frac{1}{A_1} = 0.80(7) + \frac{1}{0.0440}$$

0.0353

$$\ln[A_0] = -kt + \ln[A_1]$$

$$\ln[0.095] = -0.33(t) + \ln[0.13] = 0.950$$

- 6) A first-order reaction has a rate constant of 0.33 min^{-1} . It takes _____ min for the reactant concentration to decrease from 0.13 M to 0.095 M. 6) D
- A) 0.13 B) 0.41 C) 0.085 D) 0.95 E) 1.2

A flask is charged with 0.124 mol of A and allowed to react to form B according to the reaction $A(g) \rightarrow B(g)$. The following data are obtained for [A] as the reaction proceeds:

Time (s)	0.00	10.0	20.0	30.0	40.0
Moles of A	0.124	0.110	0.088	0.073	0.054

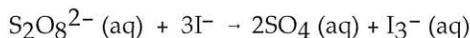
- 7) The average rate of disappearance of A between 10 s and 20 s is _____ mol/s. 7) D
- A) 9.90×10^{-3}
 B) 1.1×10^{-3}
 C) 4.4×10^{-3}
D) 2.2×10^{-3}
 E) 454
- 8) The average rate of disappearance of A between 20 s and 40 s is _____ mol/s. 8) D
- A) 7.1×10^{-3} B) 8.5×10^{-4} C) 590 D) 1.7×10^{-3} E) 1.4×10^{-3}
- 9) How many moles of B are present at 10 s? 9) E
- A) 1.4×10^{-3} B) 0.011 C) 0.110 D) 0.220 E) 0.014

$$\frac{0.022}{10} = 0.0022$$

$$\frac{0.088 - 0.054}{20}$$

$$0.124 - 0.110 = 0.014$$

The peroxydisulfate ion ($S_2O_8^{2-}$) reacts with the iodide ion in aqueous solution via the reaction:

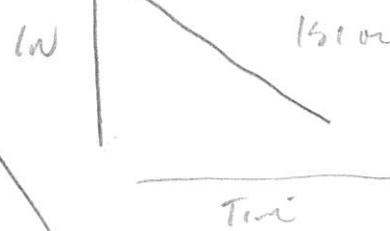


An aqueous solution containing 0.050 M of $S_2O_8^{2-}$ ion and 0.072 M of I^- is prepared, and the progress of the reaction followed by measuring $[I^-]$. The data obtained is given in the table below.

Time (s)	0.000	400.0	800.0	1200.0	1600.0
$[I^-]$ (M)	0.072	0.057	0.046	0.037	0.029

- 10) The concentration of $S_2O_8^{2-}$ remaining at 400 s is _____ M. 10) C
- A) +0.035 B) -0.007 C) +0.045 D) +0.057 E) +0.015

X	Y
0	0.072
400	0.057
800	0.046
1200	0.037
1600	0.029



$$k = +5.627e-4$$

$$\ln[A_1] = -5.627e-4(400) + \ln(0.050)$$

$$\ln[A_1] = -5.627e-4(400) + \ln(0.072)$$

$$-2.856 =$$

$$\ln[A_1] = -3.05$$

$$A_1 = 0.047 \text{ } S_2O_8^{2-}$$

$$I = 0.057$$