MULTIPLE CHOICE

Section 12.1 Reaction Rates

1. The decomposition of dinitrogen pentoxide is described by the reaction below:
   $$2\ N_2O_5(g) \longrightarrow 4\ NO_2(g) + O_2(g)$$
   If the rate of appearance of O_2 is equal to 2.40 mol/min, what is the rate of disappearance of N_2O_5?
   a) 0.600 mol/min
   b) 1.20 mol/min
   c) 4.80 mol/min
   d) 9.60 mol/min

Section 12.2 Rate Laws and Reaction Order

2. For the general rate law, Rate = $k[A][B]^2$, what will happen to the rate of reaction if the concentration of A is tripled?
   a) The rate will be halved.
   b) The rate will be doubled.
   c) The rate will be tripled.
   d) The rate will remain the same.

Section 12.3 Experimental Determination of a Rate Law

3. The following set of data was obtained by the method of initial rates for the reaction:
   $$2\ HgCl_2(aq) + C_2O_4^{2-}(aq) \longrightarrow 2\ Cl^-(aq) + 2\ CO_2(g) + Hg_2Cl_2(s)$$
   What is the rate law for the reaction?

$[HgCl_2]$,M	$[C_2O_4^{2-}]$, M	Rate, M/s
0.10	0.10	1.3×10^{-7}
0.10	0.20	5.2×10^{-7}
0.20	0.20	1.0×10^{-6}

   a) Rate = $k[HgCl_2][C_2O_4^{2-}]^{-2}$
   b) Rate = $k[HgCl_2][C_2O_4^{2-}]^{-1}$
   c) Rate = $k[HgCl_2]^2[C_2O_4^{2-}]$
   d) Rate = $k[HgCl_2][C_2O_4^{2-}]^2$

4. The following set of data was obtained by the method of initial rates for the reaction:
$2\ HgCl_2(aq) + C_2O_4^{2-}(aq) \longrightarrow 2\ Cl^-(aq) + 2\ CO_2(g) + Hg_2Cl_2(s)$
What is the value of the rate constant, k?

$[HgCl_2]$,M	$[C_2O_4^{2-}]$, M	Rate, M/s
0.10	0.10	1.3×10^{-7}
0.10	0.20	5.2×10^{-7}
0.20	0.20	1.0×10^{-6}

a) 1.4×10^{-8} M/s
b) 1.3×10^{-7} M/s
c) 1.4×10^{-5} M/s
d) 1.3×10^{-4} M/s

Section 12.4 Integrated Rate Law for a First-Order Reaction

5. For a first-order reaction, it takes 48 minutes for a reactant to decrease to 25% of its initial value. What is the rate constant (in inverse seconds) for the reaction?
a) $1.92 \times 10^{-5}\ s^{-1}$
b) $2.41 \times 10^{-4}\ s^{-1}$
c) $4.81 \times 10^{-4}\ s^{-1}$
d) $2.90 \times 10^{-2}\ s^{-1}$

6. The isomerization reaction, $CH_3NC \longrightarrow CH_3CN$, is first order and the rate constant is $0.46\ s^{-1}$ at 600 K. What is the concentration of CH_3NC after 0.20 minutes of reaction if the initial concentration is 0.10 M?
a) 9.1×10^{-4} M
b) 4.0×10^{-4} M
c) 9.1×10^{-2} M
d) 4.0×10^{-2} M

Section 12.5 Half-Life of a First-Order Reaction

7. The rate constant, k, for a first-order reaction is equal to $4.2 \times 10^{-4}\ s^{-1}$. What is the half-life of the reaction?
a) 2.9×10^{-4} s
b) 1.5 s
c) 7.2×10^{2} s
d) 1.7×10^{3} s

Section 12.6 Second-Order Reactions

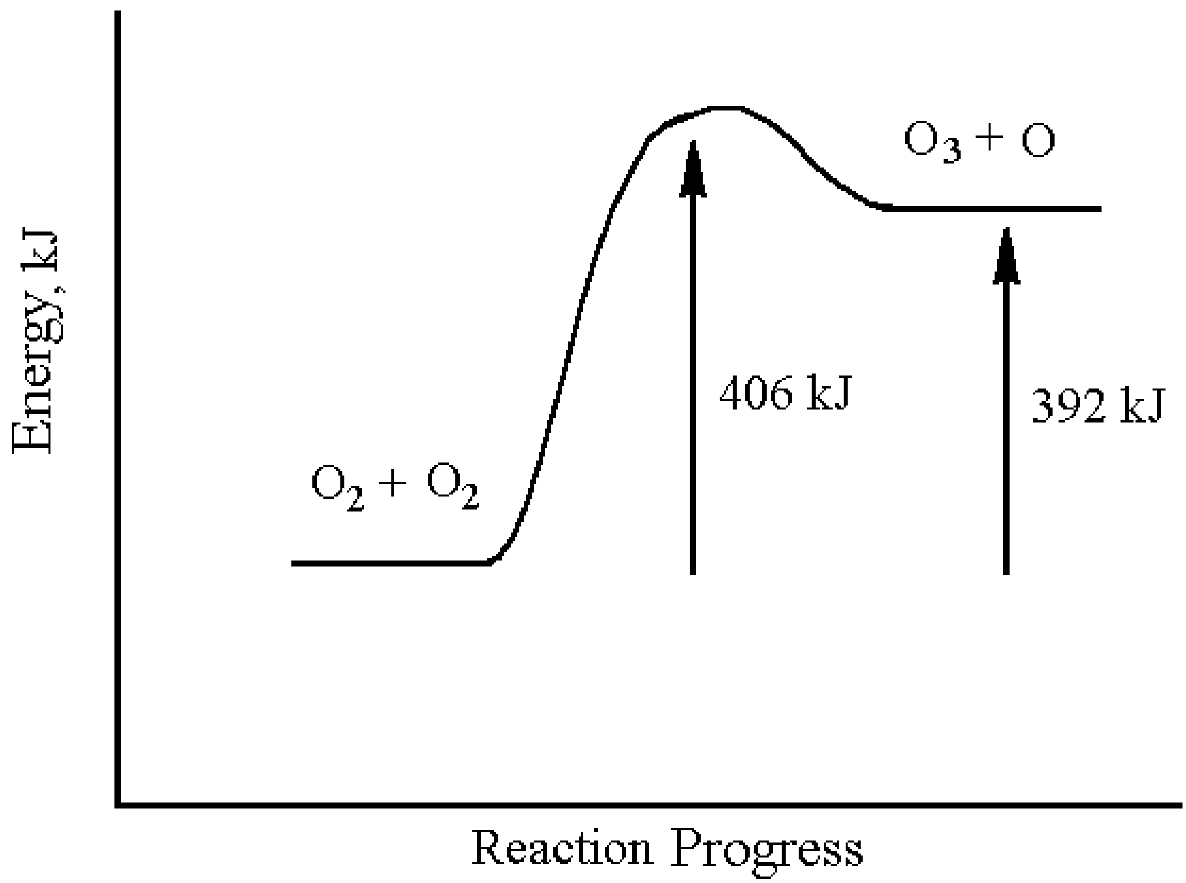
8. The reaction: $2\ HI \longrightarrow H_2 + I_2$, is second order. At 800 K it takes 142 seconds for the initial concentration of HI to decrease from 6.75×10^{-2} M to 3.50×10^{-2} M. What is the rate constant for the reaction at that temperature?
a) $2.29 \times 10^{-4}\ M^{-1}\ s^{-1}$
b) $9.69 \times 10^{-2}\ M^{-1}\ s^{-1}$
c) $10.3\ M^{-1}\ s^{-1}$
d) $4.37 \times 103\ M^{-1}\ s^{-1}$

Section 12.7 Reaction Mechanisms

9. A mechanism for a naturally occurring reaction that destroys ozone is:
Step 1: $O_3(g) + HO(g) \longrightarrow HO_2(g) + O_2(g)$
Step 2: $HO_2(g) + O(g) \longrightarrow HO(g) + O_2(g)$
Which species is an intermediate?
a) HO
b) HO_2
c) O
d) O_3

Section 12.9 Reactions Rates and Temperature: The Arrhenius Equation

10. What is the activation energy for the **formation** of ozone?
a) 14 kJ
b) 392 kJ
c) 406 kJ
d) none of these



1. c)

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2. c)

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3. d)

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4. d)

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5. c)

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6. b)

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7. d)

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8. b)

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9. b)

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10. c)

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