For the reaction below, what is $\Delta [\text{CH}_2\text{O}]/\Delta t$ with respect to $\Delta [\text{O}_2]/\Delta t$?
\[
\text{C}_2\text{H}_4(g) + \text{O}_3(g) \rightarrow 2 \text{CH}_2\text{O}(g) + \frac{1}{2} \text{O}_2(g)
\]
A. $\Delta [\text{CH}_2\text{O}]/\Delta t = 2 \cdot \Delta [\text{O}_2]/\Delta t$
B. $\Delta [\text{CH}_2\text{O}]/\Delta t = \frac{1}{4} \cdot \Delta [\text{O}_2]/\Delta t$
C. $\Delta [\text{CH}_2\text{O}]/\Delta t = -4 \cdot \Delta [\text{O}_2]/\Delta t$
D. $\Delta [\text{CH}_2\text{O}]/\Delta t = 4 \cdot \Delta [\text{O}_2]/\Delta t$
E. $\Delta [\text{CH}_2\text{O}]/\Delta t = \Delta [\text{O}_2]/\Delta t$

The reduction of NO with hydrogen produces nitrogen and water.
\[
2 \text{NO} + 2 \text{H}_2 \rightarrow \text{N}_2 + 2 \text{H}_2\text{O}
\]
The reaction is second order in NO and third order overall. The rate law for the reaction is
A. $\text{Rate} = k \left[\text{NO}\right]\left[\text{H}_2\right]$
B. $\text{Rate} = k \left[\text{NO}\right]^2\left[\text{H}_2\right]$
C. $\text{Rate} = k \left[\text{NO}\right]\left[\text{H}_2\right]^2$
D. $\text{Rate} = k \left[\text{NO}\right]^2\left[\text{H}_2\right]^2$
E. $\text{Rate} = k \left[\text{NO}_2\right]\left[\text{H}^+\right]^3$

The reduction of NO with hydrogen produces nitrogen and water.
\[
2 \text{NO} + 2 \text{H}_2 \rightarrow \text{N}_2 + 2 \text{H}_2\text{O}
\]
The reaction is second order in NO and third order overall. The $[\text{NO}]$ is increased by a factor of 5, the rate will increase by a factor of
A. 0
B. 1
C. 5
D. 10
E. 25

Given the initial rate data for the reaction $\text{A} + \text{B} \rightarrow \text{C}$, determine the rate expression for the reaction.

<table>
<thead>
<tr>
<th>$[\text{A}]$ (M)</th>
<th>$[\text{B}]$ (M)</th>
<th>$\Delta [\text{C}]/\Delta t$ (M/s)</th>
</tr>
</thead>
<tbody>
<tr>
<td>0.10</td>
<td>0.20</td>
<td>40.</td>
</tr>
<tr>
<td>0.20</td>
<td>0.20</td>
<td>80.</td>
</tr>
<tr>
<td>0.10</td>
<td>0.10</td>
<td>40.</td>
</tr>
</tbody>
</table>

A. $\Delta [\text{C}]/\Delta t = 2000[\text{A}][\text{B}]$
B. $\Delta [\text{C}]/\Delta t = 40.[\text{A}]^2$
C. $\Delta [\text{C}]/\Delta t = 4.0[\text{B}]$
D. $\Delta [\text{C}]/\Delta t = 400[\text{A}]$
E. $\Delta [\text{C}]/\Delta t = #1[\text{AC}/\text{DC}]$

For the reaction $\text{A} \rightarrow \text{B}$, the disappearance of A is found to be second-order. Which of the following will produce a straight line graph?
A. log $[\text{A}]$ vs. time
B. ln $[\text{A}]$ vs. time
C. $[\text{A}]$ vs. time
D. $1/[\text{A}]$ vs. time
E. $[\text{A}]^2$ vs. time
For the reaction $A \rightarrow B$, the disappearance of $A$ is found to be first-order. A linear regression analysis of the data yields the equation: 
$$y = -0.00106x + -3.91$$
What is the value of the rate constant, $k$?
A. -0.00106 
B. 0.00106 
C. -3.91 
D. 3.91 
E. 42

Radioactive gold-198 is used in the diagnosis of liver problems. The half-life of the isotope is 2.7 days. If you begin with 5.6 mg of the isotope, how many days does it take 5.6 mg of gold to become 0.70 mg?
A. 2.0 days 
B. 2.7 days 
C. 5.4 days 
D. 8.1 days 
E. 10.8 days

The reaction of $NO_2(g)$ and $CO(g)$ is thought to occur in two steps:
Step 1 Slow $NO_2(g) + NO_2(g) \rightarrow NO(g) + NO_3(g)$
Step 2 Fast $NO_3(g) + CO(g) \rightarrow NO_2(g) + CO_2(g)$
Which of the following rate laws would correspond to this mechanism?
A. Rate = $k[NO_2][CO]$ 
B. Rate = $k[NO_3]$ 
C. Rate = $k[NO_3]^2$

Use the rate laws below to determine which reaction is most likely to occur in a single step:
A. $2 NO_2(g) + F_2(g) \rightarrow 2 NO_2F(g)$ Rate = $k[NO_2][F_2]$ 
B. $H_2(g) + Br_2(g) \rightarrow 2 HBr(g)$ Rate = $k[H_2][Br_2]^{1/2}$ 
C. $NO(g) + O_2(g) \rightarrow NO_2(g) + O(g)$ Rate = $k[NO][O_2]$ 
D. $NO_2(g) + CO(g) \rightarrow NO(g) + CO_2(g)$ Rate = $k[NO_2]$ 

Which statement is incorrect?
A. A catalyst provides an alternative mechanism for a reaction 
B. A catalyst is regenerated in a reaction 
C. A reaction involving a catalyst yields more product 
D. A catalyst speeds up the forward and reverse reactions 
E. Catalysts are cool! :)

For the reaction $A \rightarrow B$ the disappearance of $A$ is first-order where $k = 0.030/min$. If we begin with $[A] = 0.36 \text{ M}$, what will $[A]$ be after 46 min?
A. 0.091 M 
B. 0.18 M 
C. 0.31 M 
D. 0.25 M 
E. 0.50 M
How many neutrons and protons are there in the radioisotope $^{60}\text{Co}$ that is used in cancer therapy?

A. 60 neutrons and 27 protons  
B. 27 neutrons and 60 protons  
C. 33 neutrons and 27 protons  
D. 27 neutrons and 33 protons  
E. 0 neutrons and 0 protons

What is the unknown particle in the following nuclear reaction?

$^{238}\text{U} \rightarrow \text{particle} + ^{239}\text{Np}$

A. alpha  
B. beta  
C. gamma  
D. neutron  
E. positron

What is the unknown particle in the following nuclear reaction?

$^{207}\text{Po} \rightarrow \text{particle} + ^{207}\text{Bi}$

A. alpha  
B. beta  
C. gamma  
D. neutron  
E. positron

What new nucleus is produced in the following nuclear reaction?

$^{41}\text{Ca} + ^{0}\text{e} \rightarrow ?$

A. $^{41}\text{Sc}$  
B. $^{42}\text{K}$  
C. $^{41}\text{K}$

Which of the following nuclei has the highest binding energy per nucleon?

A. $^7\text{Li}$  
B. $^{59}\text{Ni}$  
C. $^4\text{He}$  
D. $^{222}\text{Th}$  
E. $^0\text{Jq}$

Calculate the binding energy per mol of nucleons ($E_b$) for carbon-12. Helpful values:
- 1 proton = 1.007825 g/mol
- 1 neutron = 1.008665 g/mol
- carbon-12 = 12.000000 g/mol
- $2.998 \times 10^8$ m/s = c

A. $7.411 \times 10^8$ kJ  
B. $8.893 \times 10^8$ kJ  
C. $1.482 \times 10^8$ kJ  
D. $-0.098940$ kJ  
E. $0.0001 \times 10^8$ kJ
Radioactive iodine-131 is used to treat hyperthyroidism. It has a half-life of 8.04 days. If you begin with 8.8 micrograms, what mass remains after 32.3 days?

A. 4.4 micrograms  
B. 2.2 micrograms  
C. 1.1 micrograms  
D. 0.54 micrograms  
E. 0.23 micrograms

Gallium citrate, containing radioactive $^{67}$Ga, is used as a tumor-seeking agent. It has a half-life of 78.2 hours. How long will it take for a sample of gallium citrate to decay to 15% of its original activity?

A. 86.5 hours  
B. 157 hours  
C. 214 hours  
D. 235 hours  
E. 150 seconds

---

End of Review - good luck with your studying!

Need more practice?
- Practice Problem Sets (online)
- Concept Guides (Companion and online)
- Chapter Guides (online)
- End of Chapter Problems in Textbook (every other question has answer at end)

Good luck with your studying!