Question 1 of 12

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The rate of the following reaction is 0.540 M/s. What is the relative rate of change of each species in the reaction?

$$A + 3B \longrightarrow 2C$$

$\frac{\Delta[A]}{\Delta t} =$ Number [ ] M/s

$\frac{\Delta[B]}{\Delta t} =$ Number [ ] M/s

$\frac{\Delta[C]}{\Delta t} =$ Number [ ] M/s

Question 2 of 12

General Chemistry 4th Edition
McQuarrie • Rock • Gallogly
University Science Books
presented by Sapling Learning

The reaction described by this equation

$$O_3(g) + NO(g) \longrightarrow O_2(g) + NO_2(g)$$

has the following rate law at 310 K.

$$\text{rate of reaction} = k[O_3][NO] \qquad k = 3.0 \times 10^6 \ M^{-1} \cdot s^{-1}$$

Given that $[O_3]=4.0\times10^{-4}$ M and $[NO]=7.0\times10^{-5}$ M at t=0, calculate the rate of the reaction at t=0.

Number [ ] M/s

What is the overall order of this reaction?

- 0
- 1
- 2
- 3

Question 3 of 12

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The reaction

$$A + B \longrightarrow C + D \qquad \text{rate} = k[A][B]^2$$

has an initial rate of 0.0470 M/s.

What will the initial rate be if [A] is halved and [B] is tripled?

Number

M/s

What will the initial rate be if [A] is tripled and [B] is halved?

Number

M/s

Question 4 of 12

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Using the given data, calculate the rate constant of this reaction.

$$A + B \longrightarrow C + D$$

Trial	[A] (M)	[B] (M)	Rate (M/s)
1	0.230	0.340	0.0160
2	0.230	0.918	0.117
3	0.276	0.340	0.0192

$k =$ Number

Units

Select answer

Question 5 of 12

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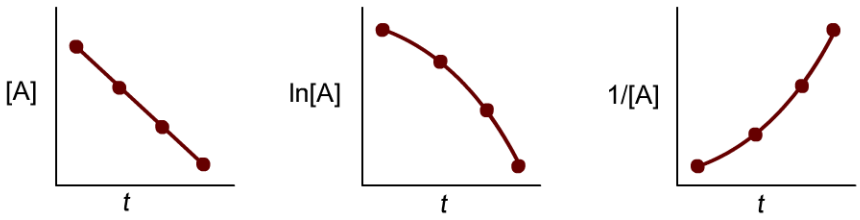
For A ⟶ products, time and concentration data were collected and plotted as shown here.

[A] (M)	t (s)
0.700	0.0
0.662	30.0
0.624	60.0
0.586	90.0



Determine the reaction order, the rate constant, and the units of the rate constant.

order = Number

k = Number

Units

Select answer

Question 6 of 12

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The rate constant for the reaction is 0.210 $M^{-1} \cdot s^{-1}$ at 200 °C.

A $\longrightarrow$ **products**

If the initial concentration of A is 0.00170 M, what will be the concentration after 785 s?

Number

M

Question 7 of 12

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The rate constant for this first-order reaction is 0.0300 s^{-1} at 400 °C.

A $\longrightarrow$ **products**

After how many seconds will 22.2% of the reactant remain?

Number

s

Question 8 of 12

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After 44.0 min, 40.0% of a compound has decomposed. What is the half-life of this reaction assuming first-order kinetics?

Number

min

Question 9 of 12

For each of the following cases, identify the order with respect to the reactant, A.

Case (A → products)	Order
The half-life of A is independent of the initial concentration of [A].	Number
A twofold increase in the initial concentration of A leads to a fourfold increase in the initial rate.	Number
A twofold increase in the initial concentration of A leads to a 1.41-fold increase in the initial rate.	Number
The time required for [A] to decrease from $[A]_0$ to $[A]_0/2$ is equal to the time required for [A] to decrease from $[A]_0/2$ to $[A]_0/4$.	Number
The rate of decrease of [A] is a constant.	Number

Question 10 of 12

Consider the following mechanism.

step 1: $A \rightleftharpoons B + C$ equilibrium

step 2: $C + D \rightarrow E$ slow

overall: $A + D \rightarrow B + E$

Determine the rate law for the overall reaction (where the overall rate constant is represented as *k*).

rate =

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Consider this reaction data:

$\mathbf{A} \longrightarrow \mathbf{products}$

T (K)	k (s^{-1})
325	0.399
825	0.724

If you were going to graphically determine the activation energy of this reaction, what points would you plot?

	x	y
point 1:	Number	Number
point 2:	Number	Number

To avoid rounding errors, use at least three significant figures in all values.

Determine the rise, run, and slope of the line formed by these points.

rise	run	slope
Number	Number	Number

What is the activation energy of this reaction?

Number J / mol

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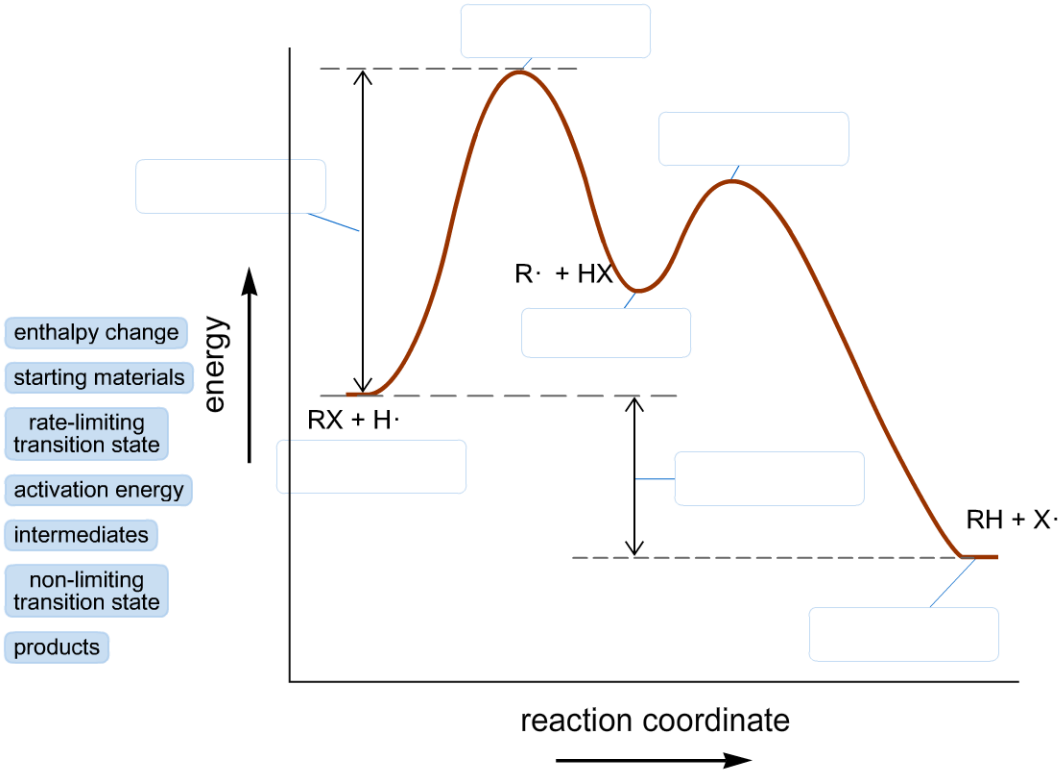
Label the energy diagram for a two-step reaction.


enthalpy change
starting materials
rate-limiting transition state
activation energy
intermediates
non-limiting transition state
products
energy
R· + HX
RX + H·
RH + X·
reaction coordinate