This print-out should have 30 questions. Multiple-choice questions may continue on the next column or page – find all choices before answering. V1:1, V2:1, V3:1, V4:1, V5:2.

Please make sure you write your version numbers on your scantron. Good luck!

Half Rctn Potential

26:09, general, multiple choice, > 1 min, fixed.

001 (part 1 of 1) 6 points

The equilibrium constant for the following cell

$$\mathrm{K}\,|\,\mathrm{K^+}\,||\,\mathrm{Ce^{4+}}\,|\,\mathrm{Ce^{3+}}\,|\,\mathrm{Pt}$$

is $K = 5.518\times10^{76}$. What is E°_{red} of the $\mathrm{K^+/K}$ half-reaction? Assume the reaction is taking place at room temperature ($T = 25^\circ\mathrm{C}$).

$\mathrm{Ce^{4+}} + e^- \rightarrow \mathrm{Ce^{3+}}$ $\qquad E^\circ_{\mathrm{red}} = +1.61$ V

1. -2.93 V **correct**

2. $+4.54$ V

3. -8.84 V

4. $+2.93$ V

5. -4.54 V

Explanation:

Cell Stoic

26:04, general, multiple choice, > 1 min, fixed.

002 (part 1 of 1) 6 points

The reaction

$$2\,\mathrm{Ag^+(aq)} + \mathrm{Fe(s)} \rightarrow \mathrm{Fe^{2+}(aq)} + 2\,\mathrm{Ag(s)}$$

taking place in a battery generates a current of 2 Amp. How much Fe(s) is consumed in 1 hour?

1. 2.08 g **correct**

2. 4.16 g

3. 8.32 g

4. 3.46×10^{-2} g

5. 1.04 g

Explanation:

Cell Potential

26:08, general, multiple choice, < 1 min, fixed.

003 (part 1 of 1) 6 points

What is the cell potential of the following cell?

$\mathrm{Pt}\,|\,\mathrm{Br^-(aq,\ 0.2\ M)}\,|\,\mathrm{Br_2(\ell)}\,||\,\mathrm{Au^+(aq,\ 0.7\ M)}\,|\,\mathrm{Au}$

$\mathrm{Br_2} + 2\,e^- \rightarrow 2\,\mathrm{Br^-}$ $\qquad E^\circ_{\mathrm{red}} = +1.09$ V

$\mathrm{Au^+} + e^- \rightarrow \mathrm{Au}$ $\qquad E^\circ_{\mathrm{red}} = +1.69$ V

1. 0.55 V **correct**

2. 0.60 V

3. 0.65 V

4. 0.48 V

5. 0.72 V

Explanation:

Battery Use

27:03, general, multiple choice, < 1 min, fixed.

004 (part 1 of 1) 6 points

Which of the following is not a correct statement about a popular battery used in our daily lives?

1. Calcium oxide is the base most commonly found in alkaline batteries. **correct**

2. "Hybrid" automobiles most often employ a nickel metal hydride battery as their electrical power source.

3. Sulfuric acid is the acid most commonly found in lead acid storage batteries.

4. Nickel cadmium batteries are decreasingly popular because memory effects reduce the lifetime of the battery.

5. Lithium ion batteries, which are used in cell phones, are considered by some to be a safety risk because of explosion or fire.

Explanation:

Rctn Rate 02

20:01, general, multiple choice, < 1 min, fixed.

005 (part 1 of 1) 6 points

In the reaction

$$3\,Mg(s) + 2\,Fe^{2+}(aq) \rightarrow 2\,Fe(s) + 3\,Mg^{2+}(aq)\,,$$

$\frac{\Delta[Fe]}{\Delta t} = 2.4 \times 10^{-4}$ M/s. What is $\frac{\Delta[Mg]}{\Delta t}$?

1. -3.6×10^{-4} M/s **correct**

2. $+3.6 \times 10^{-4}$ M/s

3. -1.6×10^{-4} M/s

4. $+1.6 \times 10^{-4}$ M/s

5. $+1.2 \times 10^{-4}$ M/s

Explanation:

Rctn Order 01

20:03, general, multiple choice, < 1 min, fixed.

006 (part 1 of 1) 6 points

A reaction has a rate constant of $k = 5.5 \times 10^{-4}$ M^2s^{-1}. What is the reaction order?

1. -1 **correct**

2. -2

3. 0

4. 1

5. 2

Explanation:

Rate Law 03

20:03, general, multiple choice, < 1 min, fixed.

007 (part 1 of 1) 6 points

If $k = 2.7 \times 10^{-6}$ $M^{-1}s^{-1}$ for the reaction

$$A \rightarrow B$$

which of the following is the correct rate law?

1. rate $= k\,[A]^2$ **correct**

2. rate $= k\,[A]^1$

3. rate $= k\,[A]^0$

4. rate $= k\,[A]^2\,[B]^{-1}$

5. rate $= k\,[A]^0\,[B]^{-1}$

Explanation:

Rate Law 04

20:02, general, multiple choice, > 1 min, fixed.

008 (part 1 of 1) 6 points

What is the rate law for the reaction

$$A + B + C \rightarrow D$$

if the following data were collected?

Exp	$[A]_0$	$[B]_0$	$[C]_0$	Initial Rate
1	0.4	1.2	0.7	2.32×10^{-3}
2	1.3	1.2	0.9	7.54×10^{-3}
3	0.4	4.1	0.8	9.25×10^{-2}
4	1.3	1.2	0.2	7.54×10^{-3}

1. rate $= 3.36 \times 10^{-3}\,[A]^1\,[B]^3\,[C]^0$ **correct**

2. rate $= 5.37 \times 10^{-3}\,[A]^1\,[B]^3\,[C]^0$

3. rate $= 1.49 \times 10^{-3}\,[A]^0\,[B]^3\,[C]^1$

4. rate $= 1.79 \times 10^{-3}\,[A]^0\,[B]^2\,[C]^1$

5. rate $= 4.48 \times 10^{-3}\,[A]^1\,[B]^2\,[C]^1$

Explanation:

Decomp Time

20:04, general, multiple choice, > 1 min, fixed.

009 (part 1 of 1) 6 points

The decomposition of hydrogen peroxide to form water is a first order process. If it takes 20 minutes for the initial concentration to fall from 1.6 M to 0.8 M, how much time has passed when only 0.05 M remains?

1. 100 minutes **correct**

2. 40 minutes

3. 120 minutes

4. 160 minutes

5. 80 minutes

Explanation:

Zero Order Rate

20:04, general, multiple choice, > 1 min, fixed.

010 (part 1 of 1) 6 points

For the reaction

$$2\,\mathrm{A} \rightarrow \mathrm{B}$$

the concentration of [A] after 15 hours is 0.15 M. How much of compound [A] was initially present if $k = 2.16 \times 10^{-7}$ M/s?

1. 1.733×10^{-1} M **correct**

2. 1.504×10^{-1} M

3. 1.535×10^{-1} M

4. 1.617×10^{-1} M

5. 7.32×10^{-2} M

Explanation:

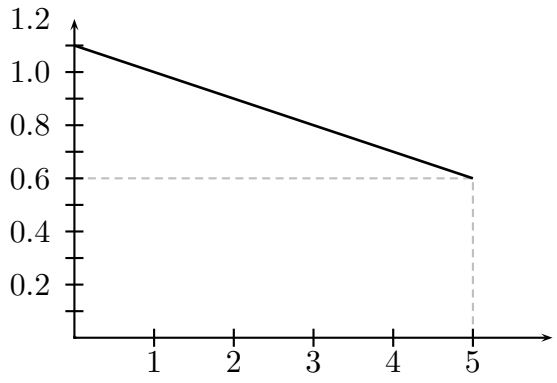
Rate Plot

20:04, general, multiple choice, < 1 min, fixed.

011 (part 1 of 1) 6 points

The graph is a plot of ln A *vs* t for the reaction

$$A \rightarrow B$$



rate $= k\,[\mathrm{A}]$ is the rate law for this reaction. What was the initial concentration of [A]?

1. 3.0 M **correct**

2. 1.8 M

3. 1.1 M

4. 5 M

5. 0.6 M

Explanation:

Sparks collision 001

20:08, general, multiple choice, < 1 min, fixed.

012 (part 1 of 1) 6 points

Which of the following statements regarding collision and transition state theory are true?

I) Reactants must collide to form products.
II) Activation energy is always positive.
III) Reactant molecules must absorb energy to form the transition state.
IV) Reactant collisions must be oriented properly to form products.

1. I, III, and IV only

2. I, II, III, and IV **correct**

3. I and IV only

4. II and III only

5. II, III, and IV only

Explanation:

Rctn Rate 03

20:09, general, multiple choice, < 1 min, fixed.

013 (part 1 of 1) 6 points

Which of the following can increase the rate of reaction by increasing the rate constant k?

I. raising the temperature
II. decreasing the volume
III. adding a catalyst
IV. increasing the concentration

1. I and III only **correct**

2. I, II, and III only

3. I only

4. II only

5. III and IV only

Explanation:

Activ Energy 01

20:07, general, multiple choice, > 1 min, fixed.

014 (part 1 of 1) 6 points

The reaction

$$2\,HI \rightarrow H_2 + I_2$$

has rate constants $k_1 = 9.7\times10^{-6}\,M^{-1}s^{-1}$ and $k_2 = 9.7\times10^{-2}\,M^{-1}s^{-1}$ at $T_1 = 326.85°C$ and $T_2 = 526.85°C$. What is the activation energy of this reaction?

1. 1.84×10^5 J **correct**

2. 2.86×10^4 J

3. 7.16×10^7 J

4. 7.93×10^3 J

5. 6.59×10^4 J

Explanation:

Rate Law 08

20:06, general, multiple choice, > 1 min, fixed.

015 (part 1 of 1) 6 points

What would you propose as the rate law for the reaction of bromine with nitric oxide if the second step of a proposed mechanism is the rate determining step?

Step 1: $NO + Br_2 \rightarrow NOBr_2$

Step 2: $NOBr_2 + NO \rightarrow 2\,NOBr$

1. $k\,[NO]^2\,[Br_2]$ **correct**

2. $k\,[NO]\,[Br_2]\,[NOBr_2]$

3. $k\,[NO]^2$

4. $k\,[NO]\,[Br_2]\,[NOBr_2]^{-1}$

5. $k\,[NO]^2\,[Br_2]\,[NOBr_2]^{-1}$

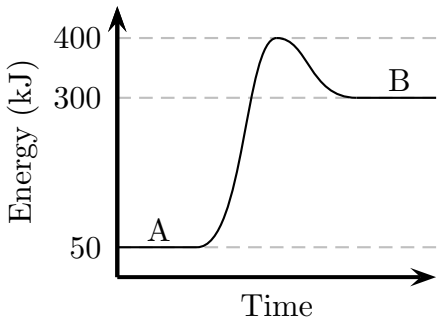
Explanation:

Activ Energy

20:09, general, multiple choice, < 1 min, fixed.

016 (part 1 of 1) 6 points

The graph describes the energy profile of a reaction.



What are the values for ΔH and E_a, respectively, for the reaction in the direction written?

1. 250 kJ, 350 kJ **correct**

2. 250 kJ, 100 kJ

3. −250 kJ, 100 kJ

4. −250 kJ, −100 kJ

5. −250 kJ, 350 kJ

Explanation:

Ozone Hole 01

39:02, general, multiple choice, < 1 min, fixed.

017 (part 1 of 1) 6 points

Which of the following is not true about the catalyst responsible for the hole in the ozone layer?

1. It is a heterogeneous catalyst. **correct**

2. It is a free radical.

3. Sunlight facilitates the formation of the catalyst.

4. The catalyst's source is often a flourochlorocarbon.

5. Ozone is converted to O_2 in the catalyzed reaction.

Explanation:

Metal Displ

07:12, general, multiple choice, < 1 min, fixed.

018 (part 1 of 1) 6 points

Metal displacement reactions produce all of the following except

1. protons. **correct**

2. a metal cation.

3. hydrogen gas.

4. intense heat.

5. hydroxide ions.

Explanation:

Chlorophyll Structure

28:04, general, multiple choice, < 1 min, fixed.

019 (part 1 of 1) 6 points

Chlorophyll contains which of the following metals?

1. magnesium **correct**

2. potassium

3. aluminum

4. bismuth

5. lithium

Explanation:

Gems

28:07, general, multiple choice, < 1 min, fixed.

020 (part 1 of 1) 6 points

Which of these famous gems is not correctly paired with its primary metal oxide?

1. topaz : silicon oxide **correct**

2. onyx : silicon oxide

3. sapphire : aluminum oxide

4. ruby : aluminum oxide

5. emerald : boron oxide

Explanation:

Mlib 11 9017

29:05, basic, multiple choice, > 1 min, fixed.

021 (part 1 of 1) 6 points

The production of nitric acid from ammonia and oxygen is the

1. Haber process.

2. arc process.

3. Ostwald process. **correct**

4. Hall process.

Explanation:

Carbon Allotrope

29:06, general, multiple choice, < 1 min, fixed.

022 (part 1 of 1) 6 points

Which of the following is not a potential application for the carbon allotrope listed?

1. diamond : superconducting wire **correct**

2. graphite : pencil lead

3. C_{60} : drug delivery

4. graphite : electrochemical cell electrode

5. diamond : abrasive

Explanation:

Manuf Chem

41:08, general, multiple choice, < 1 min, fixed.

023 (part 1 of 1) 6 points

Which of the following compounds is not one of the four most manufactured chemicals in the United States?

1. HCl **correct**

2. H_2SO_4

3. Cl_2

4. NH_3

5. H_3PO_4

Explanation:

Fluorine Property

29:02, general, multiple choice, < 1 min, fixed.

024 (part 1 of 1) 6 points

Which statement about the element F is not true?

1. The most common use for fluorine gas is production of noble gas compounds. **correct**

2. It is the only halogen that lacks *d*-orbitals for bonding.

3. The lattice energies for its ion F^- tend to be larger than for other halides.

4. It is the most abundant halogen in the earth's crust.

5. It has the smallest pollarizability of the halogens.

Explanation:

CIC T09 02

35:05, basic, multiple choice, < 1 min, fixed.

025 (part 1 of 1) 6 points

Which would be classified as a "synthetic" polymer?

1. cellulose

2. wool

3. silk

4. nylon **correct**

Explanation:

Nucleotide 01

44:08, general, multiple choice, < 1 min, fixed.

026 (part 1 of 1) 6 points

Which of the following would not be found in a nucleotide?

1. histidine **correct**

2. ribose

3. thymine

4. phosphate group

5. uracil

Explanation:

Mlib 12 1085

34:01, basic, multiple choice, > 1 min, fixed.

027 (part 1 of 1) 6 points

The molecule 2-methylbutane contains how many C atoms and how many H atoms?

1. 4; 10

2. 4; 12

3. 5; 10

4. 5; 12 **correct**

5. 5; 13

Explanation:

Mlib 12 3089

34:03, basic, multiple choice, > 1 min, fixed.

028 (part 1 of 1) 6 points

The reaction between 3-methyl-1-butene and Cl_2 gas would be expected to be

1. a substitution reaction.

2. an addition reaction. **correct**

3. a cyclization reaction.

4. an isomerization reaction.

Explanation:

Fatty Acid Name

36:03, general, multiple choice, < 1 min, fixed.

029 (part 1 of 1) 6 points

A fatty acid consists of a ten-carbon alkane with a carboxylic acid functional group. What would you propose as the name for this fatty acid?

1. decanoic acid **correct**

2. decanecarboxylate

3. dodecanoic acid

4. dodecanoate acid

5. dodecanol

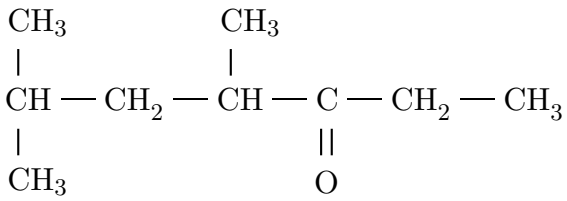
Explanation:

Mlib 12 4033

34:01, basic, multiple choice, > 1 min, fixed.

030 (part 1 of 1) 6 points

Name the compound



1. 4,6-dimethyl-3-heptanone **correct**

2. 4,6-dimethyl-3-heptanol

3. 4,6,6-trimethyl-3-hexanone

4. 2-methylpentyl, propyl ether

Explanation: