Practice Chemistry 102 Final Key

1. How many significant figures are in the mass measurement 0.06990 g?

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| 1. 6 | 1. 4 | 1. 3 | 1. 2 | 1. none of the above |

1. Convert 0.0007540 to scientific notation.

|  |  |  |
| --- | --- | --- |
| 1. 7.54 x 104 | 1. 7.540 x 10-4 | 1. 7.540 x 10-3 |
| 1. 0.754 x 10-4 | 1. none of the above |  |

1. Perform the following mathematical operation.: (2.45 x 105) (5.6x 104) =

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| 1. 1.4 x 1010 | 1. 88 | 1. 3.78 x 10-9 | 1. 1.4 x 1011 | 1. 1.4 x 109 |

1. Which of the following are not properties of a solid?

|  |  |  |
| --- | --- | --- |
| 1. fixed shape | 1. fixed volume | 1. very compressible |
| 1. melts to a liquid | 1. all of the above |  |

1. Which of the following represents a single particle composed of nonmetal atoms?

|  |  |  |
| --- | --- | --- |
| 1. molecule | 1. element | 1. formula unit |
| 1. substance | 1. alloy |  |

1. The density of olive oil is 0.918 g/mL. If 2.00 mL of oil are added to a hot pan, how many grams is that?

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| 1. 1.836 g | 1. 1.84 g | 1. 1.84 | 1. 0.459 g | 1. 2.18 g |

1. How many feet are in 525 mm?

|  |  |  |
| --- | --- | --- |
| 1. 5.25 ft | 1. 1.72 ft | 1. 17.2 ft |
| 1. 160,000 ft | 1. none of the above |  |

1. What is 80 °F in Celsius?

|  |  |  |
| --- | --- | --- |
| 1. 27 °C | 1. 176 °C | 1. 353 °C |
| 1. 449 °C | 1. none of the above |  |

1. Which of the following is a chemical change?
   1. A dry leaf is crushed.
   2. A bar of copper is formed into wire.
   3. A block of dry ice evaporates.
   4. Silverware tarnishes.
   5. Grass is cut.
2. P-32 decays by beta emission to produce

|  |  |  |
| --- | --- | --- |
| 1. S-32 | 1. Si-32 | 1. Al-28 |
| 1. Cl-17 | 1. none of the above |  |

1. What mass of a 44.0 mg tablet of I-131 remains after 32 days, given t1/2 = 8 days?

|  |  |  |
| --- | --- | --- |
| 1. 11.0 mg | 1. 2.75 mg | 1. 22.0 mg |
| 1. 5.50 mg | 1. none of the above |  |

1. The half-life of a radioisotope is
   1. One-half of the time it takes for the radioisotope to completely decay to a nonradioactive isotope.
   2. The time it takes for the radioisotope to become an isotope with one-half of the atomic weight of the original radioisotope.
   3. The time it takes for the radioisotope to become an isotope with one-half the atomic number of the original radioisotope.
   4. The time it takes for the radioisotope to lose one-half of its neutrons.
   5. The time it takes for one-half of the sample to decay to a new isotope.
2. Which pair represents isotopes?

|  |  |  |
| --- | --- | --- |
|  |  |  |
|  | 1. n-propyl and isopropyl alcohol | |

1. Which of the following is the correct electron configuration for silver (Ag)?

|  |  |  |
| --- | --- | --- |
| 1. 1s2 2s2 2p6 3s2 3p6 4s2 4p9 | 1. [Kr] 4s2 4p5 | 1. [Ar] 5s2 4d9 |
| 1. [Kr] 5s2 4d9 | 1. none of these is correct |  |

1. Which of the following species is isoelectronic with the sulfide ion, S2-?

|  |  |  |
| --- | --- | --- |
| 1. Ar | 1. Cl+ | 1. P- |
| 1. all of the above | 1. none of the above |  |

1. The number of molecules present in 25.0 grams of benzene, C6H6, is

|  |  |  |
| --- | --- | --- |
| 1. 0.320 | 1. 3.20 x 1023 | 1. 1.93 x 10-23 |
| 1. 3.24 x 10-21 | 1. 1.93 x 1023 |  |

1. What is the name for SO3?

|  |  |  |
| --- | --- | --- |
| 1. sulfur trioxide | 1. monosulfur trioxide | 1. sulfur oxide |
| 1. disulfur trioxide | 1. sulfur (II) oxide |  |

1. What is the formula for iron (III) phosphate?

|  |  |  |
| --- | --- | --- |
| 1. Fe2PO4 | 1. FePO3 | 1. FePO4 |
| 1. Fe3(PO4)3 | 1. none of the above |  |

1. The electron dot symbol for the element tellurium, Te, shows how many electrons?

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| 1. 2 | 1. 4 | 1. 6 | 1. 7 | 1. 8 |

1. Draw the Lewis structure for the hydrogen cyanide, HCN, then state the type of bonds in one molecule.

|  |  |  |
| --- | --- | --- |
| 1. 4 single bonds | 1. 2 double bonds | 1. 1 single and 1 double bond |
| 1. 1 single and 1 triple bond | 1. none of the above |  |

1. Which of the following is not true of the molecule CHF3?

|  |  |  |
| --- | --- | --- |
| 1. trigonal pyramidal | 1. bond angle 107° | 1. nonpolar molecule |
| 1. all of the above | 1. none of the above |  |

1. Which statement is a true description of the three molecules shown below?
2. All three have bond angles close to 90°
3. All three have trigonal planar geometry and bond angles close to 109.5°
4. All three have tetrahedral electron geometry and bond angles close to 109.5°
5. All three have tetrahedral electron geometry and bond angles close to 120°
6. The number of groups is different for each molecule and all have different bond angles



1. What is the net ionic equation for:

HClO4 (aq) + NaOH (aq) 🡪 NaClO4 (aq) + H2O (l)

|  |  |  |
| --- | --- | --- |
| 1. H+(aq) + OH-(aq) 🡪 H2O (l) | 1. ClO4-(aq) + Na+(aq) 🡪 NaClO4 (aq) | 1. same as the original equation |
| 1. all of the above | 1. none of the above |  |

1. When the equation below is balanced using integers, the coefficient of O2 will be

NH3 + O2 🡪 H2O + NO

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| 1. 2 | 1. 3 | 1. 5 | 1. 7 | 1. Something else |

1. What class of compound is represented by: O

||

CH3COCH2CH3

|  |  |  |
| --- | --- | --- |
| 1. carboxylic acid | 1. ketone | 1. ether |
| 1. aldehyde | 1. none of the above |  |

1. What is an acceptable name for:

1. 6-isopropyl-2,3-dimethyldecane
2. 7-isopropyl-2-methyl-3-propylheptane
3. 2,3,7-trimethyl-6-propyloctane
4. 1,1,2,6-tetramethyl-5-propylheptane
5. E. no answer shown
6. The definition of enantiomers is:
   * + 1. A pair of objects that are mirror images of each other
       2. A pair of objects that are superimposable mirror images
       3. A pair of objects that are non-superimposable mirror images
       4. A pair of objects that are not mirror images
7. In contrast to other triglycerides, oils are liquids at room temperature because:
8. They have a high proportion of unsaturated fatty acids.
9. They have a high proportion of saturated fatty acids.
10. They have a high proportion of phosphate groups
11. None of the above.
12. Which term best describes this pair of structures?





1. How many **stereocenters** are possible for the molecule at right?
   1. a) 0 b) 1 c) 2 d) 3 e) 4
2. What is the molecular formula for the following compound?



|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| * 1. C7H16 | * 1. C8H16 | * 1. C8H17 | * 1. C8H18 | * 1. C9H18 |

1. What is the condensation product of a ketone and excess alcohol?

|  |  |  |
| --- | --- | --- |
| 1. Aldehyde | 1. Primary alcohol | 1. Carboxylic acid |
| 1. Carboxylic ester | 1. Acetal |  |

1. What is the condensation product of a carboxylic acid and an alcohol?

|  |  |  |
| --- | --- | --- |
| 1. Aldehyde | 1. Secondary alcohol | 1. Ketone |
| 1. ester | 1. Acetal |  |

1. What is the product when an alcohol gets oxidized two steps?

|  |  |  |
| --- | --- | --- |
| 1. Aldehyde | 1. Carboxylic acid | 1. Ketone |
| 1. Carboxylic ester | 1. Acetal |  |

1. What is the product when a ketone gets reduced one step?

|  |  |  |
| --- | --- | --- |
| 1. Aldehyde | 1. Carboxylic ester | 1. Secondary alcohol |
| 1. Primary alcohol | 1. Acetal |  |

1. 20.0 L of a gas originally at 22 ºC and 1.05 atm pressure are compressed to 10.0 L. The new temperature is 57 ºC. What is the new pressure?
   1. 2.35 atm b. 5.44 atm c. 0.469 atm d. 1.88 atm e. 0.587 atm
2. Which of the following compounds is trans-3-hexene?



1. The major product of the following reaction is :





A. II B. III C. I D. V E. IV

1. The following carbohydrate would be classified:



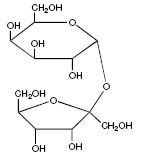
* 1. D- aldohexose
  2. D-ketohexose
  3. L-aldohexose
  4. L-ketohexose
  5. L-ketopentose

1. How many moles of sodium ions were given to a patient who received 500 mL of a 154 mEq/L solution?

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| 1. 77 | 1. 154 | 1. 0.077 | 1. 0.154 | 1. none of these |

1. A substance is classified as an electrolyte. This means that
   1. When dissolved in water it forms ions.
   2. When dissolved in water it conducts electricity by the movement of electrons.
   3. When dissolved in water it conducts electricity by the movement of ions.
   4. When dissolved in water it conducts electricity by the movement of molecules.
   5. Both (a) and (c) are true
2. Which Fischer representation below shows the linear form of the cyclic sugar shown at right?







1. What is the glycosidic link in the disaccharide shown start with the pyranose?

A. (1,1) B. (1) (2) C. (1,6) D. (1,2) E. (1) (2)

1. An acid is
   1. A substance that turns litmus blue.
   2. A substance with a sour taste.
   3. Something that has a slippery or soapy feel.
   4. Two of the above.
   5. None of the above.
2. Which pair represents a strong acid and base, respectively?

|  |  |  |
| --- | --- | --- |
| 1. HNO3 and NaOH | 1. HC2H3O2 and KOH | 1. HC2H3O2 and NH3 |
| 1. HCl and KCl | 1. NaCl and NH4C2H3O2 |  |

1. A Brønsted base by definition

|  |  |  |
| --- | --- | --- |
| 1. Is a proton donor. | 1. Will cause litmus to turn pink or red. | 1. Is a proton acceptor. |
| 1. Is slippery. | 1. Provides hydroxide ions in solution. |  |

1. The conjugate base of HSO4-1 is

|  |  |  |
| --- | --- | --- |
| 1. H2SO4 | 1. H2O | 1. OH-1 |
| 1. SO42- | 1. something else |  |

1. A solution has a pH of 8.7; the hydrogen ion concentration is

|  |  |  |
| --- | --- | --- |
| 1. 2 x 10-8 M | 1. 2 x 10-9 M | 1. 5 x 10-8 M |
| 1. 5 x 10-9 M | 1. 8.7 x 10-8 M |  |

1. What is the pOH of a 0.037 M HCl solution?

|  |  |  |
| --- | --- | --- |
| 1. 1.43 | 1. 3.7 x 10-2 | 1. 12.57 |
| 1. 3.7 x 10-12 | 1. None of the above |  |

1. The sequence of amino acids residues in a protein is called the:

|  |  |  |
| --- | --- | --- |
| 1. Isoelectric Point | 1. primary structure | 1. secondary structure |
| 1. tertiary structure | 1. no answer shown |  |

49. The active site of an enzyme

1. contains the amino acid backbone and is far from the substrate binding site
2. contains the side chains of the amino acids and is far from the substrate binding site

# Contains the side chains of the amino acids and is the substrate binding site

1. is far from the coenzyme binding site
2. is in the core of the protein
3. Hydrophobic interactions can stabilize what type(s) of structure in a protein?

|  |  |  |
| --- | --- | --- |
| 1. primary | 1. secondary | 1. tertiary & quaternary |
| 1. all levels of structure | 1. none of the levels of protein structure | |

1. Denaturation of a protein
2. is always irreversible

# Disrupts the secondary, tertiary or quaternary structure of a protein

# Changes the primary structure of the protein

# Hydrolyzes the peptide bond

1. can only occur in proteins with quaternary structure
2. The function of the enzyme-substrate complex is to provide an alternative reaction pathway that

|  |  |
| --- | --- |
| 1. lowers the energy of the products | 1. lowers the energy of the substrate |
| 1. changes the concentration of the substrate | 1. changes the possible product formed |
| 1. decreases the activation energy for the reaction |  |

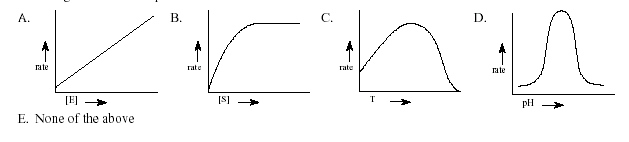
1. The amino acid, Val can be classified as:
2. neutral and polar
3. neutral and non-polar
4. acidic
5. basic
6. zwitterion
7. If a strand of DNA has the following base sequence that is used as a template for a segment of RNA, the RNA sequence (read 5’ to 3’) is:

5’ A T G C A 3’

|  |  |  |  |
| --- | --- | --- | --- |
| 1. UACGU | 1. UGCAU | 1. TACGT | 1. TGCAT |

1. Which of the following shows a saturation curve for an enzyme?

Assuming all factors except "x axis" are held constant.



1. If a segment of mRNA has the following sequence of bases, which tripeptide will form?

5’ A U G C A U G G C 3’

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| 1. Met-His-Gly | 1. . Gly-His-Met | 1. Arg-Tyr-Val | 1. Val-Tyr-Arg | 1. none |

1. Which nucleic acid contains the anticodon?

|  |  |  |  |
| --- | --- | --- | --- |
| 1. rRNA | 1. DNA | 1. tRNA | 1. mRNA |

1. Which of the following helps to serve as a site for protein synthesis?

|  |  |  |  |
| --- | --- | --- | --- |
| 1. DNA | 1. tRNA | 1. mRNA | 1. rRNA |

1. Which nucleic acid is formed during transcription?

|  |  |  |  |
| --- | --- | --- | --- |
| 1. tRNA | 1. mRNA | 1. rRNA | 1. DNA |

1. Which of the following represents the correct order in the flow of genetic information?

|  |  |
| --- | --- |
| 1. mRNA🡪tRNA🡪proteins | 1. rRNA🡪mRNA🡪proteins |
| 1. mRNA🡪DNA🡪proteins | 1. DNA🡪mRNA🡪proteins |

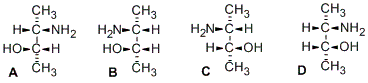
1. The molarity (M) of a solution refers to

|  |  |
| --- | --- |
| 1. Moles of solute/L of solution. | 1. Moles of solute/L of solvent. |
| 1. Moles of solute/100 mL of solution. | 1. Grams of solute/100 mL of solution. |
| 1. Grams of solute/L of solution. |  |

1. During the process of diluting a solution to a lower concentration,
   1. The amount of solvent does not change.
   2. There is more solute in the concentrated solution.
   3. The amount of solute does not change.
   4. The volume of the solution does not change.
   5. Water is removed from the concentrated solution.
2. The solubility of a gas in a liquid
   1. Decreases as the gas pressure above the liquid increases.
   2. Increases as the gas pressure above the liquid increases.
   3. Remains the same as the temperature increases.
   4. Depends on the liquid polarity.
   5. Depends on the liquid density.
3. In a solution, the solvent is generally:

|  |  |  |
| --- | --- | --- |
| 1. the substance in the greatest amount | 1. the substance that is dissolved | 1. always water |
| 1. always a gas | 1. none |  |

1. Which of the following pairs of stereoisomers are related as enantiomers?



|  |  |  |  |
| --- | --- | --- | --- |
| 1. A and B; C and D | 1. A and C; B and D | 1. A and D; B and C | 1. none of them |

1. Which of the following compounds exhibits hydrogen bonding?

|  |  |  |  |
| --- | --- | --- | --- |
| 1. CH3Cl | 1. NH3 | 1. H3C-O-CH3 | 1. HI |

1. Red blood cells are placed into pure water. Which of the following statements is true?
   1. The osmotic pressure inside the cells equals the osmotic pressure outside.
   2. Water molecules flow out of the red blood cells, causing them to collapse.
   3. Water flows into the red blood cells, causing them to swell and burst.
   4. None of the above
2. The decomposition of nitrosyl bromide is exothermic: 2 NOBr(*g*) ⮀ 2 NO(*g*) + Br2(*g*). Which of the following changes in reaction condition will shift the reaction to the left?

|  |  |  |  |
| --- | --- | --- | --- |
| 1. Remove NO (g) | 1. add more NOBr | 1. increase the temperature | 1. none of the above |

1. Which amine has the **lowest** boiling point?
2. Metabolism is which of the following?

|  |  |
| --- | --- |
| a. | all the processes which involve breaking down molecules into smaller fragments |
| b. | all the processes which involve the synthesis of molecules |
| c. | all the processes involved in both (a) and (b) above |
| d. | all the processes involved in both (a) and (b) plus additional processes |
| e. | None of the above |

1. The products of the following reaction are : A



1. Which of the following nucleotides is most likely to be found in RNA?



1. In AMP, ADP and ATP the adenine is linked to ribose through which carbon atom?

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| a. | C-1 | b. | C-2 | c. | C-3 | d. | C-5 |

1. Which of the following is true of the FAD/FADH2 system?

|  |  |
| --- | --- |
| a. | FAD is the oxidized form and FADH2 is the reduced form |
| b. | FAD is the reduced form and FADH2 is the oxidized form |
| c. | the conversion of FAD to FADH2 is an addition reaction |
| d. | the conversion of FAD to FADH2 is a condensation reaction |

1. The formation of citrate ion in step 1 of the citric acid cycle involves the reaction of acetyl CoA with which of the following?

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| a. | isocitrate | b. | oxaloacetate | c. | fumarate | d. | malate |

1. In the reaction in which succinate is converted to fumarate in the citric acid cycle, succinate undergoes a(n):

|  |  |  |
| --- | --- | --- |
| 1. isomerization | 1. hydration | 1. oxidation |
| 1. oxidative decarboxylation | 1. none of the above |  |

1. The production of 3-phosphoglycerate from 1,3-bisphosphoglycerate is an example of which of the following?

|  |  |  |  |
| --- | --- | --- | --- |
| a. | addition | c. | phosphorylation |
| b. | dephosphorylation | d. | Oxidation |

1. Which of the following compounds contain a hemiacetal functional group?



|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| a. | A and B | b. | B and C | c. | B only | d. | C only |

1. Cyclization of the following hydroxy aldehyde will form which hemiacetal?

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| a. |  | | c. |  |
| b. |  | | d. |  |
| 1. Examine the following structure.      1. If this substance was subjected to hydrolysis in the presence of NaOH, which of the following describes the products of this reaction? | | | | |
| 1. Three fatty acids and soap. 2. Sphingosine, phosphoric acid and two fatty acids. 3. Glycerol and three sodium carboxylate salts. 4. Glycerol, phosphate, choline and two sodium carboxylate salts. 5. No reaction. | | |

1. Competitive inhibition of enzyme activity can best be described as
2. A type of enzyme regulation that requires an inactive form of an enzyme.
3. A multi-step biochemical process in which the rate of an early step is affected by the concentration of products of a later step.
4. A process that occurs when a molecule similar to the correct substrate interacts with the active site of an enzyme.
5. A process that occurs when a molecule other that the correct substrate interacts with some part of the enzyme to alter the shape of the active site.
6. An alteration of the tertiary structure via covalent modification of the enzyme.
7. The theory that proposes a somewhat flexible enzyme conformation is the
8. Lock and key theory b) Induced fit theory c) Physically fit theory

d) Expanding fit theory e) None of the above

1. 25.0 ml of a 3.5 M solution of sulfuric acid is diluted to 100 ml. The concentration of the resultant solution is

|  |  |  |
| --- | --- | --- |
| * 1. 0.88 M | * 1. 1.4 M | * 1. 14 M |
| * 1. 0.66 M | * 1. None |  |

1. How do competitive and noncompetitive enzyme inhibitors differ?
   1. Competitive inhibitors bind to the active site, whereas noncompetitive inhibitors change the shape of the active site.
   2. Competitive inhibitors have a higher energy of activation than noncompetitive inhibitors have.
   3. They function at different pH values.
   4. Noncompetitive enzyme inhibitors contain magnesium, whereas competitive inhibitors contain iron.
   5. Noncompetitive enzyme inhibitors are reversible, whereas competitive inhibitors are irreversible.
2. If a covalent bond forms between an enzyme and an inhibitor the reaction catalyzed by this enzyme will have undergone \_\_\_\_\_\_\_\_.

|  |  |  |
| --- | --- | --- |
| 1. genetic control | 1. noncompetitive inhibition | 1. competitive inhibition |
| 1. irreversible inhibition | 1. feedback control |  |

1. What kind of inhibition caused by denaturing of the enzyme

|  |  |  |
| --- | --- | --- |
| 1. genetic control | 1. noncompetitive inhibition | 1. competitive inhibition |
| 1. irreversible inhibition | 1. none of the above |  |

1. Which is found in body fat?

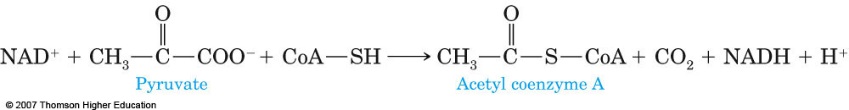
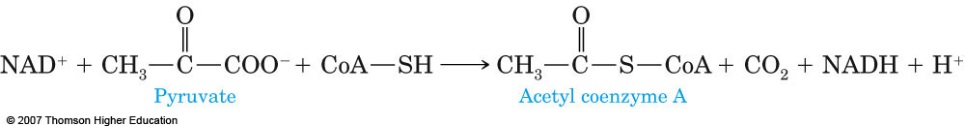
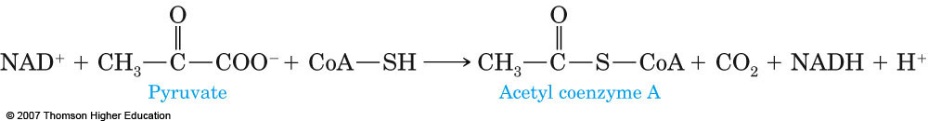


1. In transitioning from the glycolytic pathway to the Citric Acid Cycle, acetyl-CoA serves what purpose?
2. It acetylates glucose
3. It reduces NADH
4. It carries electrons to the respiratory chain
5. It delivers a “two carbon chunk” for processing in the cycle
6. It does nothing. Why do we need to know about it anyway?
7. ATP is often hydrolyzed in order to drive unfavorable reactions. Another important and very common role for ATP that does not involve hydrolysis is:

|  |  |
| --- | --- |
| 1. Reduction of carboxylic acids | 1. Phosphorylation of alcohols |
| 1. Oxidation of alcohols | 1. Oxidation of primary amines |
| 1. Cyclization of sugars |  |

1. In respiration, a H+ gradient across the mitochondrial membrane is used to drive the following unfavorable reaction:

|  |  |
| --- | --- |
| 1. NAD+ 🡪 NADH + H+ | 1. NADH + H+ 🡪 NAD+ |
| 1. ADP + Pi 🡪ATP | 1. ATP 🡪 ADP + Pi |
| 1. oxidation of fatty acids |  |

1. The end product of glycolysis, pyruvate cannot enter as such into the citric acid cycle. What is the name of the process that converts this C3 compound to a C2 compound (Acetyl coA)?
2. oxidation
3. hydrogenation
4. oxidative carboxylation
5. oxidative decarboxylation
6. oxidative deamination
7. What occurs in step 6 of glycolysis?
8. NADH gets oxidized to NAD and glyceraldehyde gets reduced
9. Glyceraldehyde gets oxidized and phosphorylated
10. Glyceraldehyde isomerizes from an aldehyde to a carboxylate
11. NAD gets phosphorylated to NAD+
12. Glyceraldehyde expels inorganic phosphate (P*i*)
13. The acetyl CoA formed in the bridging reaction requires \_\_\_\_ to form citrate.

|  |  |
| --- | --- |
| 1. succinyl CoA | 1. fumarate |
| 1. malate | 1. oxaloacetate |

1. The enzyme phosphofructokinase has the primary role in regulation of glycolysis. What is the most likely allosteric inhibitor of this enzyme?

|  |  |  |
| --- | --- | --- |
| 1. ADP | 1. glucose | 1. glucose-6-phosphate |
| 1. fructose-6-phosphate | 1. ATP |  |