

Biochemistry I Lab Quiz 5

Name: _____

1. Alkaline phosphatase is a cellular protein that acts as a _____.
 - a. Catalyst
 - b. Lipid
 - c. Acid
 - d. Base

2. Alkaline phosphatase, as with many enzymes, is an indicator of disease only if it is found in the _____.
 - a. Pancreas
 - b. Liver
 - c. Heart
 - d. Blood serum

3. The solution described in the ALP experiment as an "alkaline buffer" is added to _____.
 - a. Catalyze the reaction.
 - b. Establish a pH of about 10.
 - c. Maintain a neutral pH.
 - d. Establish a pH of about 3.

4. Name the parameters used as the x-axis and y-axis for the graph you made using your experimental data.
 - a. Time – pH
 - b. Absorbance – pH
 - c. Absorbance – Time
 - d. Volume – Time

5. Which of the following is a cofactor for the hydrolysis of para-nitrophenylphosphate?
 - a. Cu^{2+}
 - b. Na^+
 - c. Mg^{2+}
 - d. Fe^{2+}

April 5, 2004

NAME _____

- In the 'Kinetic Enzyme Assay' experiment, the enzyme alkaline phosphatase is used to catalyze the _____.
 - hydrolysis of PP_i
 - oxidation of pNP
 - reduction of pNP
 - hydrolysis of pNPP
 - oxidation of pNPP
- Name the species, from this experiment, that is yellow.
 - P_i
 - pNP
 - Mg^{2+}
 - PP_i
 - the pH 10.3 buffer
- The graphs you prepared for this experiment showed absorbance on the 'y' axis and _____ on the 'x' axis.
 - [pNP]
 - [ALP]
 - time
 - pH
 - [pNPP]
- In the vitamin C experiment, the ascorbate was treated as though it was a(n) _____.
 - oxidizing agent
 - acid
 - reducing agent
 - simple sugar
 - base
- If a 25 ml urine sample assays to 1.3 mg of vitamin C, how many mg of vitamin C would this individual be expected to lose, as a urinary component, during the course of the day (24 hours)?
 - 19.2 mg
 - 52 mg
 - 32.5 mg
 - 25 mg
 - 840 mg

NAME _____

1. What pH range is maintained by the buffer system used in the test solutions for the ALP experiment?

- A) 4-6
- B) 3-5
- C) 11-13
- D) 2-4
- E) 8-10

2. Which of the following is the cofactor for the ALP catalyzed hydrolysis of para-nitrophenylphosphate? (REMEMBER: A cofactor is required for an enzyme catalyzed reaction but the cofactor itself is not a polypeptide)

- A) Na⁺
- B) Fe³⁺
- C) Mg²⁺
- D) Cu²⁺
- E) K⁺

3. Using the display at the bottom of the page, complete the reaction shown below.



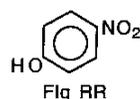
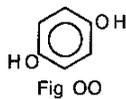
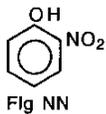
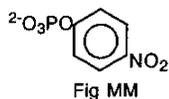
- A) Fig. XX B) Fig. RR C) Fig. NN D) Fig. OO E) Fig. MM

4. When one uses a Spectronic-20, one is measuring the absorbance of light by a particular species and the concentration of that species is proportional to the amount of light absorbed. What is the chemical which is absorbing light in the Spectronic-20 in this experiment?

- A) pNP
- B) P_i
- C) ALP
- D) pNPP
- E) the buffer used in the test solutions

5. Name the parameters which are used as the 'x-axis' and the 'y-axis' for the graph you made using your experimental data.

- A) absorbance - time
- B) time - pH
- C) absorbance - pH
- D) absorbance - [pNPP]
- E) pH - time



April 5, 2005

NAME _____

1. What is the normal pH range for the alkaline phosphatase catalyzed hydrolysis of p-nitrophenylphosphate (pNPP)?

- A) 8-11
- B) 10-13
- C) 4-6
- D) 1-3
- E) 5-7

2. Which of the following agents is yellow in color and is detected by the spectrophotometer?

- A) p-nitrophenylphosphate
- B) Mg^{2+}
- C) p-nitrophenol
- D) HPO_4^{2-}
- E) PP_i

3. The appearance of alkaline phosphatase in the _____ allows the enzyme to used as a 'marker'.

- A) blood
- B) pancreas
- C) prostate
- D) liver
- E) heart

4. Estimate the slope of the line produced when the data shown in the table at the right is displayed on a graph. (NOTE: Absorbance (A) is on the 'Y' axis and time (t) is on the 'x' axis)

A	t (min)
0.100	2
0.199	4
0.296	6
0.402	8
0.498	10

- A) 0.05
- B) 0.2
- C) 0.0025
- D) 10
- E) 20

5. The vitamin C analysis uses 2,6 dichloroindophenol as a(n) _____.

- A) ester
- B) oxidizing agent
- C) activator
- D) enzyme
- E) reducing agent

B I O C H E M I S T R Y I L A B Q U I Z

August 8, 2005

QUIZ #5

NAME _____

1. The reaction: $\text{pNPP} + \text{H}_2\text{O} \rightarrow \text{pNP} + \text{P}_i$; which is catalyzed by alkaline phosphatase, will have its maximum rate at a pH of about _____.

A) 3
B) 13
C) 5
D) 9
E) 1

2. What is the color of light having a wavelength of 405 nm? NOTE: This is the wavelength setting for the ALP assay you performed in the lab.

A) yellow
B) red
C) blue
D) green
E) orange

3. Estimate the slope of the line produced when the data shown at the right is plotted with 'abs' on the 'y' axis, and 't' on the 'x' axis.

Abs	t (min)
0.68	17
0.50	12
0.32	7
0.14	2

A) 0.36
B) 2.78
C) 0.18
D) 5
E) Impossible to determine

4. The name of the titrant in the vitamin C assay is _____.

A) 3 M HCl
B) 3 M NaOH
C) meta phosphoric acid
D) ascorbic acid
E) 2,6 dichloroindophenol

5. Excess vitamin C is excreted as a urinary component because it is _____.

A) a base
B) easily reduced
C) an reducing agent
D) an acid
E) water soluble

B I O C H E M I S T R Y L A B Q U I Z
August 8, 2006

QUIZ #5

632

NAME _____

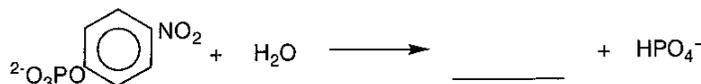
1. Which of the following types of cells are normally associated with alkaline phosphatase?

- A) red blood cells
- B) liver
- C) skeletal muscle
- D) heart
- E) pancreas

2. The reaction being monitored in this experiment is best performed at a pH of _____.

- A) 2-5
- B) 8-11
- C) 12-14
- D) 1-3
- E) 7

3. Select the substance from the display at the bottom of the page that completes the hydrolysis reaction shown below.



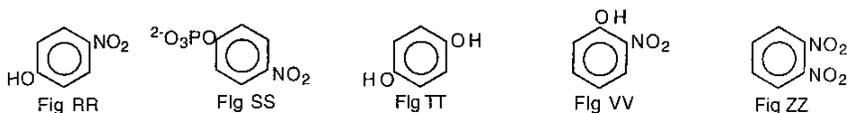
- A) Fig VV
- B) Fig RR
- C) Fig ZZ
- D) Fig SS
- E) Fig TT

4. In the vitamin C assay procedure, ascorbic acid functions as a(n) _____.

- A) indophenol
- B) reducing agent
- C) acid
- D) oxidizing agent
- E) base

5. If a person is assumed to void one liter of urine per day, and a 25 ml aliquot of urine shows 3.5 mg of ascorbic acid, then the individual is assumed to lose _____ mg ascorbic acid in a 24 hour period.

- A) 286 mg
- B) 84 mg
- C) 3500 mg
- D) 140 mg
- E) 87.5 mg



1. Alkaline phosphatase is a cellular protein that acts as a _____.
 - a. Catalyst
 - b. Lipid
 - c. Acid
 - d. Base

2. Alkaline phosphatase, as with many enzymes, is an indicator of disease only if it is found in the _____.
 - a. Pancreas
 - b. Liver
 - c. Heart
 - d. Blood serum

3. The solution described in the ALP experiment as an "alkaline buffer" is added to _____.
 - a. Catalyze the reaction.
 - b. Establish a pH of about 10.
 - c. Maintain a neutral pH.
 - d. Establish a pH of about 3.

4. Name the parameters used as the x-axis and y-axis for the graph you made using your experimental data.
 - a. Time - pH
 - b. Absorbance - pH
 - c. Absorbance - Time
 - d. Volume - Time

5. Which of the following is a cofactor for the hydrolysis of para-nitrophenylphosphate?
 - a. Cu^{2+}
 - b. Na^+
 - c. Mg^{2+}
 - d. Fe^{2+}

B I O C H E M I S T R Y L A B Q U I Z
August 8, 2006

QUIZ #5

632

NAME _____

1. Which of the following types of cells are normally associated with alkaline phosphatase?

- A) red blood cells
- B) liver
- C) skeletal muscle
- D) heart
- E) pancreas

2. The reaction being monitored in this experiment is best performed at a pH of _____.

- A) 2-5
- B) 8-11
- C) 12-14
- D) 1-3
- E) 7

3. Select the substance from the display at the bottom of the page that completes the hydrolysis reaction shown below.



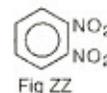
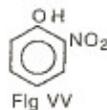
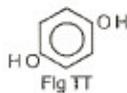
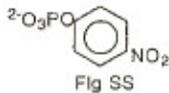
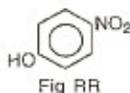
- A) Fig VV
- B) Fig RR
- C) Fig ZZ
- D) Fig SS
- E) Fig TT

4. In the vitamin C assay procedure, ascorbic acid functions as a(n) _____.

- A) indophenol
- B) reducing agent
- C) acid
- D) oxidizing agent
- E) base

5. If a person is assumed to void one liter of urine per day, and a 25 ml aliquot of urine shows 3.5 mg of ascorbic acid, then the individual is assumed to lose _____ mg ascorbic acid in a 24 hour period.

- A) 286 mg
- B) 84 mg
- C) 3500 mg
- D) 140 mg
- E) 87.5 mg



B I O C H E M I S T R Y I L A B Q U I Z

August 8, 2005

QUIZ #5

NAME _____

1. The reaction: $\text{pNPP} + \text{H}_2\text{O} \rightarrow \text{pNP} + \text{P}_i$; which is catalyzed by alkaline phosphatase, will have its maximum rate at a pH of about _____.

- A) 3
- B) 13
- C) 5
- D) 9
- E) 1

2. What is the color of light having a wavelength of 405 nm? NOTE: This is the wavelength setting for the ALP assay you performed in the lab.

- A) yellow
- B) red
- C) blue
- D) green
- E) orange

3. Estimate the slope of the line produced when the data shown at the right is plotted with 'abs' on the 'y' axis, and 't' on the 'x' axis.

Abs	t (min)
0.68	17
0.50	12
0.32	7
0.14	2

- A) 0.36
- B) 2.78
- C) 0.18
- D) 5
- E) Impossible to determine

Answer is actually 0.036

4. The name of the titrant in the vitamin C assay is _____.

- A) 3 M HCl
- B) 3 M NaOH
- C) meta phosphoric acid
- D) ascorbic acid
- E) 2,6 dichloroindophenol

5. Excess vitamin C is excreted as a urinary component because it is _____.

- A) a base
- B) easily reduced
- C) an reducing agent
- D) an acid
- E) water soluble

NAME _____

1. What pH range is maintained by the buffer system used in the test solutions for the ALP experiment?

A) 4-6
B) 3-5
C) 11-13
D) 2-4
E) 8-10

2. Which of the following is the cofactor for the ALP catalyzed hydrolysis of para-nitrophenylphosphate? (REMEMBER: A cofactor is required for an enzyme catalyzed reaction but the cofactor itself is not a polypeptide)

A) Na^+
B) Fe^{3+}
C) Mg^{2+}
D) Cu^{2+}
E) K^+

3. Using the display at the bottom of the page, complete the reaction shown below.



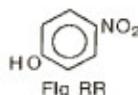
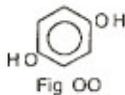
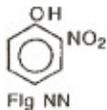
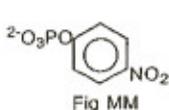
A) Fig. XX B) Fig. RR C) Fig. NN D) Fig. OO E) Fig. MM

4. When one uses a Spectronic-20, one is measuring the absorbance of light by a particular species and the concentration of that species is proportional to the amount of light absorbed. What is the chemical which is absorbing light in the Spectronic-20 in this experiment?

A) pNP
B) P_i
C) ALP
D) pNPP
E) the buffer used in the test solutions

5. Name the parameters which are used as the 'x-axis' and the 'y-axis' for the graph you made using your experimental data.

A) absorbance - time
B) time - pH
C) absorbance - pH
D) absorbance - [pNPP]
E) pH - time



April 5, 2005

NAME _____

1. What is the normal pH range for the alkaline phosphatase catalyzed hydrolysis of p-nitrophenylphosphate (pNPP)?

- A) 8-11
- B) 10-13
- C) 4-6
- D) 1-3
- E) 5-7

2. Which of the following agents is yellow in color and is detected by the spectrophotometer?

- A) p-nitrophenylphosphate
- B) Mg^{2+}
- C) p-nitrophenol
- D) HPO_4^{2-}
- E) PP_i

3. The appearance of alkaline phosphatase in the _____ allows the enzyme to used as a 'marker'.

- A) blood
- B) pancreas
- C) prostate
- D) liver
- E) heart

4. Estimate the slope of the line produced when the data shown in the table at the right is displayed on a graph. (NOTE: Absorbance (A) is on the 'Y' axis and time (t) is on the 'x' axis)

A	t (min)
0.100	2
0.199	4
0.296	6
0.402	8
0.498	10

- A) 0.05
- B) 0.2
- C) 0.0025
- D) 10
- E) 20

5. The vitamin C analysis uses 2,6 dichloroindophenol as a(n) _____.

- A) ester
- B) oxidizing agent
- C) activator
- D) enzyme
- E) reducing agent

B I O C H E M I L A B Q U I Z

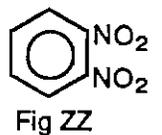
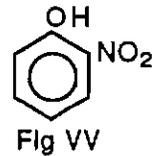
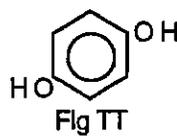
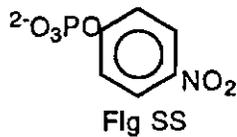
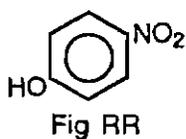
October 14, 2003

Key

- Alkaline phosphatase is an indicator of a disease only if it is found in one's _____.
 - prostate
 - pancreas
 - blood plasma
 - liver
 - heart
- With the understanding that ultraviolet light has wavelengths < 380 nm, and infrared light has wavelengths > 750 nm, the spectrometer setting of 405 nm is designed to detect visible light which would have the color _____.
 - blue or violet
 - red or green
 - red or orange
 - orange or yellow
 - green or yellow
- The buffer system required for this experiment sets the pH for the reaction at a value of _____.
 - 7.4
 - 3.5
 - 10.3
 - < 3
 - > 12
- Indicate the substance used as a cofactor (activator) for the reaction system studied in this experiment?
 - p-nitrophenol
 - alkaline phosphatase
 - HPO_4^-
 - p-nitrophenylphosphate
 - Mg^{2+}
- Which of the figures from below will complete the reaction:



- Fig SS
- Fig ZZ
- Fig RR
- Fig VV
- Fig TT



1. In the 'Kinetic Enzyme Assay' experiment, the enzyme alkaline phosphatase is used to catalyze the _____.
 - A) hydrolysis of PP_i
 - B) oxidation of pNP
 - C) reduction of pNP
 - D) hydrolysis of pNPP
 - E) oxidation of pNPP
2. Name the species, from this experiment, that is yellow.
 - A) P_i
 - B) pNP
 - C) Mg^{2+}
 - D) PP_i
 - E) the pH 10.3 buffer
3. The graphs you prepared for this experiment showed absorbance on the 'y' axis and _____ on the 'x' axis.
 - A) [pNP]
 - B) [ALP]
 - C) time
 - D) pH
 - E) [pNPP]
4. In the vitamin C experiment, the ascorbate was treated as though it was a(n) _____.
 - A) oxidizing agent
 - B) acid
 - C) reducing agent
 - D) simple sugar
 - E) base
5. If a 25 ml urine sample assays to 1.3 mg of vitamin C, how many mg of vitamin C would this individual be expected to lose, as a urinary component, during the course of the day (24 hours)?
 - A) 19.2 mg
 - B) 52 mg
 - C) 32.5 mg
 - D) 25 mg
 - E) 840 mg

NAME Kay

- The reaction catalyzed by alkaline phosphatase in the experiment on kinetic enzyme assays is _____. (NOTE: 'pNPP' = para-nitrophenylphosphate; pNP = para-nitrophenol; 'ALP' = alkaline phosphatase)

A) $ATP + H_2O \rightarrow ADP + P_i$ B) $pNPP + ATP \rightarrow ADP + pNPPP$
 C) $ALP + pNP \rightarrow pNPP + P_i$ D) $Mg^{2+} + H_2O \rightarrow pNP + MgO$ **(E)** $pNPP + H_2O \rightarrow pNP + P_i$
- With the understanding that light having $\lambda > 750 \text{ nm}$ is classified as infrared and light having $\lambda < 380 \text{ nm}$ is classified as ultraviolet, suggest the color of the light used in this experiment which has a $\lambda = 405 \text{ nm}$.

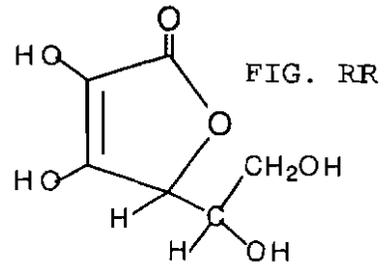
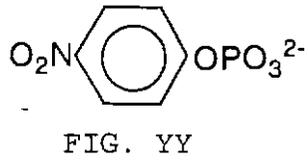
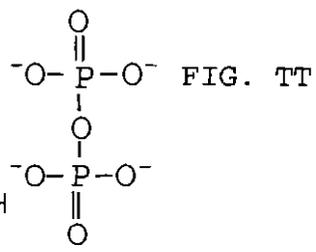
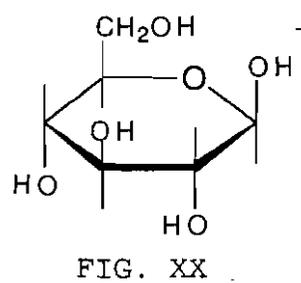
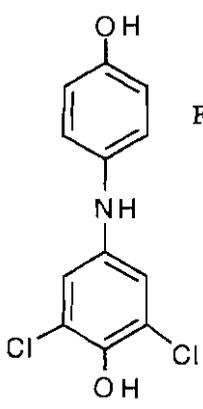
(A) blue B) brown C) yellow D) orange E) red
- The solution described in the ALP experiment as an 'alkaline buffer' is added to _____.

A) catalyze the process of hydrolysis B) stabilize the Mg^{2+} ion
 C) keep the pH as close to neutral as possible **(D)** establish a pH of about 10
 E) establish a pH of about 3
- Which of the following sets of parameters is used to label the axes for the graph you need to draw for the ALP experiment?

(A) time -- absorbance B) absorbance -- pH C) pH -- time D) absorbance -- [pNP]
 E) time -- pH
- Which of the structures, from the display at the bottom of the page, is identified as ascorbic acid? (Q5-Q6)

A) Fig. SS B) Fig. YY **(C)** Fig. RR D) Fig. TT E) Fig. XX
- Estimate the AA titer of a DCP solution if 35.4 ml of the DCP solution is required to titrate a 5 ml portion of a solution taken from a flask having an ascorbic acid concentration of 500 mg AA/500 ml solution. (NOTE: 'AA' = ascorbic acid; 'DCP' = 2,6 dichlorindophenol)

A) 0.0708 mg AA/ml DCP B) 0.354 mg AA/ml DCP **(C)** 0.14 mg AA/ml DCP
 D) 0.177 mg AA/ml DCP E) 7.08 mg AA/ml DCP



Quiz #5

1. Using the display at the bottom of the page, identify the SUBSTRATE for the reaction.

- A) ZZ
- B) YY
- C) SS
- D) TT
- E) RR

2. From the display at the bottom of the page, identify the reagent for which the change in concentration is followed by the spectrophotometer.

- A) YY
- B) ZZ
- C) RR
- D) TT
- E) SS

3. Using the data table at the right, estimate the slope of the line that results when 't(min)' is plotted on the x-axis and 'Abs' is plotted on the y-axis.

Abs	t (min)
0.68	17
0.50	12
0.32	7
0.14	2

- A) 0.036
- B) 15
- C) 0.018
- D) 27.8
- E) 6

4. During the assay for vitamin C, the titrant, DCP, is a(n) _____.

- A) oxidizing agent
- B) acid
- C) reducing agent
- D) enzyme
- E) base

5. Calculate the ascorbic acid titer for a DCP solution if a 5 ml aliquot of an ascorbic acid solution having a concentration of 2 mg ascorbic acid/ml requires 28.7 ml of the DCP solution to reach an equivalence point. (NOTE: Titer units are 'mg Ascorbic acid/ml of DCP')

- A) 2.87
- B) 5.74
- C) 0.348
- D) 143
- E) 0.174

