

**Bonus:** What is the concentration of LOL in assay #3? (2)

8. You prepare the assay conditions listed and set the spectrophotometer to MKO's absorption maximum. Readings are taken every 30sec for 4 min.

a) Predict the outcome of the experiment. HAND-DRAW a well labeled figure that represents the predicted effect on enzymatic activity that would be seen in data from the assays above. (4pt)

b) Explain the reasoning behind the figure that you proposed in 8a. (4pt)

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9. While downloading/opening this review and working through the first eight questions it is likely that you experienced some sort of stress response with symptoms like pounding heart, sweaty palms, and 'butterflies'. Your whole body is experiencing the same stress, explain why different cells in your body respond to it differently. (5pt)

10. List four of the 2<sup>nd</sup> messengers that we have discussed in class. Discuss two similarities shared by all four and explain why those characteristics are critical to their cellular roles as 2<sup>nd</sup> messengers. (6pt)

**Bonus:** What is the final (5<sup>th</sup>) 2<sup>nd</sup> messenger that we discussed in class. Describe the role it plays one of our examples of cellular communication. (2pt)

11. Consider the action potential in a nerve and the action potential in skeletal muscle.

a) What is an action potential? (3pt)

b) What advantages in cellular communication are gained by using an action potential? (provide at least two) (5pt)

c) Why does a nerve action potential result in secretion while a skeletal muscle action potential results in contraction? (Do not list all the steps in secretion or contraction. Discuss how an action potential can 'connect' to two such different events.) (4pt)

12. Consider synaptic vesicle exocytosis and cortical granule fusion.

a) Provide at least two similarities and two differences between the events listed. (4pt)

b) Why does a synaptic vesicle exocytose rather than fusing with the ER? (4pt)

13. Focus on stress induced events in the liver and in the heart muscle.

a) Cellular events induced by stress are reversible. Discuss two reasons why this reversibility is important. (4pt)

b) Providing **one** example from each cell type, explain how the cell returns to a 'pre-stress' condition. (not *all* examples from each cell type—pick one from each) (6pt)

14. Why do cells need both active and passive transport? Use examples from the process of fertilization to support your answer. (5pt)

The chemical names in bold here are hypothetical. Refer to this information in questions 5-8.

You are interested in studying a particular enzyme named **LOL**. **LOL** converts **MKO** into **MKOP** via phosphorylation. You have 10ml of each of the following stocks 4.5U/ml **LOL**; 0.3mM **MKO**; 2M **MKOP**; 1.5M Tris buffer; and 100ml of distilled H<sub>2</sub>O, a spectrophotometer, and all laboratory equipment needed for using the spectrophotometer and for weighing, measuring.

+++You want to determine the effect of increasing **LOL** concentration on the rate of the reaction. +++You determine the absorption maximum of **MKO**.

5. Enzymes causing phosphorylation/ dephosphorylation events play a big regulatory role in the cell.

a) What is a polymer vs a monomer? In your answer provide an example of a *type* of polymer that can be phosphorylated. and two specific monomers that can be phosphorylated. (Note that *type* means category not a specific individual and specific means—‘name its name’) (7pt)

**Bonus:** Draw the chemical structure of one of the two monomers you named in #5. (1pt)

b) What are enzymes? In your answer provide two examples of enzymes that phosphorylate. Each example must come from a different cell type mentioned in class (mention the cell type). (6pt)

c) Phosphorylation is an example of what type of regulation? In the case of phosphorylation why does the regulation occur?(3pt)

d) Provide the name of a substrate for each of the examples that you provided in 5.b. State what happens in the cell as a result of those phosphorylation events. (5pt)

6. What is an absorption maximum and how would knowing the absorption maximum of **MKO** help you achieve your objective of learning more about **LOL** catalyzed reaction rates? (5pt)

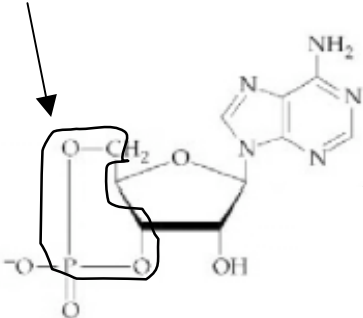
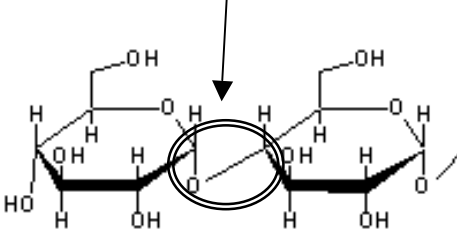
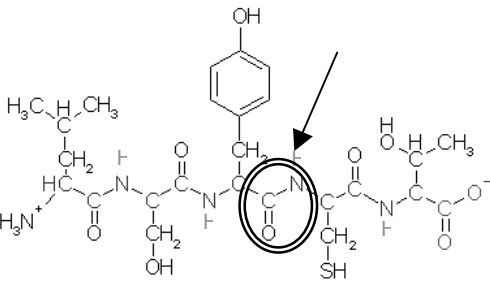
To proceed with the experiment you make up the series of assay conditions

1	0µl <b>LOL</b>	10µl <b>MKO</b>	0µl <b>MKOP</b>	190µl 0.4mM Tris buffer
2	2.5 µl <b>LOL</b>	10µl <b>MKO</b>	0µl <b>MKOP</b>	187.5µl 0.4mM Tris buffer
3	5µl <b>LOL</b>	10µl <b>MKO</b>	0µl <b>MKOP</b>	185µl 0.4mM Tris buffer
4	10µl <b>LOL</b>	10µl <b>MKO</b>	0µl <b>MKOP</b>	180µl 0.4mM Tris buffer
5	0µl <b>LOL</b>	0µl <b>MKO</b>	10µl <b>MKOP</b>	190µl 0.4mM Tris buffer
6	2.5µl <b>LOL</b>	0µl <b>MKO</b>	10µl <b>MKOP</b>	187.5µl 0.4mM Tris buffer
7	5µl <b>LOL</b>	0µl <b>MKO</b>	10µl <b>MKOP</b>	185µl 0.4mM Tris buffer
8	10µl <b>LOL</b>	0µl <b>MKO</b>	10µl <b>MKOP</b>	180µl 0.4mM Tris buffer

7. Explain how you would prepare the Tris buffer needed in the assays listed above. (5pt)

1. In this unit we have discussed 4 major types of biological macromolecules. Examine the structures below and fill in the table. Your answer sheet can have a list resembling

' 1A \_\_\_\_\_ , \_\_\_\_\_ , \_\_\_\_\_ ' 6pt total

	Type of biological macromolecule	Name of circled bond
<p>A</p> 		
<p>B</p> 		
<p>C</p> 		

2. Consider the category of macromolecule defined by diagram 1A. Provide two cellular locations where that category of macromolecular would be found and explain your reasoning. (ex. \_\_\_ would be found in the \_\_\_ because they form/ take part in/ are needed for \_\_\_\_.) (4pt)

3. Would the compound diagrammed in 1B be found in human cells? (briefly explain your reasoning) (3pt)

4. What is type of chemical reaction used to form the bond circled in 1C? (2pt)

This review must **be signed in at the Biology Office before 4:30pm Wednesday February 8th**. Refer to the syllabus for information about course policies regarding tests and other written assignments.

- There is no time limit for taking the review except for the final due time. It was designed to be completed in 2 hours and I suggest you use that as a guideline but do not wait until the last minute to begin and leave time to print and deliver.
- This is a closed-book, closed-note review. Once you have seen any question your review period has begun.
- This page must be the first page of your answer packet. Fill out this page and attach it to the ones containing your answers. The top of each additional page in the packet should contain only your initials and the page number.
- All answers must be typed and in complete sentences unless otherwise indicated. Any accompanying *graphs or figures may be hand-drawn*.
- You may use a calculator for +, -, \*, and / only. To receive full credit all calculations must be included. Calculations/equations may be hand written and do not need to be sentence form. The answer to the question requiring the calculation should be in sentence form.
- Be sure to completely answer the question asked. Brevity is encouraged.
- There are 14 questions worth 100pt and 3 bonus questions worth 5 pt.

I will be in D.C. from noon Sunday until Wednesday evening. I cannot guarantee that I will have email access on Monday or Tuesday. If I do it will be in the late evening. If you have any questions send them before 8pm and I will try to get to them. I will not have email access on Wednesday.

Name: \_\_\_\_\_

(PRINT)

Signature: \_\_\_\_\_

Write out the honor code (found here:

<http://www.davidson.edu/administrative/admission/whydav/honor.html>)

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This review was completed in \_\_\_\_\_ hours