

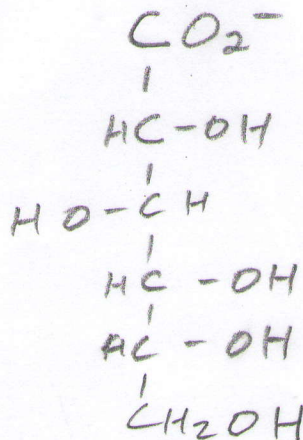
BIOSC 1820
Metabolic Pathways and Regulation
Spring, 2009
Prof. Jeffrey L. Brodsky
Quiz #1
January 27, 2010

NAME: _____

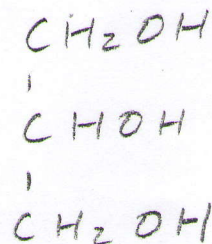
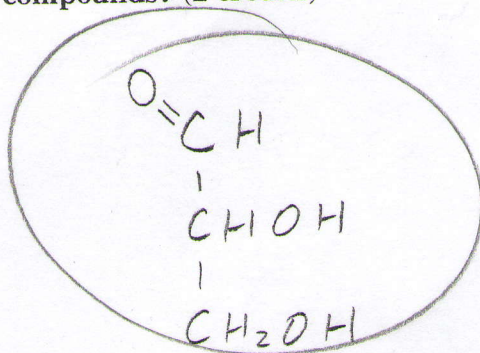
KEY

1. Tap water contains a decent concentration of heavy metals (which in part gives it "taste"). You are asked in lab to make a 1 M solution of glucose, and instead of using distilled water you use tap water. About a week later, through the use of a glucose oxidase test, it is discovered that your solution contains a lower glucose concentration than the anticipated 1 M value. What happened? Draw the structure of the molecule that has formed from glucose in the open chain form.

Glucose has
been oxidized
by the metals.



2. Circle the more oxidized species among the following pair. What are the names of these compounds? (2 credits)



glyceraldehyde

glycerol

3. Which of the following statements is FALSE? (circle one answer)

- A. Hexokinase's K_M for glucose is lower than Glucokinase's K_M for glucose
- B. The K_M for Glucokinase is about the same as the concentration of blood glucose
- C. Skeletal muscle can break down glycogen to glucose and efficiently delivers glucose into the blood**
- D. Hexokinase and Glucokinase are negatively regulated by substrate inhibition
- E. Hexokinase and Glucokinase undergo an induced fit conformational change
- F. None of the above—each of the statements above is true

Hexokinase would not "allow" G-6-P from making a stable population of glucose.

(The glucose is rapidly turned into G-6-P and would not leave the cell).

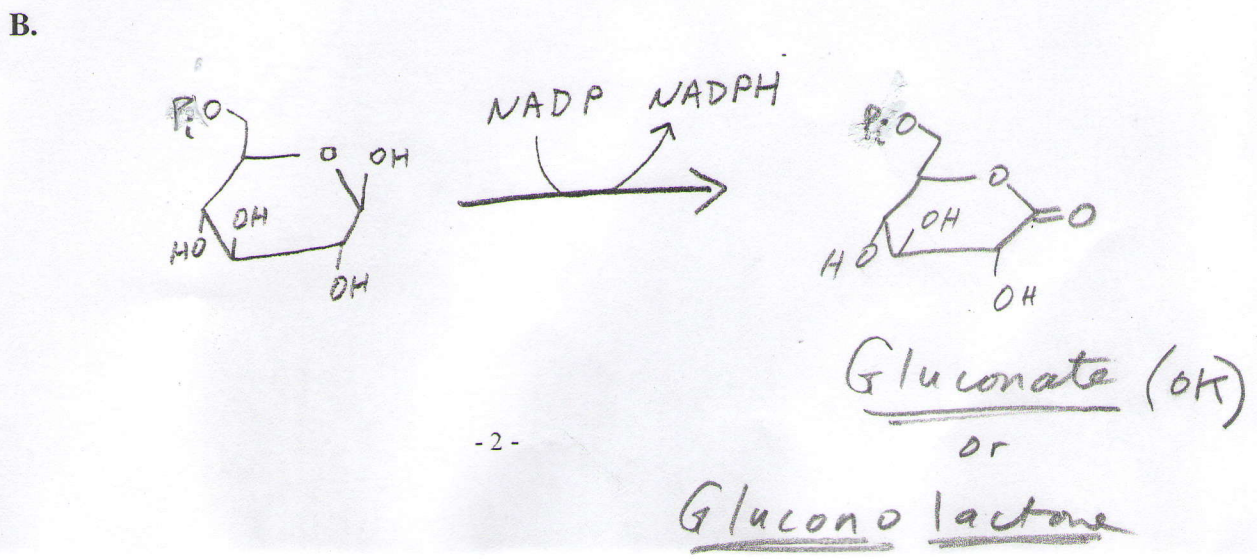
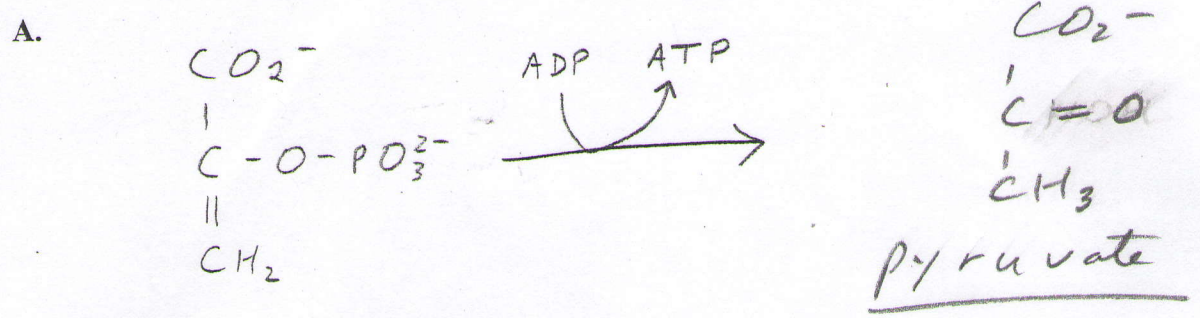
4. What is the name of the enzyme that converts pyruvate into oxaloacetate concomitant with the hydrolysis of ATP?

pyruvate carboxylase

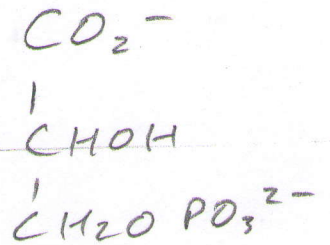
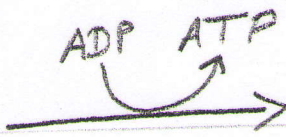
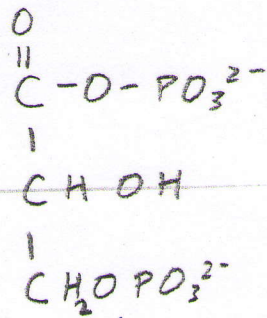
5. During the anaerobic conversion of pyruvate into lactic acid, which enzyme in the glycolytic pathway generates the required NADHs?

glyceraldehyde-3-phosphate dehydrogenase

6. Draw the structures AND give the names of the products of the following reactions:

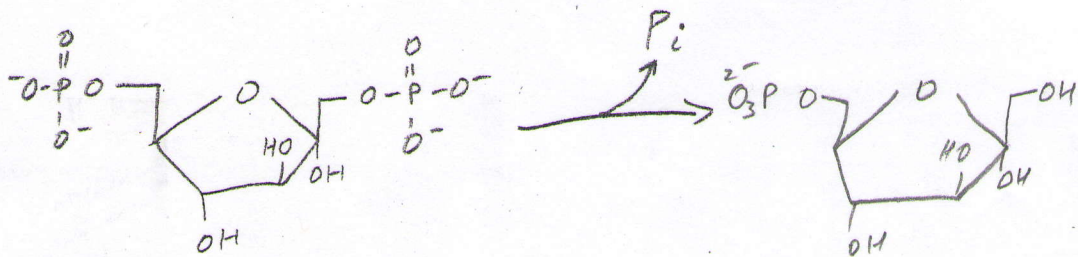


C.



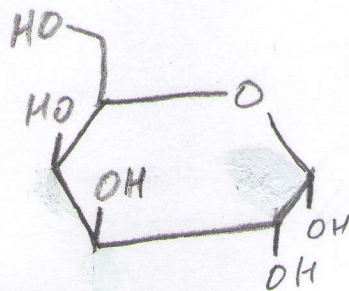
3-phospho-glycerate

D.



Fructose-6-phosphate

7. Draw the structure of D-β-galactose (in the pyranose form):

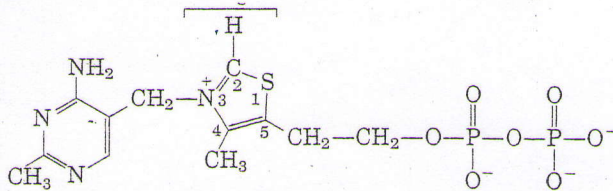


8. What is the name of the short peptide that is required to detoxify hydrogen peroxide and reacts with NADPH?

glutathione

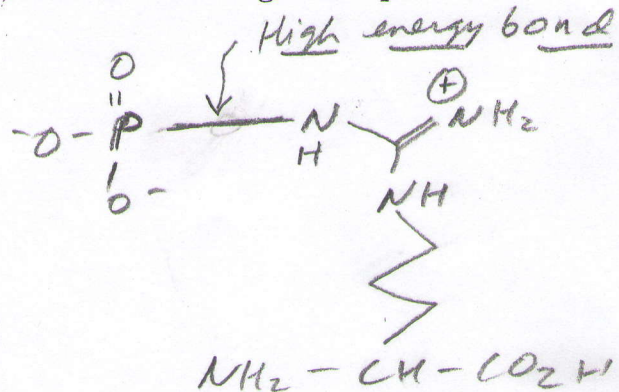
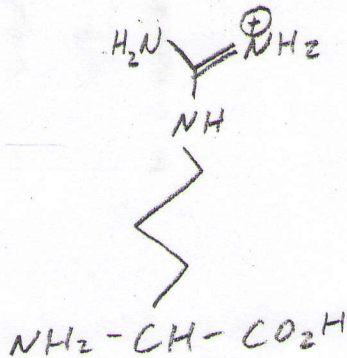
9. The following cofactor/vitamin is needed for the reaction catalyzed by which enzyme that we have discussed?

pyruvate de carboxylase



(TPP)

10. In some organisms (e.g., select worm species), muscle contains phosphorylated arginine instead of phosphorylated creatine to help maintain ATP concentrations at consistent levels. Based on the structure of phosphorylated creatine, draw the structure of phospho-arginine (to help you, the structure of arginine is provided):



11. Recitation: What is the name of the substrate that was employed to measure the activity of the glucose transporter in cells? Why was the use of this substrate necessary?

3-O-methyl glucose

It is not metabolized in cells
(or broken down).

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