

Name: _____

Student ID: _____

CHEM 161 PAL Fall 2026

Worksheet #19: Glycolysis

1. Write a balanced chemical equation for each reaction in the preparatory phase of glycolysis and include its standard free-energy change (ΔG°). Draw the complete chemical structure of every reactant and product and highlight the atoms or functional groups transformed in each reaction. Finally, identify the enzyme class responsible for catalyzing each reaction.

2. Write the net equation for the preparatory phase of glycolysis and calculate the standard free energy change.

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3. Write a balanced chemical equation for each reaction in the payoff phase of glycolysis and include its standard free-energy change (ΔG°). Draw the complete chemical structure of every reactant and product and highlight the atoms or functional groups transformed in each reaction. Finally, identify the enzyme class responsible for catalyzing each reaction.

4. Write the net equation for the payoff phase of glycolysis and calculate the standard free energy change.

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5. What is the purpose of phosphorylating glucose in the preparatory phase?

6. Why is reaction 6 in glycolysis an energy conserving reaction?

7. Which reactions in the payoff phase are examples of substrate level phosphorylation? Explain your answer.

8. Calculate the actual change in Gibb's free energy for the reaction catalyzed by aldolase at 37 °C if the concentrations of the products in reactants in the cell are as follows: [fructose-1,6-bisphosphate] = 1.40×10^{-5} M, [glyceraldehyde-3-phosphate] = 3.03×10^{-6} M, [dihydroxy acetone phosphate] = 1.62×10^{-5} M.
$$\Delta G = \Delta G^{o'} + RT \ln Q \quad R = 8.315 \text{ J/mol} \cdot \text{K}$$