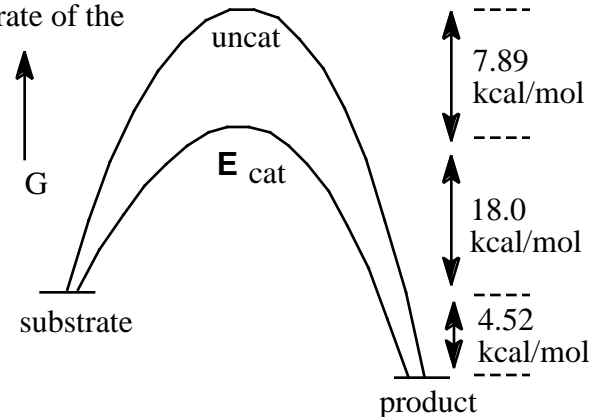




CHEMISTRY 365 BIOCHEMISTRY
SOME PRACTICE FOR EXAM 2

1. Based on the reaction energy diagram shown, calculate the rate of the catalyzed reaction compared to the uncatalyzed reaction at 37.0 °C.

$$\frac{\text{catalyzed rate}}{\text{uncatalyzed rate}} = e^{-(G_{\text{uncat}}^{\ddagger} - G_{\text{cat}}^{\ddagger})/RT}$$



2. An enzyme lowers the activation energy of a reaction from 36.9 kcal/mol to 20.0 kcal/mol at 37.0 °C. Calculate the rate of the catalyzed reaction compared to the uncatalyzed reaction.
- $$\frac{\text{catalyzed rate}}{\text{uncatalyzed rate}} = e^{-(G_{\text{uncat}}^{\ddagger} - G_{\text{cat}}^{\ddagger})/RT}$$
3. An enzyme speeds up a reaction by a factor of 36,500 over the uncatalyzed reaction at 37.0°C. How much has the enzyme lowered the activation energy for the reaction in kcal/mole?
4. A student creates a standard plot for a spectrophotometric determination of monosaccharides. They report the slope and intercept in their Abstract as 445 and -0.044 respectively. What concentration units did they use for the standard solutions?
5. 200.0 μL of a lake water sample was analyzed for inorganic phosphate using the phosphomolybdate method where the final 10.0 mL of solution gave an absorbance at 650 nm of 0.160. The slope of the standard monobasic potassium phosphate solution Beer's law plot was 4.08 mM⁻¹ and the intercept was 0.005. What is the concentration of inorganic phosphate in the original lake sample?
6. 1.00 mL of a lake water sample was analyzed by the phosphomolybdate method that gave a concentration of 0.80 mM phosphate in the final 10.0 mL of solution. Following gentle acid hydrolysis for 7 minutes in boiling water (where 1.00 ml of lake water is diluted to 5.00 mL), 1.00 mL of that solution is analyzed by the same phosphomolybdate method. The concentration of the resulting 10.0 mL is 0.25 mM phosphate. What is the concentration of high-hydrolysis energy organic phosphate bonds in the lake sample?
7. 4.0 mM solutions of each of the following molecules should yield what concentration of P_i after gentle hydrolysis or total phosphate determination based on the procedure of Palmer (*J. Chem. Educ.* 1985)?
AMP ADP ATP G1P G6P
8. How does each of the following affect the solubility and structure of proteins in solution?
(NH₄)₂SO₄, ethanol, NaCl, SDS, Triton X-100, strong acids/bases, high T
9. How many H-bond acceptors and donors does TRIS have?

