

Ch 880 Ch 15.

1) A

2) B

3) B

4) C

5) feedback inhibition

6) a) ATP can bind to multiple sites of PFK-1. At lower concentrations, ATP will bind to the enzyme's active site and drive the reaction. At high concentrations, it can bind allosterically, inhibiting the enzyme.

b) High ATP levels, which signify an excess of energy in the body, will inhibit glycolysis to prevent further generation of ATP. It inhibits PFK-1, which produces fructose-1,6-bisphosphate and inhibits pyruvate kinase which generates pyruvate.

c) ADP is an allosteric activator of the enzyme. When ADP concentration is high, there is a greater chance ADP will bind compared to ATP, which mitigates the effect of high ATP concentrations.

7) (a) Because free glucose, as a large molecule, cannot freely diffuse into cells. It is also converted from the glucose upon entry into a cell.

(b) Glucose is converted into glucose-6-phosphate for use in the biochemical cycle.

(c) Glucose-6-phosphate is extremely charged, and would not be able to enter the cell through the plasma membrane. Thus, it cannot participate in glycolysis.



8) Equilibrium is the state where the forward and backward rates of a reaction are equal, while homeostasis involves the changes of synthesis and breakdown of a metabolite to maintain a constant concentration. The main differences are that equilibrium usually involves a reversible reaction, where the ratios of product and reactant concentrations are always fixed. Homeostasis involves a non-reversible reaction, and the concentration of the metabolite is fixed, while increasing the concentrations of two species in equilibrium will overall decrease the concentration of both species.

9) Reactions that are far from equilibrium are essentially irreversible, so it is important to control their rates such that the creation of their products is not too quick or too much product is created. If too much product is created, and the process is irreversible, reactants are wasted and the concentrations could be problematic for the body.

10) ATP is a marker of less energy being used, so it regulates glycolysis to prevent excess waste of stored energy. AMP is a marker of used energy, so it activates glycolysis. Also, because ATP concentrations are generally high while AMP is generally low, the same change in ATP concentration compared to AMP concentration has much less effect. A small change in AMP concentration can have huge effects on regulation.