

Quiz 3 Key (Ave 70, s.d. 27, high 96, low 44)
BI-102-1, Fall '06, Dr. C. S. Tritt

Please keep your answers concise (more words will not necessarily lead to more points). Use the amount of space provided as a guide as to how detailed to make your answers. This is a 7 question, 2-sided test! Each question is worth the same amount.

1. Name or describe 2 environmental factors that can be sensed by cells.

Any 2 of the following (5 pts each): chemical concentrations (incl. pH), mechanical forces, temperature, light intensity and possibly others.

2. What is general purpose and operating mechanism of *protein kinase* (also known as *enzyme*) *cascades*?

The general purpose of enzyme cascades is to amplify a small signal (5 pts). The amplification occurs because each activated enzyme molecule in the cascade can activate hundreds or thousands of other enzyme molecules that make up the next step in the cascade. This is shown below schematically:

A → A*
100B → 100B*
10,000C → 10,000C*, etc.

Describing enzymes in general -6. Saying they always involve a second messenger -3. Just defining kinases -6. Not getting around to saying the purpose is amplification -2. I accepted answers to the effect of speeding response time because this is also true.

3. Explain the difference between endothermic and exothermic reactions.

Endothermic reactions absorb heat while exothermic reactions release heat. I also accepted endothermic reactions have positive ΔH values while exothermic reactions have negative ΔH . Confusing endothermic and exothermic with endogonic and exogonic and saying something about spontaneity was wrong, but worth 5 points. Stating that exothermic reactions are spontaneous -5.

4. Briefly explain what both *cofactors* and *coenzymes* are and name a common cofactor or coenzyme.

Cofactors are small molecules required for particular enzymes to function (3 pts). Coenzymes are organic cofactors (3 pts). Common cofactors include Ca^{++} , Zn^{++} . Common coenzymes include NAD^+ , FAD, ATP, cAMP?, CoA, etc (4 pts).

5. What is the key difference between aerobic and anaerobic respiration?

Aerobic respiration uses oxygen as its terminal (or primary) electron acceptor, while anaerobic respiration uses something else as the electron acceptor. The something else can be organic or inorganic. Not mentioning electrons, -2. Saying aerobic produces more ATP -6.

6. Name two important “electron carriers” in cells.

NAD^+/NADH and FAD/FADH_2 (5 pts each). I gave 3 pts for ATP (it carries energy, not electrons) and 5 pts for oxygen (it is the electron acceptor in respiration). 7 pts given for NAD^+ and NADH, etc.

7. Why do naturally occurring fatty acids typically contain an even number of carbon atoms?

Because they are formed and broken down 2 carbons at a time using acetyl-CoA and β -oxidation, respectively (you only had to mention one of these for full credit). A lot of people missed this one. I gave 2 pts for saying you didn't know.