

KEY

I. Briefly describe how the carbon chains and nitrogen from protein break-down in muscle are delivered to the liver so that the nitrogen can be de-toxified and the carbon can be converted into a re-usable molecule:

The nitrogen from amino-acid breakdown is "attached" to α KG \rightarrow Glu, which by a transaminase is converted into alanine (from pyruvate). The alanine is delivered to the liver where it is re-converted into pyruvate (for gluconeogenesis) and the NH_3 is delivered into the urea cycle. Glucose is then transferred back to muscle...

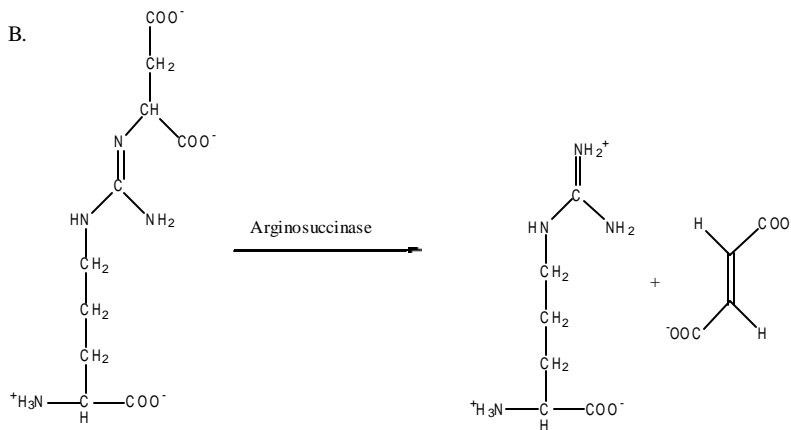
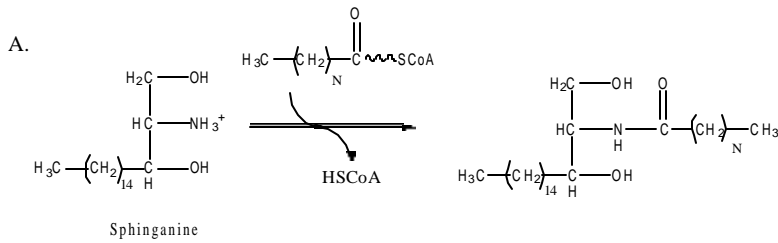
("Glucose-Alanine Cycle")

II. Describe the most common way that a cytoplasmic protein is "tagged" for degradation, and give the names of the two enzymes required for this process in mammalian cells:

Ubiquitination for degradation by the protease.

- (1) ubiquitin activating enzyme
- (2) ubiquitin conjugating enzyme

III. Draw the structures of the products of the following reactions:



IV. Draw the structures AND write the names of the products of the following reactions:

