

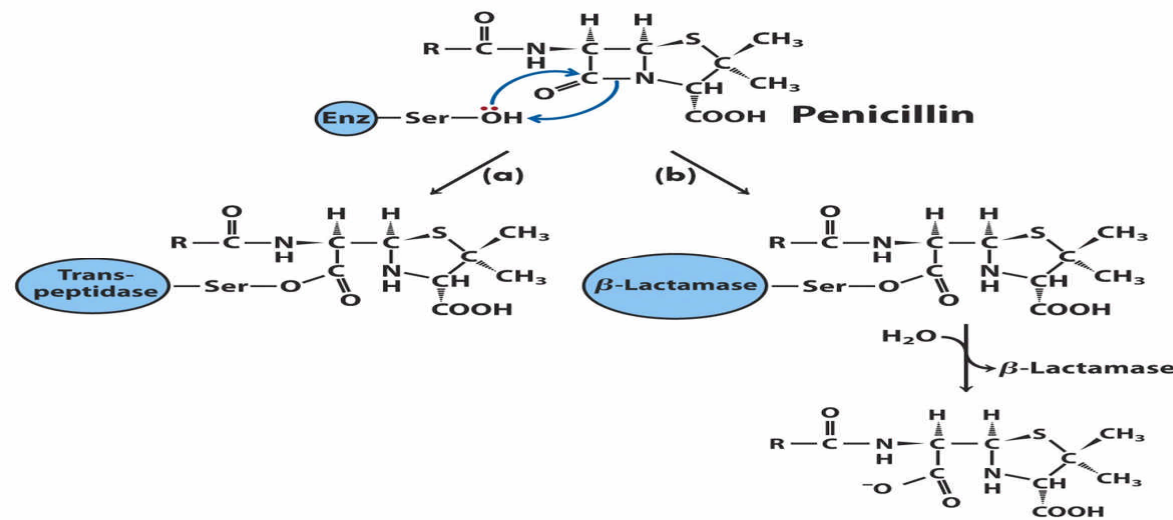
國立嘉義大學 99 學年度

生化科技學系碩士班招生考試試題

科目：生物化學

一、Based on the following figure, answer the questions.

1. Why the transpeptidase working in bacterial cell wall synthesis is inhibited by penicillin, but β -lactamase from antibiotic resistance bacterial could hydrolyse penicillin? Point out the differences in reaction mechanism performed by these two enzymes to penicillin. (10%)
2. The sequences of these two enzymes are hardly to be aligned together. It seems that they are not homologous. But their 3D structure could be superimposed together very well. Is it possible that transpeptidase and β -lactamase are homologous? Why? (5%) Could you explain their evolutionary relationship based on the sequences and 3D structure alignment results? (5%)



二、Artificial, but functional, electron transfer systems can be made in the lab by building artificial membrane-bound vesicles. This is done by combining detergent-solubilized, purified respiratory complexes and membrane lipids. When the mixture is dialyzed to remove the detergent, liposomes spontaneously form that contain the protein complexes integrated into the “membrane”. The central cavity of the liposome can be made to contain certain molecules in aqueous solution; the surrounding medium can also be manipulated.

Using this protocol, you create the following electron transfer systems in liposomes, containing the listed set of components (not necessarily in their functioning order) along with the specified initial electron donors. Place the components in their correct functional sequence and indicate the final electron acceptor in each case.

1. NADH as initial electron donor; Q and complexes I, III and IV in the liposomes; oxygen is present. (5%)
2. NADH as initial electron donor; Complexes I, II, and IV in the liposomes; oxygen is present. (5%)
3. Succinate as initial electron donor; Q, cytochrome *c*, and complexes II, III, and IV in the liposomes; oxygen is present. (10%)

三、Please describe the synthesis and process of a secretory glycoprotein? (20%)

四、Please answer the following questions.

1. Why do the furanose and pyranose forms of monosaccharides predominate in nature? (10%)
2. The compounds α -D-fructofuranose and β -D-fructofuranose are _____.
(A) enantiomers (B) mutamers (C) anomers (D) conformational isomers (5%)
3. What type of bond links the monomers of a polysaccharide?
(A) glucotide bond (B) phosphate ester bond (C) peptide bond (D) glycosidic bond (5%)

五、Match: (20%)

Questions	Choices
(1) The amino acid residue can cause the disulfide bond formation within a polypeptide.	A. Ala B. Cys C. Gln D. Glu E. His F. Leu G. Met H. Pro I. Ser J. Trp
(2) The amino acid residue has strong absorbance of light at a wavelength of 280 nm.	
(3) The amino acid residue has a nonpolar thioether group in its side chain.	
(4) The amino acid residue binds to the iron atom of heme group in hemoglobin.	
(5) The amino acid residue in regulated proteins can be phosphorylated by specific protein kinases.	
(6) The amino acid residue shows tendency to form α helix.	
(7) The amino acid residue shows tendency to form α -keratin.	
(8) The amino acid residue shows tendency to form β turn.	