Which of the following account for the increase in catalytic rate seen with an enzyme?  
  
a. destabilization of the transition state  
b. stabilization of the ES complex  
c. decrease in entropy when the E binds to the S  
d. destabilization of ES through desolvation  
e. destabilization of ES through electrostatic effects

|  |  |  |
| --- | --- | --- |
|  |  | all of the above |
|  |  | none of the above |
|  |  | d and e only |
| http://owl.cengage.com/owlimages/check.GIF |  | c, d, and e |
|  |  | a, b, and c |

Bottom of Form

The catalytic triad of amino acid residues in serine proteases contains:

|  |  |  |
| --- | --- | --- |
|  |  | Asp, Asp and Ser |
| http://owl.cengage.com/owlimages/check.GIF |  | Asp, His and Ser |
|  |  | Asn, His and Ser |
|  |  | Glu, Asp and Ser |

If KS is the dissociation constant for the ES complex and KT is the dissociation constant for the transition state complex, EX‡, enzyme catalysis requires that:

|  |  |  |
| --- | --- | --- |
|  |  | KS < KT |
| http://owl.cengage.com/owlimages/check.GIF |  | KT < KS |
|  |  | KS = KT |
|  |  | none of the above because the tight binding of the transition state means it has no KT |

Low barrier H-bonds:

|  |  |  |
| --- | --- | --- |
|  |  | require the distance between heteroatoms to be larger than for a normal H-bond |
|  |  | have energies of 60 kJ/mol or more because the energy barrier the H atom must surmount to exchange heteroatoms becomes greater as the distance between hetroatoms decreases |
| http://owl.cengage.com/owlimages/check.GIF |  | redistribute electron density in the reactive intermediate and accomplish rate acceleration by hydrogen tunneling |
|  |  | require the pKas for the two heteroatoms to be different |

Which of the following is true concerning transition state analogs?

|  |  |  |
| --- | --- | --- |
|  |  | They would make a valuable tool for drug design. |
|  |  | They are locked into a three dimensional shape that mimics what normally happens fleetingly during a catalyzed reaction. |
|  |  | They are potent inhibitors of the enzyme. |
|  |  | Their dissociation constants, *K*T, are much lower than the corresponding *K*S of the natural substrate. |
| http://owl.cengage.com/owlimages/check.GIF |  | All of the Above |

In the mechanism of action of aspartate proteases, there is

|  |  |  |
| --- | --- | --- |
|  |  | an amino-enzyme intermediate involving an amide bond |
| http://owl.cengage.com/owlimages/check.GIF |  | general acid-general base catalysis |
|  |  | an aspartyl-glycoside intermediate |
|  |  | an acyl-enzyme intermediate involving an acid anhydride |

Histidine is a versatile amino acid residue in general acid-base catalysis because:

|  |  |  |
| --- | --- | --- |
|  |  | none of the above because firstly, His is rarely found at the active site and secondly, its amide side-chain preclude it from acting as a general acid-base. |
|  |  | it carries a net positive charge at physiological pH and acts as an acid |
|  |  | it carries a net negative charge at physiological pH and acts as a base |
| http://owl.cengage.com/owlimages/check.GIF |  | the p*K*a of its side chain is 6-7 so it acts as either an acid or a base at physiological pH |

A good transition state analog would be an effective:

|  |  |  |
| --- | --- | --- |
|  |  | irreversible inhibitor |
| http://owl.cengage.com/owlimages/check.GIF |  | competitive inhibitor |
|  |  | uncompetitive inhibitor |
|  |  | noncompetitive inhibitor |

In covalent catalysis, nucleophilic centers on the enzyme include:  
a. amines  
b. carboxyls  
c. hydroxyls  
d. phosphorus  
e. carbonyl C  
  
Choose the correct answer.

|  |  |  |
| --- | --- | --- |
|  |  | a, b, c, and e |
|  |  | all the above |
|  |  | b, c, d, and e |
| http://owl.cengage.com/owlimages/check.GIF |  | a, b, and |

The burst kinetics observed when serine proteases react with simple esters such as *p*-nitrophenylacetate is consistent with a:

|  |  |  |
| --- | --- | --- |
|  |  | one-step process in which the binding of *p*-nitrophenylacetate is fast and the release of *p*-nitrophenol and acetate is slow |
|  |  | one-step process in which the binding of *p*-nitrophenylacetate is slow and the release of *p*-nitrophenol and acetate is fast |
| http://owl.cengage.com/owlimages/check.GIF |  | two-step process in which release of the first product, *p*-nitrophenol is fast and release of the second product, acetate, is slow |
|  |  | two-step process in which release of the first product, acetate is fast and release of the second product, *p*-nitrophenol, is slow |

Mechanisms of catalysis include:  
a. covalent  
b. acid-base  
c. high barrier hydrophobic bonds  
d. metal ions  
e. proximity and orientation  
  
Choose the correct answer.

|  |  |  |
| --- | --- | --- |
| http://owl.cengage.com/owlimages/check.GIF |  | a, b, d, and e |
|  |  | a, b, and d |
|  |  | all the above |
|  |  | b, d, and e |

The specificity pocket of trypsin:

|  |  |  |
| --- | --- | --- |
|  |  | is shallow with bulky Thr and Val residues at the opening |
|  |  | is surrounded by hydrophobic residues and is large enough to accommodate an aromatic side-chain |
| http://owl.cengage.com/owlimages/check.GIF |  | has a negatively charged Asp at the bottom to facilitate binding of positively charged Arg and Lys residues |
|  |  | uses the amide nitrogens of Ser and Gly to form an oxyanion hole |