

1.

Which of the following statements is true?

- ☐ The primary purpose of all enzymes is digestion
- ☐ Some cells in your body do not contain any enzymes
- ☐ Enzymes are generally DNA molecules
- ☒ Enzymes are generally protein molecules
- ☐ The primary purpose of all enzymes is metabolism

2. How

might an enzyme speed up a certain chemical reaction?

- ☐ By binding to the substrate(s) in the active site in an optimal orientation
- ☐ By creating an environment suitable for catalysis (e.g. acidic / basic residues)
- ☐ By stabilising the highest energy part of the reaction (transition state)
- ☐ By expelling water/unwanted reatants from the active site
- ☒ All of the above

3. Which of the following definitions is wrong?

- ☒ Coenzymes are protein components which assist some enzymes in catalysis
- ☐ Activation energy is the minimum energy required for a specific reaction to proceed
- ☐ The active site is the area of an enzyme where substrate binding and catalysis occur
- ☐ Quantum tunnelling is a phenomenon by which small reactants become product without possessing the classical activation energy
- ☐ Enzymology is the study of enzyme structure, function and catalytic mechanism

4. In terms of molecular evolution, which statement is true?

- ☐ Sequence motifs important for function are likely to vary over time
- ☐ Sequence motifs important for function are unlikely to be present in related sequences
- ☐ Sequence motifs important for function are likely to occur randomly / by coincidence in unrelated sequences
- ☐ Sequence motifs important for function are never present in homologous enzymes
- ☒ Sequence motifs important for function are likely to remain conserved overtime

5. Which of the following definitions is wrong?

- ☐ Homologues are sequences descended from a common ancestor
- ☐ Phylogenetics is the study of evolutionary relationships
- ☒ A metagenome is the entire complement of DNA in an organism
- ☐ Bioinformatics is the use of computational approaches to analyse biological data
- ☐ Molecular evolution is the process by which sequences change over evolutionary time

6. Which of the following parameters is a measure of the affinity of the enzyme for its substrate in kinetic analysis?

- ☐ Reaction Rate
- ☐ Substrate Concentration
- ☐ $1/2 V_{max}$
- ☒ K_M
- ☐ V_{max}

7. Which of the following is not a method for determining the structure of an enzyme?

- ☐ Electron Paramagnetic Resonance
- ☐ Cryo-Electron Microscopy
- ☐ Nuclear Magnetic Resonance
- ☒ High Pressure Liquid Chromatography
- ☐ X-ray Crystallography

8. In which of the following situations might it be desirable to produce an enzyme in laboratory strain bacteria, rather than the original host organism

- ☐ When the original host is a plant with slow growth rate
- ☐ When the original host only produces low levels of the enzyme
- ☐ When the enzyme needs to be tagged and purified for study
- ☒ All of the above
- ☐ None of the above

9. Which of the following statements about rational design is most accurate?

- ☐ It requires intense screening but not extra structural / mechanistic / molecular modelling data
- ☐ It requires intense screening and extra structural / mechanistic / molecular modelling data
- ☐ It requires neither structural / mechanistic / molecular modelling data nor intense screening
- ☐ None of the above
- ☒ It requires extra structural / mechanistic / molecular modelling data but not intense screening

10. In which of the following situations is a biotechnologist most likely to decide to use directed evolution as an enzyme engineering technique as opposed to rational design?

- ☐ When a structure of the enzyme is available to aid engineering
- ☐ When the enzyme can only be screened in a low throughput manner
- ☐ When the enzyme mechanism is understood and provides insight to engineering
- ☐ When current data allows molecular modelling techniques to be used predictively
- ☒ When none of the above are true

11. Which of these statements about enzyme technology is true?

- ☒ Enzymes do not always have optimal properties for industrial use
- ☐ Enzymes are only ever used for chemical synthesis
- ☐ Enzymes always provide a more sustainable route in any given sector
- ☐ Enzymes always have optimal properties for use in medical intervention
- ☐ Enzymes never have optimal properties for use in bioremediation