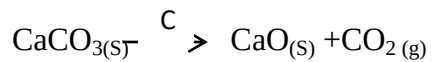


Biochemistry Assignment Answers.

1. Enzyme adenylyl cyclase is activated when it connects to the epinephrine receptor cells. The binding causes conformational changes which causes the alpha-sub-unit to dissociate. The dissociation of these units forms GTP from the complex of these units. The resulting complex, that's, G α -GTP binds together forming adenylyl cyclase causing activation thus the cAMP is released.

2. Voltage-gated ion channels refer to key molecules which are responsible for synthesis of electronic signals inside the cells. They can be excited by depolarized membrane causing changes that allows permeability of ions in the cell. The nonconducting form of these channels results from inactivation of the open state which is done by conformational changes.

3. Activation energy refers to the least quantity of energy needed to excite an atom for chemical reaction. Enzymes increase the rate of reaction by reducing activation energy needed to facilitate a reaction. The reactions of enzymes do not alter the state of equilibrium of any given reaction thus K_{eq} and ΔG^0 remains constant. Example;



$$K_c = [\text{CO}_2]_{\text{eq}}$$

If the reaction above is catalysed by C, then the amount of K_c will not be influenced by C but instead, C will influence the rate of production of K_c .

4. If y-intercept = $-1/V_{\text{max}}$ y-intercept = 25,

$$\text{thus } V_{\text{max}} = 1/25 = 0.04$$

$$1/2V_{\text{max}} = 1/2 * 0.04 = 0.02 \text{ mol/s}$$

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a) Competitive inhibitors

b) Increases K_m but does not affect V_{max} - enzymes interact with these inhibitors than the substrate decreasing the rate of reaction on the substrate increasing the K_m .

6. A nucleotide comprises of 3 parts which are: nitrogenous base, phosphate group and a 5 carbon sugar.

Whereas DNA has thymine as one of the bases, the RNA has uracil

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a)

1st genome

A=T and C=G

If C=22, G=22, A and T=100-44=56

$T = 1/2 * 56 = 28 = A$

A=28%

C=22%

G=22%

T=28%

2nd genome

If C=30, G=30, A and T=40, thus A=20, T=20

A=20%

C=30%

b) The 2nd genome since it has more C and G bases. C and G bases has more hydrogen bonds than A and T, thus is, 3 and 2 bonds respectively.

8. Is the structure formed when the polymers interact together in the DNA. The structure is held together by hydrogen bond. The bond originated from hydroxyl group formed in the ribose sugar

9. Primase is an enzyme that enhances the formation of short RNA segment to single stranded DNA template.

Primase is not needed in transcription. Whereas, replication requires primers, and transcription does not require any hence primase is not needed in this process.

10. Helicase unwound the double helix of the DNA making replication process to occur separately in each strand. In the process, there is production of two sets of copies of the initial DNA molecule. The two copies formed contain two strands each, that is, the newly produced and the original strand.

In semi-conservative, there are two copies with each copy containing original and newly synthesized strands while in conservative, the original template of the DNA remain together and it produces strands containing 2 newly synthesized DNA strands.

11. Template is a strand that runs in the direction of 3' to 5'. The strand is synthesized from mRNA. The non-template runs in the direction of 5' to 3'.

The strands enhance functioning of the polymerase enzyme in attaching the bases. The molecules move in the direction of 3' to 5' in this process.

12. The 5' cap is used to enhance attachment of ribosomes to mRNA.

The cap is built from 5'-5' linkage found in between 2 substrates.

13. The process is enhanced by aminoacyl transferase enzyme which binds amino acid to ATP releasing polypeptide chains. The aminoacyl tRNA synthetase enhances binding of tRNA to AMP amino acids. The process runs in 3 stages which are initialisation where ribosomes binds mRNA and tRNA, elongation where amino acids are moved to the ribosome being enhanced by tRNA forming a chain and termination where tRNA and peptides are hydrolysed to cause the release of the peptide. The peptide is released in the cytoplasm completing the translation process.

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a) TACTAGAGG|AAGGGA|CGCGTTTGGCAT|GACCACACT

b) AUGAUCUCC|UUCCCU|GCGCAAACCGUA|CUGGUGUGA

c) Methionine, isoleucine, serine, phenylalanine, proline, alanine, glutamine, threonine, valine, leucine, valine, stop.