

MDCM601 2024 Exam 3

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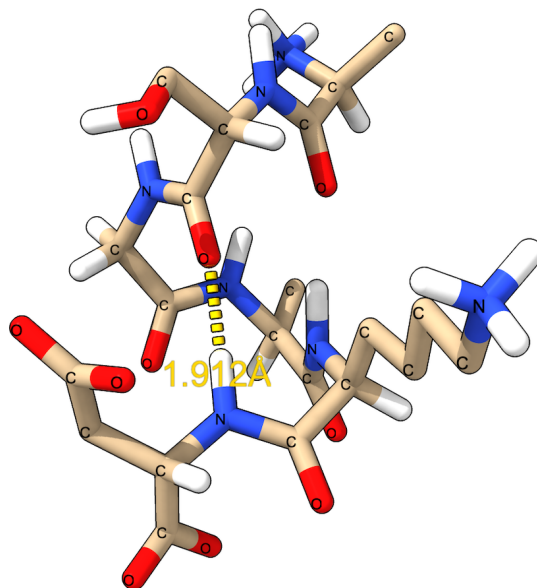
October 20, 2024

Note: Use this codon chart for questions that require it.

		Second letter				
		U	C	A	G	
First letter	U	UUU } Phe UUC } UUA } Leu UUG }	UCU } UCC } Ser UCA } UCG }	UAU } Tyr UAC } UAA Stop UAG Stop	UGU } Cys UGC } UGA Trp UGG Trp	U C A G
	C	CUU } CUC } Leu CUA } CUG }	CCU } CCC } Pro CCA } CCG }	CAU } His CAC } CAA Gln CAG }	CGU } CGC } Arg CGA } CGG }	U C A G
	A	AUU } Ile AUC } AUA Met AUG }	ACU } ACC } Thr ACA } ACG }	AAU } Asn AAC } AAA Lys AAG }	AGU } Ser AGC } AGA Stop AGG Stop	U C A G
	G	GUU } GUC } Val GUA } GUG }	GCU } GCC } Ala GCA } GCG }	GAU } Asp GAC } GAA Glu GAG }	GGU } GGC } Gly GGA } GGG }	U C A G

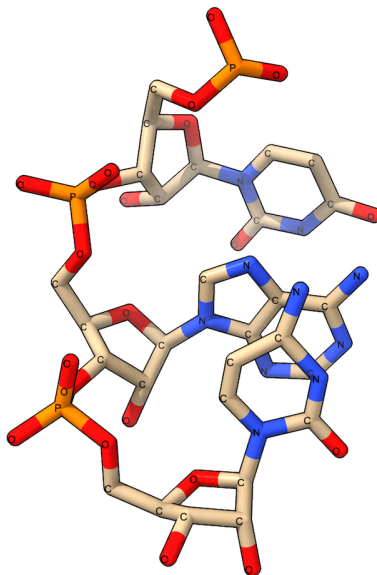
1 Problems

Problem 1. Please answer the following questions about the structure shown.



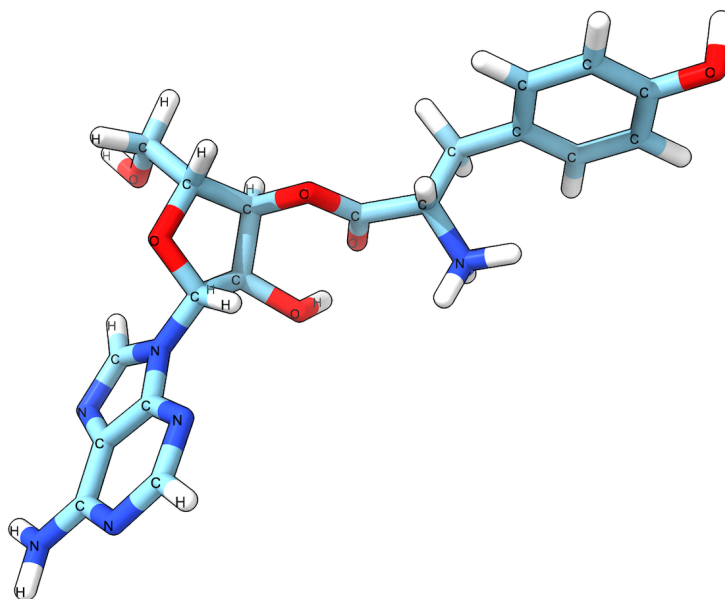
1. Which amino acid is at the N-terminus of this oligopeptide?
2. Which amino acid is at the C-terminus?
3. How many amino acids are there in this oligopeptide?
4. What is the total charge of this oligopeptide? (All relevant protons are shown.)
5. Side chain of which amino acid is positively charged?
6. Which residue is most likely to be phosphorylated?
7. Is this a left-handed or a right-handed helix?
8. What is the length of the indicated hydrogen bond in nm?
9. Determine configuration of the third amino acid (N-to-C direction) in this peptide.
10. How many amide bonds are there?

Problem 2. Please answer the following questions about the structure of the tRNA anticodon loop shown.



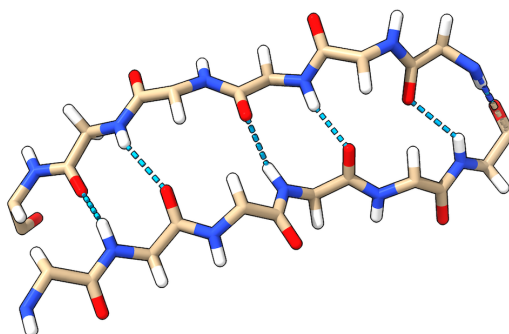
1. In the anticodon loop of this tRNA, what is the sequence of nucleotides in the 3'-5' direction?
2. What is the corresponding codon sequence in the 5'-3' direction?
3. Which amino acid does this tRNA correspond to?
4. Which nucleotide is in the “wobble” position?

Problem 3. An amino acid is attached to the molecule of tRNA.



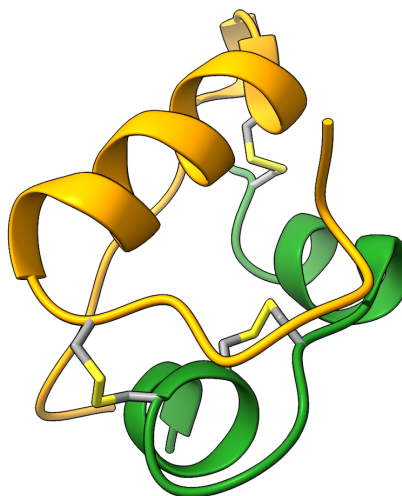
1. Which amino acid is it?
2. What is the functional group through which it is attached?
3. What is the number of the carbon atom on the ribose through which it is attached to the nucleotide?
4. What is the identity of the nucleotide?
5. Determine the stereochemical descriptor for the anomeric carbon.
6. Predict the anticodon sequence on this tRNA (read in 3'-5' direction).

Problem 4. A fragment of a structure of α -Bungarotoxin is shown.



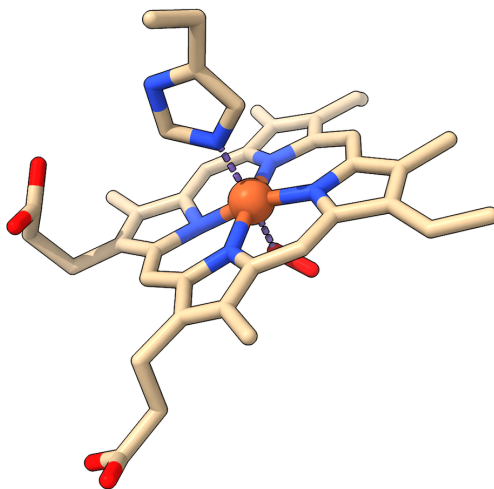
1. Is this an α -helical or a β -sheet structure?
2. How many hydrogen bonds are shown?
3. Is this a parallel or anti-parallel structure?

Problem 5. A molecule of an important metabolic hormone, insulin, is shown.



1. Mature insulin consists of two chains held together by how many disulfide bonds?
2. Disulfide bonds are formed through the _____ (oxidation or reduction) of thiols in _____ (amino acid).

Problem 6. A fragment of myoglobin is shown.



1. Which element is in the center of the porphyrin ring?
2. Which amino acid side chain is coordinating to it from the top?
3. What else is bound to it at the bottom?

2 Solutions

1. Ala; Asp; 6; 0; Lys; Ser; Right-handed; 0.1912 nm; Not stereogenic; 5
2. CAU; GUA; Val; U
3. Tyr; ester; 3; A; *R*; AUA or AUG
4. β sheet; 6; anti-parallel
5. 3; oxidation; Cys
6. Fe; His; O₂