

Session #32: Homework Solutions

Problem #1

Explain the chemistry behind giving a “permanent” to a head of hair.

Solution

A permanent alters the shape of hair by changing the location of the disulfide bridges within the hair. This is accomplished by first applying a reducing agent to reduce all of the existing disulfide bridges in the protein strands. Then the hair is curled into the desired shape, and an oxidizing agent is applied to form new disulfide bridges which hold the hair in the new shape.

Problem #2

What is the major force responsible for the formation of an α -helix in protein secondary structure?

Solution

hydrogen bonding

Problem #3

In a globular protein, would the side chain of aspartic acid most probably be oriented toward the interior of the protein or outward toward the aqueous surroundings? Explain.

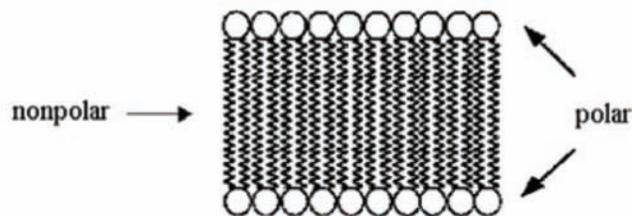
Solution

The aspartic acid side chain is negatively charged at biological pH. This negatively charged group is highly hydrophilic and will most likely be oriented so that interaction with water is possible.

Problem #4

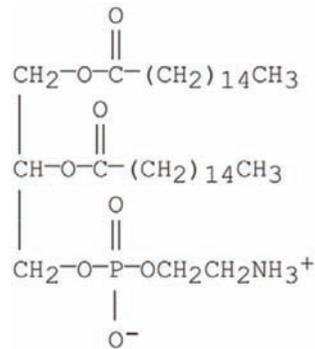
Provide a sketch of a lipid bilayer. Label the polar and nonpolar regions.

Solution



Problem#5

Which of the following terms best describes the compound below?



- A) a phospholipid
- B) a phosphoglyceride
- C) a cephalin
- D) a molecule which contains a polar head group
- E) all of the above

Solution

Answer: E

Problem #6

Besides a possible difference in base structure, what is the major structural difference between ribo- and deoxyribonucleosides?

Solution

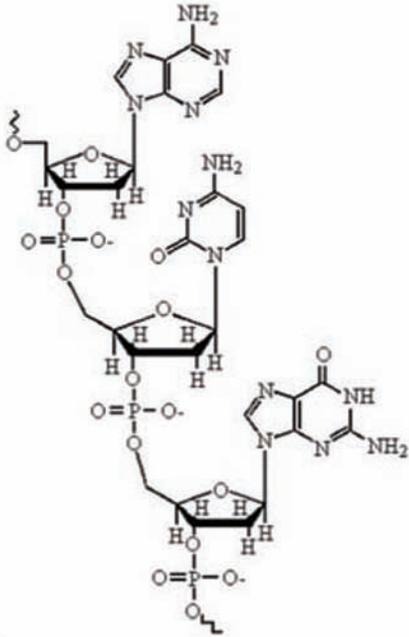
Deoxyribonucleosides have a hydrogen instead of a hydroxyl group at the C2 position of the sugar.

Problem #7

Show that you understand how the structural components of DNA are bonded together by drawing a linear segment that contains 3 base residues.

Solution

Other choices for the base components are possible.



Problem #8

Define a nucleic acid.

Solution

Chains of five-membered-ring sugars linked by forming a phosphodiester with phosphoric acid.

Problem #9

Describe the primary structure of DNA.

Solution

DNA consists of two strands of nucleic acids with the sugar-phosphate backbone on the outside and the bases on the inside. H-bonds hold the chains together between the bases on the two strands. Adenine and thymine are always paired and guanine and cytosine are always paired.

Problem #10

Which of the following statements is not true about the structure of DNA as proposed by Watson and Crick?

- A) The number of adenines in DNA is equal to the number of thymines.
- B) The number of cytosines is equal to the number of guanines.
- C) DNA consists of two strands of nucleic acids with the sugar-phosphate backbone on the inside and the bases on the outside.
- D) The chains in DNA are held together by hydrogen bonding.
- E) Adenine always pairs with thymine and guanine always pairs with cytosine.

Solution

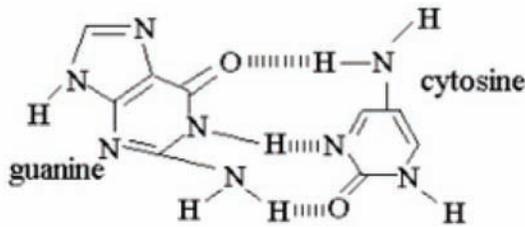
Answer: C

Problem #11

Show the hydrogen bonding which occurs when guanine and cytosine form a base pair.

Solution

Answer:

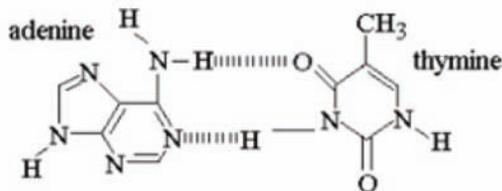


Problem #12

Show the hydrogen bonding which occurs when adenine and thymine form a base pair.

Solution

Answer:



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