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QUESTION 1

Which of the following species cannot hydrogen bond with itself?

A. ethanol

B. acetic acid

C. ammonia

D. acetone

Correct Answer: D

Hydrogen bonds occur between hydrogen of one molecule with an electronegative atom (oxygen, nitrogen, or fluorine) of another atom. Consequently, acetone is unable to hydrogen bond with itself. The hydrogen atoms in acetone are covalently bonded to carbon atoms and not a strong electronegative atom like nitrogen, oxygen, of fluorine.

QUESTION 2

When blood flow to human tissue is interrupted, the lack of sufficient blood supply is called ischemia. If ischemia is not restored quickly, the affected tissue may undergo a process called infarction, which involves a series of chemical changes that damage the tissue. The lack of blood supply results in lack of oxygen, and thus lactic acidosis. Mitochondrial dysfunction results. Microscopic examination and chemical analysis of ischemic cells reveal membrane degeneration, excessive calcium (Ca+) inside the cell, and free radical formation, accompanied by a reactive inflammation and free fatty acid formation. A research experiment is designed to evaluate the response of infarcted tissue to intra-arterial administration of an antioxidant. Preliminary results demonstrate that follow-up evaluation of tissue exposed to intra-arterial antioxidant injection resulted, on average, in a smaller area of infarcted tissue after seven days when compared to controls without exposure to the antioxidant. It was noted that 70% of the patients who demonstrated smaller areas of infarction also had a notable decease in edema of the ischemic tissue lasting about 6 to 10 hours after injection.

Which of the following chemical moieties forms the backbone of DNA?

A. Nitrogenous bases

B. Glycerol

C. Amino groups

D. Pentose and phosphate

Correct Answer: D

DNA is composed of nucleotides joined together in long chains. Nucleotides are composed of a pentose sugar, a phosphate group, and a nitrogenous base. The bases form the "rungs" of the ladder at the core of the DNA helix and the pentose-phosphates are on its outside, or backbone.

QUESTION 3

The addition of HBr with peroxide and an alkene yields what product?

A. Markovnikov\\'s product

B. anti-Markovnikov\\'s product

C. Saytzeff\\'s product

D. the ortho product

Correct Answer: B

In the absence of peroxide, HBr plus an alkene yields Markovnikov\\'s product. But, in the presence of peroxide, the result of the reaction is an anti-Markovnikov\\'s product.

QUESTION 4

Coughs that linger after a cold or sinus problem cause constant disruption in the home, school, and workplace. Often, these dry, nonproductive coughs become increasingly troublesome although other symptoms ?fever, congestion, and fatigue ?resolved days or weeks ago. This stubborn cough persists for weeks, and plagues its victim and the victim\\'s family night and day. The diagnosis might be a common, but overlooked cause of lingering cough: atypical pneumonia caused by mycoplasma. Mycoplasma ? pleomorphic bacteria that lack a cell wall ?are the smallest and simplest self-replicating organisms known to humans. They probably evolved from gram-positive, walled eubacteria by degenerative evolution. Smaller than amoebas, these 0.1-micrometer organisms grow and reproduce slowly and require no oxygen or host cell. They also change shapes asymmetrically, appearing as long, thin filaments, tiny spheres, or branches. Scientists have identified more than 100 mycoplasma species. Fifteen species are known to live in humans, most as normal symbiotic flora. Mycoplasma pneumoniae, previously called "walking pneumonia," is pathogenic in humans. Mycoplasma pneumoniae glides freely and uses its specialized filamentous tips to burrow between cilia within the respiratory epithelium, causing the respiratory epithelial cells to slough. It also produces hydrogen peroxide, which causes initial cell disruption in the respiratory tract and damages erythrocyte membranes. Researchers have determined that more than 40% of infants younger than 1 year old have had a mycoplasma infection. By age 5, approximately 65% of children have been infected. Nearly all adults have been infected at least once, often repeatedly. Mycoplasma pneumonia usually affects people younger than 40 years of age. The highest incidence is found in the 5- to 9-year age group. The risk of contracting mycoplasma pneumonia is greatest for people who live or work in crowded areas, such as daycare facilities, schools, homeless shelters, long-term care units, and military and prison environments. However, many people who develop mycoplasma infections have no identifiable risk factor. Most mycoplasma infections cause mild to moderate clinical symptoms, but the infection incubates over 3 weeks and can last weeks without treatment. This infection cannot be diagnosed based on symptoms alone; laboratory testing is essential. Infection can also cause ear infections, sinus infections, bronchitis, croup, severe sore throats, infectious asthma, and 1 type of the common cold. When mycoplasma infects children, about 25% of them develop nausea, vomiting, or diarrhea.

In paragraph 2, "symbiotic" most nearly means

A. independent

B. cooperative

C. divided

D. shared

Correct Answer: B

The full context of this word is a description of the "normal symbiotic flora" that lives inside the human gut. This "normal" flora is contrasted with mycoplasma pneumonia, which is described as pathogenic in humans. Given that some of the species take up residence in the human gut, without causing issue, it is likely that this symbiotic relationship is one of cooperation.

QUESTION 5

Which of the following is NOT made by the pituitary gland?

A. ACTH

B. ADH

C. FSH

D. LH

Correct Answer: B

The list of hormones made by the pituitary gland can be recalled with the mnemonic FLATPOG, signifying: FSH, LH, ACTH, TSH, GH, MSH (melanocyte stimulating hormone), and prolactin. ADH is made by the hypothalamus and is only secreted by the posterior pituitary.