

Sample Prague Exam Questions – BIOLOGY and CHEMISTRY (Physics not available)

Please note these questions are several years old. Actual questions may reflect changes to specifications.

- 1) **Fat-soluble vitamins is/are:**
  - a) D
  - b) B2 (Riboflavin)
  - c) C
  - d) Folic acid
- 2) **Crossing over occurs in:**
  - a) leptotene
  - b) pachytene
  - c) G2 phase
  - d) G0 phase
- 3) **If allele A is completely dominant over allele a, then the phenotype of a heterozygote Aa will be:**
  - a) the same as of homozygote aa
  - b) the same as of homozygote AA
  - c) the same as one of the parents
  - d) intermediate between AA and aa phenotypes
- 4) **In a large population, 9% of recessive homozygotes were detected for monogenic trait. Assuming no co-heritance the frequency of:**
  - a) dominant homozygotes is expected to be 36%
  - b) heterozygotes is expected to be 48%
  - c) dominant allele is expected to be 70%
  - d) recessive allele is expected to be 30%
- 5) **Prokaryotic cells:**
  - a) contain many ribosomes for polypeptide synthesis
  - b) have their DNA in the form of a circular chromosome
  - c) may contain small circular plasmids
  - d) contain a nucleus that is separated from the cytoplasm by a nuclear membrane
- 6) **A mother has blood group A, her child has A. The following fathers can be excluded:**
  - a) with group A
  - b) with group B
  - c) with group O
  - d) paternity cannot be excluded based on ABO system group of the father
- 7) **Positive phototropism is observed in:**
  - a) roots
  - b) leaves
  - c) stalks
  - d) flowers
- 8) **The karyotype of a girl with Turner syndrome has**
  - a) 3 copies of chromosome 18 and heterochromosomes XX
  - b) one heterochromosome X and 22 pairs of autosomes
  - c) autosomes XX and 1 heterochromosome 21
  - d) 45 autosomes and heterochromosomes XX
- 9) **During G<sub>1</sub>, S and G<sub>2</sub> phases, a cell is said to be in:**
  - a) the process of mitosis
  - b) the process of meiosis
  - c) cytokinesis
  - d) interphase
- 10) **Assume the mode of inheritance is complete dominance. Crosses between dominant homozygotes and heterozygotes (AAx Aa) lead to:**
  - a) phenotypically identical offspring
  - b) segregation ratio 1:1
  - c) segregation ratio 3:1
  - d) segregation ratio 1:2:1
- 11) **The Golgi complex:**
  - a) can be found in the cytoplasm of plant and animal cells
  - b) is well developed in secretory cells
  - c) has a cisternae-shaped network made of rough endoplasmic reticulum
  - d) is particularly involved in the secretion of glycoproteins
- 12) **Human gastric juice contains:**
  - a) sulphuric acid
  - b) amylase
  - c) hydrochloric acid
  - d) pepsin
- 13) **Which of the following classes of antibodies are elevated in allergy:**
  - a) IgM
  - b) IgA
  - c) IgG
  - d) IgE
- 14) **Catabolism:**
  - a) Complex compounds are broken into simpler ones.
  - b) involves mostly exergonic reactions
  - c) does not occur in the muscle cells
  - d) is a typical reaction for building up body structures
- 15) **In humans viruses cause:**
  - a) rabies
  - b) tuberculosis
  - c) haemophilia A
  - d) influenza
- 16) **During replication adenine pairs with:**
  - a) cytosine
  - b) thymine
  - c) guanine
  - d) uracil
- 17) **In the fruit fly (Drosophila melanogaster) crossing white-eyed males with homozygous red-eyed females leads to:**
  - a) males with red eyes and females with white eyes
  - b) males with white eyes and females with red eyes
  - c) one half of the offspring with white eyes and one half with red eyes regardless of sex
  - d) identical offspring with red eyes
- 18) **Mitosis**
  - a) is a type of cell division producing gametes
  - b) consists of prophase, metaphase, anaphase and telophase
  - c) produces two daughter cells with the same chromosome number as the parental cell
  - d) contains a phase during which the chromosomes are duplicated
- 19) **X-linked inheritance is involved in:**
  - a) cystic fibrosis (mucoviscidosis)
  - b) red-green colour blindness
  - c) Klinefelter syndrome
  - d) haemophilia A
- 20) **The first evolutionary complete separation of the heart into a right half and left half occurred in:**
  - a) reptiles
  - b) mammals
  - c) birds
  - d) fish
- 21) **Plasmids:**
  - a) are small circular molecules of bacterial RNA
  - b) can not be found in bacterial cells
  - c) are replicated independently of the central chromosome
  - d) could carry genes for resistance to antibiotics
- 22) **Vaccinations stimulate**
  - a) the body's active immune response
  - b) the body's passive immune response
  - c) the body's non-specific immunity
  - d) none of the above
- 23) **Chlorophyll:**
  - a) Is a porphyrin molecule
  - b) Consists mainly of chlorophyll a and b
  - c) is photoactivated during the light stages of photosynthesis
  - d) has a red colour
- 24) **Antibodies are produced by:**
  - a) T lymphocytes
  - b) monocytes
  - c) B lymphocytes
  - d) macrophages
- 25) **A normal human diploid cell contains:**
  - a) 46 chromosomes
  - b) 23 chromosomes
  - c) 46 homologous pairs of chromosomes
  - d) 23 homologous pairs of chromosomes
- 26) **A person with blood group type AB has:**
  - a) both A and B antigens
  - b) neither A nor B antigens
  - c) only B antigens
  - d) neither anti-A nor anti-B antibodies
- 27) **Crosses between two heterozygotes (Aa x Aa) assuming codominance leads to phenotypic ratio:**
  - a) 1:1
  - b) 3:1
  - c) 1:2:1
  - d) 1:1:1
- 28) **Assuming independent assortment, individuals with the genotype AaBb produce:**
  - a) two types of gametes in the ratio 3:1
  - b) four types of gametes
  - c) gametes AA,Bb
  - d) two types of gametes
- 29) **An example of a monogenic inheritance is:**
  - a) Down's syndrome
  - b) ABO blood group
  - c) phenylketonuria
  - d) Rh blood group

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- 1) **Choose the correct statement/s:**  
 a) the noble gases form monoatomic molecules  
 b) a mole fraction may have any value from 0 – 1  
 c) the noble gases form diatomic molecules  
 d) a mole fraction may have any value from 1 – 2
- 2) **The oxidation number of H<sub>2</sub> is:**  
 a) 0    b) 2    c) -2    d) -1
- 3) **The oxidation number of O in the H<sub>2</sub>O is:**  
 a) -2    b) +2    c) -3    d) +3
- 4) **NaNO<sub>3</sub> is:**  
 a) potassium nitrate  
 b) sodium nitrite  
 c) sodium nitrate  
 d) potassium nitrite
- 5) **Aqueous means that:**  
 a) a substance is not dissolved in water  
 b) a substance is dissolved in oil  
 c) a substance is dissolved in water  
 d) a substance is dissolved in H<sub>2</sub>O
- 6) **Choose the INCORRECT statement:**  
 a) NaCl is not soluble in water  
 b) HNO<sub>3</sub> is a weak acid  
 c) HNO<sub>3</sub> is a strong acid  
 d) NaCl is soluble in water
- 7) **The conjugate base of H<sub>2</sub>SO<sub>4</sub> is:**  
 a) 2H<sup>+</sup>  
 b) SO<sub>4</sub><sup>2-</sup>  
 c) HSO<sub>4</sub><sup>-</sup>  
 d) H<sup>+</sup>
- 8) **Which of the following is/are NOT the conjugate base of CH<sub>3</sub>COOH:**  
 a) CH<sub>3</sub>COOH  
 b) CH<sub>3</sub>COO<sup>-</sup>  
 c) CH<sub>3</sub>COO<sup>+</sup>  
 d) CH<sub>3</sub>COH
- 9) **The number of moles of water in 30.0 g of water is**  
 a) 1.20 mol  
 b) 1.00 mol  
 c) 1.48 mol  
 d) 1.66 mol
- 10) **The number of moles of sodium ions in 1.30 mol of sodium sulfate is:**  
 a) 2.00 mol Na<sup>+</sup>  
 b) 2.60 mol Na<sup>+</sup>  
 c) 1.60 mol Na<sup>+</sup>  
 d) 2.40 mol Na<sup>+</sup>
- 11) **An anhydride is a compound formally derived from:**  
 a) an acid by the removal of a hydroxide group  
 b) an acid by the removal of a water molecule  
 c) a base by the removal of a water molecule  
 d) a base by the removal of a hydroxide group
- 12) **The molarity of an aqueous sodium chloride solution containing 284 g of NaCl in 2.20 dm<sup>3</sup> of solution is: [the atomic mass of Na is 23 amu and Cl is 35 amu]**  
 a) 2.2 mol/l  
 b) 2.3 mol/l  
 c) 3.2 mol/l  
 d) 1.2 mol/l
- 13) **pH is defined as:**  
 a) the logarithm of the hydrogen ion concentration  
 b) the negative logarithm of hydrogen  
 c) the negative logarithm of the hydrogen concentration  
 d) the negative logarithm of the hydrogen ion concentration
- 14) **Strong electrolyte(s) is/are:**  
 a) most of the soluble salts  
 b) hydrochloric acid  
 c) water  
 d) mercuric chloride
- 15) **The pH of solution B is 4.0. The H<sup>+</sup> (aq.) concentration in solution A is 100 times greater than in solution B. The pH of solution A is:**  
 a) 2    b) 6    c) 1    d) 0.04
- 16) **Select the right statement:**  
 a) oxidation is a chemical change in which a substance gains electrons  
 b) oxidation is a chemical change in which a substance loses electrons  
 c) oxidation is a chemical change in which one or more elements increase in oxidation number  
 d) oxidation is a chemical change in which one or more elements decrease in oxidation number
- 17) **The aqueous solution of CH<sub>3</sub>COONa is:**  
 a) Acidic  
 b) Basic  
 c) Neutral  
 d) CH<sub>3</sub>COONa is not soluble in water
- 18) **How many constitutional (structural) isomers does hexane have:**  
 a) 4    b) 5    c) 6    d) 7
- 19) **CH<sub>3</sub>-CO-CH<sub>3</sub> is:**  
 a) ketone  
 b) alcohol  
 c) acetone  
 d) propanone
- 20) **Palmitic acid has:**  
 a) 16 carbon atoms  
 b) 18 carbon atoms  
 c) one double bond  
 d) two double bonds
- 21) **Stereoisomers have:**  
 a) different molecular and structural formulas but the arrangement of their atoms in space is the same  
 b) the same molecular and structural formulas but the arrangement of their atoms in space is different  
 c) the same molecular and different structural formulas but the arrangement of their atoms in space is the same  
 d) different molecular and the same structural formulas but the arrangement of their atoms in space is different
- 22) **CH<sub>3</sub>-CH<sub>2</sub>-O-CH<sub>2</sub>-CH<sub>3</sub> is:**  
 a) ethoxyethane  
 b) methoxymethan  
 c) diethyl ketone  
 d) diethyl ether
- 23) **The pH of the solution of 0,005 mol/l H<sub>2</sub>SO<sub>4</sub> is:**  
 a) 0,05  
 b) 2  
 c) 5  
 d) 0.1
- 24) **Which of the following is/are NOT monosaccharide/s:**  
 a) galactose  
 b) lactose  
 c) maltose  
 d) mannose
- 25) **Amino acid containing an aromatic ring is:**  
 a) tyrosine  
 b) tryptophan  
 c) histidine  
 d) phenylalanine
- 26) **Bond responsible for protein structure is:**  
 a) peptide bond  
 b) glycosidic bond  
 c) disulfide bond  
 d) hydrogen bond
- 27) **Triacylglycerol is:**  
 a) ester  
 b) fat  
 c) alcohol  
 d) propantriol
- 28) **Purine is:**  
 a) heterocyclic compound containing 2 N atoms  
 b) heterocyclic compound containing 4 N atoms  
 c) heterocyclic compound containing 5 C atoms  
 d) heterocyclic compound containing 6 C atoms
- 29) **The amount of water that must be added to 5.80 grams of H<sub>3</sub>PO<sub>4</sub> in the preparation of a 0.1 mol/l solution is: (formula mass of H<sub>3</sub>PO<sub>4</sub> is 98.0 amu)**  
 a) 0.685 l  
 b) 0.592 l  
 c) 0.698 l  
 d) 0.892 l