

***Talaros Foundations in Microbiology 12th edition
Chess Test Bank***

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CORRECT ANSWERS ARE LOCATED IN THE 2ND HALF OF THIS DOC.

TRUE/FALSE - Write 'T' if the statement is true and 'F' if the statement is false.

- 1) A covalent bond is formed between an anion and a cation.
☐ true
☐ false
- 2) Electrons that participate in chemical bonding are typically located closest to the nucleus.
☐ true
☐ false
- 3) Only charged atoms can form ionic bonds.
☐ true
☐ false
- 4) Water molecules are nonpolar molecules.
☐ true
☐ false
- 5) Polar molecules have more reactivity compared to nonpolar molecules.
☐ true
☐ false
- 6) Elements have unique chemical properties.
☐ true
☐ false
- 7) The concentration of a solution expresses the amount of solvent present.
☐ true
☐ false
- 8) If solution A has a lower pH compared to solution B, then solution A is more acidic than solution B.
☐ true
☐ false
- 9) The only part of an amino acid that differs from other amino acids is its R group.
☐ true
☐ false

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- 10) All proteins are enzymes.
- ☐ true
 - ☐ false
- 11) Replication is the cellular process that copies the DNA prior to cell division.
- ☐ true
 - ☐ false
- 12) Nucleic acids have primary, secondary, tertiary, and quaternary levels of organization.
- ☐ true
 - ☐ false
- 13) Neutrally charged subatomic particles are called neutrons.
- ☐ true
 - ☐ false
- 14) The combinations of subatomic particles are called atoms.
- ☐ true
 - ☐ false
- 15) An atom that receives additional electrons is called the oxidizing agent.
- ☐ true
 - ☐ false
- 16) The permanent breakage of molecules to release products are decomposition reactions.
- ☐ true
 - ☐ false
- 17) The solvent is the substance that will be dissolved in the solution.
- ☐ true
 - ☐ false
- 18) Cellular membranes that show both hydrophilic and hydrophobic properties are called amphipathic.
- ☐ true
 - ☐ false
- 19) Alkaline is another term that is interchangeable with basic.
- ☐ true
 - ☐ false

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20) Carbonyl groups are found in lipids.

- Ⓐ true
- Ⓑ false

CHECK ALL THE APPLY. Choose all options that best completes the statement or answers the question.

21) Which elements are found in all carbohydrates, lipids, proteins, and nucleic acids?

- A) Nitrogen
- B) Carbon
- C) Hydrogen
- D) Oxygen
- E) Phosphorus
- F) Sulfur

22) Which elements are NOT critical to the life of any organism found on Earth?

- A) Arsenic (As)
- B) Uranium (U)
- C) Cobalt (Co)
- D) Copper (Cu)
- E) Manganese (Mn)
- F) Hydrogen (H)

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MULTIPLE CHOICE - Choose the one alternative that best completes the statement or answers the question.

23) Anything that occupies space and has mass is called

- A) an electron.
- B) living.
- C) matter.
- D) energy.
- E) space.

24) All of the following pertain to $^{14}_6\text{C}$ except it

- A) has 6 protons.
- B) has 6 electrons.
- C) has 14 neutrons.
- D) is an isotope of carbon.
- E) has a mass number of 14.

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- 25) The electrons of an atom are
- A) always equal in number to the number of neutrons in an atom.
 - B) found in the nucleus.
 - C) used to determine atomic number.
 - D) positively charged.
 - E) consistently moving in pathways called orbitals.
- 26) The subatomic particles that orbit the nucleus are the
- A) electrons.
 - B) protons.
 - C) neutrons.
 - D) protons and neutrons.
 - E) protons and electrons.
- 27) What is the maximum number of electrons in the second energy shell of an atom?
- A) 2
 - B) 4
 - C) 8
 - D) 18
 - E) 32
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- 28) Isotopes are atoms of the same element that differ in their
- A) neutron number.
 - B) electron number.
 - C) proton number.
 - D) atomic number.
 - E) chemical properties.
- 29) Two or more atoms bonded together are called a/an
- A) ion.
 - B) isotope.
 - C) element.
 - D) electrolyte.
 - E) molecule.

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30) What would be the valence number of electrons in the sulfur atom $^{32}_{16}\text{S}$?

- A) 2
- B) 6
- C) 8
- D) 16
- E) 32

31) Polar molecules are composed of covalently-bonded

- A) identical atoms.
- B) carbon atoms.
- C) ions.
- D) atoms of different electronegativity.
- E) atoms of identical electronegativity.

32) Which term describes reactions that involve the removal of an electron?

- A) Oxidation
- B) Reduction
- C) Dehydration
- D) Decomposition
- E) Dissolution

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33) Which of the following represents a synthesis reaction?

- A) $\text{AB} \rightarrow \text{A} + \text{B}$
- B) $\text{A} + \text{B} \rightarrow \text{AB}$
- C) $\text{AB} + \text{XY} \rightarrow \text{AX} + \text{BY}$
- D) $\text{AB} + \text{XY} \leftrightarrow \text{AX} + \text{BY}$

34) The important solvent associated with natural systems is

- A) carbon dioxide.
- B) sodium chloride.
- C) ethyl alcohol.
- D) benzene.
- E) water.

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35) What do H_2O , NaCl , CO_2 , and HCl all have in common?

- A) All are salts
- B) All are acids
- C) All are gases
- D) All are inorganic
- E) All are solutes

36) Which term does *not* belong in this list?

- A) Lactic acid
- B) Vinegar
- C) Hydrogen ion donor
- D) pH 8
- E) Acidic

37) Compared to a solution of pH 9, a solution of pH 7

- A) is more basic.
- B) has no OH^- ions.
- C) has more H^+ ions.
- D) has a higher pH.
- E) All of these choices are correct.

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38) The building blocks of an enzyme are

- A) nucleotides.
- B) glycerol and fatty acids.
- C) monosaccharides.
- D) phosphate, glycerol, fatty acids.
- E) amino acids.

39) Which of the following functional groups is *mismatched* to the organic compound?

- A) Phosphate – carbohydrates
- B) Sulfhydryl – proteins
- C) Amino – proteins
- D) Hydroxyl – alcohols
- E) Carboxyl – fatty acids

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- 40) All of the following are monosaccharides *except*
- A) glucose.
 - B) glycogen.
 - C) fructose.
 - D) ribose.
 - E) deoxyribose.
- 41) All of the following are lipids *except*
- A) cholesterol.
 - B) starch.
 - C) phospholipid.
 - D) wax.
 - E) triglyceride.
- 42) A monosaccharide with 5 carbon atoms will have
- A) 10 hydrogen atoms and 5 oxygen atoms.
 - B) 5 hydrogen atoms and 10 oxygen atoms.
 - C) 5 hydrogen atoms and 5 oxygen atoms.
 - D) 10 hydrogen atoms and 10 oxygen atoms.
 - E) 2 hydrogen atoms and 1 oxygen atom.
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- 43) One nucleotide contains
- A) one phosphate.
 - B) one pentose sugar.
 - C) one nitrogenous base.
 - D) All of these choices are correct.
- 44) Which of the following would have glycosidic bonds?
- A) Triglycerides
 - B) Monosaccharides
 - C) Polypeptides
 - D) Polysaccharides
 - E) ATP
- 45) All of the following are polysaccharides, *except*
- A) dextran in some bacterial slime layers.
 - B) agar used to make solid culture media.
 - C) a cell's glycocalyx.
 - D) cellulose in certain cell walls.
 - E) prostaglandins in inflammation.

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- 46) The hydrophobic tails of a phospholipid are composed of
- A) fatty acids.
 - B) glycerol.
 - C) phosphate.
 - D) alcohol.
 - E) All of these choices are correct.
- 47) Which of the following is found in DNA but *not* in RNA?
- A) Ribose
 - B) Adenine
 - C) Thymine
 - D) Uracil
 - E) Nucleotides
- 48) An amino acid contains all of the following *except*
- A) an amino group.
 - B) a carboxyl group.
 - C) a variable R group.
 - D) a carbon atom.
 - E) a nitrogenous base.
- 49) ATP is best described as
- A) an enzyme.
 - B) a double helix.
 - C) an electron carrier.
 - D) the energy molecule of cells.
 - E) All of these choices are correct.
- 50) Which amino acid contains sulfur atoms that form covalent disulfide bonds and stabilize the tertiary structure of some proteins?
- A) Valine
 - B) Cysteine
 - C) Serine
 - D) Alanine
 - E) Tyrosine

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- 51) The nucleic acid that delivers the correct amino acid to the ribosome for protein synthesis is
- A) rRNA.
 - B) DNA.
 - C) tRNA.
 - D) mRNA.
 - E) ATP.
- 52) Which is *not* true about enzymes?
- A) Enzymes are found in all cells.
 - B) Enzymes are catalysts.
 - C) Enzymes catalyze the cell's chemical reactions.
 - D) Enzymes can be denatured by heat and other agents.
 - E) Enzymes have high-energy bonds between phosphates.
- 53) The weak, attractive force between water molecules is due to
- A) hydrogen bonds.
 - B) covalent bonds.
 - C) ionic bonds.
 - D) peptide bonds.
 - E) glycosidic bonds.
- 54) The purine bases in nucleic acids include
- A) thymine and cytosine.
 - B) guanine and adenine.
 - C) cytosine and guanine.
 - D) adenine and thymine.
 - E) ribose and deoxyribose.
- 55) A student forgot to label a beaker containing a DNA solution and a beaker containing a glucose solution. If chemical analysis was performed to identify the contents of each beaker, which of the following would be found in the beaker of DNA but *not* in the beaker with glucose?
- A) Amino acids
 - B) Hydrogen and oxygen atoms
 - C) Nitrogen and phosphorus
 - D) Fatty acids
 - E) Carbon atoms

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56) Which component of an atom is equal to the atomic number?

- A) Neutrons
- B) Protons
- C) Protons plus electrons
- D) Neutrons plus protons

57) $C_6H_{12}O_6 + C_6H_{12}O_6 \rightarrow C_{12}H_{22}O_{11} + H_2O$ is an example of

- A) formation of a peptide bond.
- B) a decomposition reaction.
- C) denaturation.
- D) a hydrolytic reaction.
- E) dehydration synthesis.

58) If carbon has an atomic number of 6 and an atomic mass of 14, how many neutrons does it have?

- A) 6
- B) 7
- C) 8
- D) 14
- E) There is not enough information to determine this.

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59) The neutrons of an atom are

- A) always equal to the number of protons in an atom.
- B) found in the nucleus.
- C) used to determine atomic number.
- D) positively charged.
- E) moving in pathways called orbitals.

60) Which of the following represents an exchange reaction?

- A) $AB \rightarrow A + B$
- B) $A + B \rightarrow AB$
- C) $X + Y \rightarrow XYD$
- D) $AB + XY \leftrightarrow AX + BY$

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- 61) A student needs to prepare one liter of a 4% NaCl solution. How much NaCl should they weigh out?
- A) 0.4 grams
 - B) 4.0 grams
 - C) 40 grams
 - D) 400 grams
- 62) How many times more acidic is a solution with a pH of 3 than a solution with a pH of 6?
- A) 3
 - B) 10
 - C) 1000
 - D) 36
 - E) 63
- 63) Which of the following carbohydrates is found in dairy products?
- A) Lactose
 - B) Sucrose
 - C) Maltose
 - D) Glucose
 - E) Fructose
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- 64) Which of the following is the stored form of carbohydrates in animals?
- A) Glycogen
 - B) Maltose
 - C) Starch
 - D) Cellulose
 - E) Galactose
- 65) All of the following are correct about triglycerides, *except*
- A) triglycerides are insoluble in water.
 - B) triglycerides are a concentrated source of energy.
 - C) unsaturated triglycerides are solid at room temperature.
 - D) triglycerides dissolve in nonpolar solvents.
 - E) triglycerides are hydrolyzed by lipases.
- 66) Which of the following functional groups participate in the formation of an ester bond?
- A) Hydroxyl group and amino group
 - B) Carboxyl group and amino group
 - C) Hydroxyl group and carboxyl group
 - D) Hydroxyl group and carbonyl group

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- 67) Which type of chemical reaction forms an ester bond in a triglyceride?
- A) Dehydration synthesis
 - B) Oxidation
 - C) Hydrolysis
 - D) Reduction
- 68) The type of chemical bond linking amino acids together is a/an
- A) glycosidic bond.
 - B) peptide bond.
 - C) ester bond.
 - D) ionic bond.
 - E) hydrogen bond.
- 69) The alpha helix and beta pleated sheet are examples of
- A) primary structure.
 - B) secondary structure.
 - C) tertiary structure.
 - D) quaternary structure.
 - E) gamma structure.
- 70) Which class of bond links polynucleotide strands of DNA along their length between the bases?
- A) Covalent
 - B) Ionic
 - C) Van der Waals
 - D) Double
 - E) Hydrogen
- 71) Which of the following is/are hydrophilic?
- A) Glucose
 - B) Vegetable oil
 - C) Butter
 - D) Cholesterol
 - E) All of these choices are correct.
- 72) Water, glucose, and carbon dioxide are examples of
- A) compounds.
 - B) atoms.
 - C) gases.
 - D) macromolecules.

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- 73) Chemical analysis of an unidentified compound isolated from cells showed the presence of carbon, hydrogen, oxygen, nitrogen, and sulfur. This unknown compound is most likely a
- A) carbohydrate.
 - B) nucleic acid.
 - C) lipid.
 - D) protein.
- 74) Select the incorrect statement.
- A) Molecules contain atoms.
 - B) Compounds may contain only one type of atom.
 - C) Compounds contain molecules.
 - D) Atoms are joined by chemical bonds forming molecules.
 - E) Molecules may contain two of the same type of atom.
- 75) During cellular reactions, electrons may be removed from compounds such as glucose and picked up by a coenzyme known as NAD^+ . When NAD^+ gains these electrons, it is said to be
- A) oxidized.
 - B) reduced.
 - C) synthesized.
 - D) dehydrated.
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- 76) What is the smallest particle that cannot be divided into smaller subunits through ordinary chemical means?
- A) Atom
 - B) Element
 - C) Molecule
 - D) Ion
 - E) Compound
- 77) The position of an electron at any on time is dictated by its
- A) charge.
 - B) energy shell.
 - C) atomic position.
 - D) nucleus position.
- 78) Equal sharing of electrons during covalent bonding involves_____ molecules.
- A) nonpolar
 - B) polar
 - C) electrolyte
 - D) ion

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- 79) Dissolving substances such as salt in water that release ions are termed
- A) polar.
 - B) nonpolar.
 - C) electrolytes.
 - D) solvents.
- 80) Weak structurally important molecular interactions that are similar to but weaker than hydrogen bonds are called
- A) ionic bonds.
 - B) van der Waals forces.
 - C) charged bonds.
 - D) covalent bonds.
- 81) Which of the following is not one of the four of the main chemical families found within of living things?
- A) Lipids
 - B) Ribosomes
 - C) Nucleic acids
 - D) Proteins
- 82) Cations are
- A) charged subatomic particles.
 - B) atoms that have gained electrons.
 - C) radioactive isotopes.
 - D) capable of forming ionic bonds with anions.
 - E) atoms without protons.
- 83) Which of the following statements about functional groups is FALSE?
- A) A functional group's chemical properties will vary depending on the associated carbon skeleton's structure.
 - B) The type of functional groups associated with a molecule contribute to how that molecule is classified.
 - C) Functional groups confer specific physical and chemical properties to the overall molecule.
 - D) By identifying which functional groups a molecule contains, a researcher can predict the type of reactions it will most likely undergo.
 - E) None of these choices are false.

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- 84) Which functional group would be LEAST likely to alter the pH of the surrounding environment?
- A) $\text{R}-\text{C}=\text{O}$ (carbonyl)
 - B) $\text{R}-\text{COOH}$ (carboxyl)
 - C) $\text{R}-\text{PH}_2\text{O}_4$ (phosphate)
 - D) $\text{R}-\text{SH}$ (sulfhydryl)
 - E) $\text{R}-\text{OH}$ (hydroxyl)
- 85) Which functional group is generally not associated with proteins?
- A) Carboxyl
 - B) Hydroxyl
 - C) Ester
 - D) Sulfhydryl
 - E) Amino
- 86) Which two compounds undergo the formation of an ester bond during the synthesis of triglycerides?
- A) Glycerol + fatty acid
 - B) Glucose + ester
 - C) Glycogen + hydrocarbon chain
 - D) Cholesterol + glycerol

FILL IN THE BLANK. Write the word or phrase that best completes each statement or answers the question.

- 87) The total number of protons and neutrons of an element establishes its _____ number.
- 88) Atoms that gain or lose electrons become charged particles called _____.
- 89) Protons and neutrons make up the atom's central core referred to as its _____.
- 90) Organic chemicals always have a basic framework of the element _____ bonded to other atoms.
- 91) _____ bonds are formed by dehydration synthesis between adjacent amino acids.
- 92) Purines and pyrimidines are components in the building block units of all _____.
- 93) During protein synthesis, genes in DNA are copied, making _____ RNA.
- 94) An ion that contains more protons than electrons is considered a _____.

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- 95) The contents of a reaction are termed a/an_____.
- 96) A glucose molecule is attracted to the water group on another molecule; therefore, glucose is a_____ molecule.
- 97) The amine group on a protein is attracted by a water molecule; therefore, the amine group is_____.
- 98) A fat is called_____ if all carbons of the fatty acid chain are single bonded to 2 other carbons and 2 hydrogens.
- 99) _____ can be used to trace the position of key atoms that are utilized for diagnosis and treatment.

SHORT ANSWER. Write the word or phrase that best completes each statement or answers the question.

- 100) Certain antibiotics are effective against bacteria that cause human infections because they target prokaryotic ribosomes. Discuss, in detail, how the drug attacking a pathogen's ribosomes will affect the cell. Discuss at least three specific detrimental results.

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Answer Key

Test name: Chapter 02

- 1) FALSE
- 2) FALSE
- 3) TRUE
- 4) FALSE
- 5) TRUE
- 6) TRUE
- 7) FALSE
- 8) TRUE
- 9) TRUE
- 10) FALSE
- 11) TRUE
- 12) FALSE
- 13) TRUE
- 14) TRUE
- 15) TRUE
- 16) TRUE
- 17) FALSE
- 18) TRUE
- 19) TRUE
- 20) FALSE
- 21) [B, C, D]
- 22) [A, B]
- 23) C
- 24) C
- 25) E
- 26) A
- 27) C
- 28) A
- 29) E
- 30) B
- 31) D
- 32) A
- 33) B
- 34) E
- 35) D
- 36) D
- 37) C

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- 38) E
- 39) A
- 40) B
- 41) B
- 42) A
- 43) D
- 44) D
- 45) E
- 46) A
- 47) C
- 48) E
- 49) D
- 50) B
- 51) C
- 52) E
- 53) A
- 54) B
- 55) C
- 56) B
- 57) E
- 58) C
- 59) B
- 60) D
- 61) C
- 62) C
- 63) A
- 64) A
- 65) C
- 66) C
- 67) A
- 68) B
- 69) B
- 70) E
- 71) A
- 72) A
- 73) D
- 74) B
- 75) B
- 76) A
- 77) B

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- 78) A
- 79) C
- 80) B
- 81) B
- 82) D
- 83) A
- 84) D
- 85) C
- 86) A
- 87) mass
- 88) ions
- 89) nucleus
- 90) carbon
- 91) Peptide
- 92) nucleic acids
- 93) messenger
- 94) cation
- 95) chemical equation
- 96) hydrophilic
- 97) hydrophilic
- 98) saturated
- 99) Radioactive isotopes
- 100) Short Answer

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