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Chapter 02
The Chemical Basis of Life

Multiple Choice Questions

1. Which of the following is responsible for most of the mass of an atom?
A. neutron.
B. proton.
C. electron.
D. both neutrons and protons
E. both electrons and neutrons

Blooms Level: 2. Understand
HAPS Learning Outcome: C01.1d With respect to the structure of an atom: Distinguish among the terms atomic number, mass number and atomic weight.
Learning Objective: 2.01B Define matter, mass, and weight.
Section: 02.01
Topic: Atoms and molecules
Topic: Chemistry

2. The mass number of an element is:
A. the number of neutrons in the atom.
B. the number of protons in the atom.
C. the sum of the number of protons plus the number of neutrons.
D. the sum of the number of protons plus the number of electrons.
E. the sum of the number of neutrons plus the number of electrons

Blooms Level: 2. Understand
HAPS Learning Outcome: C01.1d With respect to the structure of an atom: Distinguish among the terms atomic number, mass number and atomic weight.
Learning Objective: 02.01D Define atomic number and mass number.
Section: 02.01
Topic: Atoms and molecules
Topic: Chemistry

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3. The chemical notation for Magnesium ions is Mg^{+2}. The designation 2+ indicates that:
A. two electrons have been lost
B. two protons have been gained
C. the ion is negatively charged
D. the atomic number is two
E. the number of electrons equals the number of protons.

Blooms Level: 3. Apply
HAPS Learning Outcome: C02.1a With respect to non-polar covalent, polar covalent, ionic, and hydrogen bonds: List each type of bond in order by relative strength.
HAPS Learning Outcome: C02.1b With respect to non-polar covalent, polar covalent, ionic, and hydrogen bonds: Explain the mechanism of each type of bond.
HAPS Learning Outcome: C02.1c With respect to non-polar covalent, polar covalent, ionic, and hydrogen bonds: Provide biologically significant examples of each.
Learning Objective: 02.01F Compare and contrast ionic and covalent bonds.
Section: 02.01
Topic: Atoms and molecules
Topic: Chemistry

4. The smallest particle of an element that has the chemical characteristics of that element is a(n)
A. neutron.
B. proton.
C. electron.
D. atom.
E. electron cloud.

Blooms Level: 2. Understand
HAPS Learning Outcome: C01.3 Compare and contrast the terms atoms, molecules, elements, and compounds.
Learning Objective: 02.01C Distinguish between an element and an atom.
Section: 02.01
Topic: Atoms and molecules
Topic: Chemistry

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5. Subatomic particles located in the nucleus of an atom are called
A. protons.
B. neutrons.
C. electrons.
D. orbitals.
E. Both protons and neutrons are correct names.

Blooms Level: 2. Understand
HAPS Learning Outcome: C01.1a With respect to the structure of an atom: Describe the charge, mass, and relative location of electrons, protons and neutrons.
HAPS Learning Outcome: C01.1b With respect to the structure of an atom: Relate the number of electrons in an electron shell to an atoms chemical stability and its ability to form chemical bonds.
HAPS Learning Outcome: C01.3 Compare and contrast the terms atoms, molecules, elements, and compounds.
Learning Objective: 02.01E Name the subatomic particles of an atom, and indicate their location.
Section: 02.01
Topic: Atoms and molecules
Topic: Chemistry

6. Subatomic particles that possess a negative charge, and move around the nucleus of an atom are called
A. protons.
B. electrons.
C. neutrons.
D. photons
E. quarks

Blooms Level: 1. Remember
HAPS Learning Outcome: C01.1a With respect to the structure of an atom: Describe the charge, mass, and relative location of electrons, protons and neutrons.
HAPS Learning Outcome: C01.1b With respect to the structure of an atom: Relate the number of electrons in an electron shell to an atoms chemical stability and its ability to form chemical bonds.
HAPS Learning Outcome: C01.3 Compare and contrast the terms atoms, molecules, elements, and compounds.
Learning Objective: 02.01E Name the subatomic particles of an atom, and indicate their location.
Section: 02.01
Topic: Atoms and molecules
Topic: Chemistry

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7. The atomic number of an atom is equal to
A. the number of neutrons in the atom.
B. the number of protons in the atom.
C. the sum of the number of protons plus the number of neutrons.
D. the sum of the number of protons plus the number of electrons.
E. the sum of the number of neutrons plus the number of electrons.

Blooms Level: 2. Understand
HAPS Learning Outcome: C01.1d With respect to the structure of an atom: Distinguish among the terms atomic number, mass number and atomic weight.
Learning Objective: 02.01D Define atomic number and mass number.
Section: 02.01
Topic: Atoms and molecules
Topic: Chemistry

8. The amount of matter in an object is its
A. mass.
B. weight.
C. atomic number.
D. element.
E. ionic charge.

Blooms Level: 1. Remember
HAPS Learning Outcome: C01.1d With respect to the structure of an atom: Distinguish among the terms atomic number, mass number and atomic weight.
Learning Objective: 2.01B Define matter, mass, and weight.
Section: 02.01
Topic: Atoms and molecules
Topic: Chemistry

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9. The chemical behavior of an atom is largely determined by
A. the number of neutrons it has.
B. the size of its nucleus.
C. the electrons closest to the nucleus.
D. the size of neutrons it has.
E. its outermost electrons.

Blooms Level: 3. Apply
HAPS Learning Outcome: C01.1a With respect to the structure of an atom: Describe the charge, mass, and relative location of electrons, protons and neutrons.
HAPS Learning Outcome: C01.1b With respect to the structure of an atom: Relate the number of electrons in an electron shell to an atoms chemical stability and its ability to form chemical bonds.
HAPS Learning Outcome: C01.3 Compare and contrast the terms atoms, molecules, elements, and compounds.
Learning Objective: 02.01E Name the subatomic particles of an atom, and indicate their location.
Section: 02.01
Topic: Atoms and molecules
Topic: Chemistry

10. Every atom of the element carbon has the same number of
A. protons.
B. neutrons.
C. electrons.
D. photons.
E. quarks.

Blooms Level: 2. Understand
HAPS Learning Outcome: C01.3 Compare and contrast the terms atoms, molecules, elements, and compounds.
Learning Objective: 02.01C Distinguish between an element and an atom.
Section: 02.01
Topic: Atoms and molecules
Topic: Chemistry

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11. Atoms that have gained or lost electrons are called
A. ions.
B. covalents.
C. nonpolars.
D. molecules.
E. neutrons.

Blooms Level: 2. Understand
HAPS Learning Outcome: C02.1a With respect to non-polar covalent, polar covalent, ionic, and hydrogen bonds: List each type of bond in order by relative strength.
HAPS Learning Outcome: C02.1b With respect to non-polar covalent, polar covalent, ionic, and hydrogen bonds: Explain the mechanism of each type of bond.
HAPS Learning Outcome: C02.1c With respect to non-polar covalent, polar covalent, ionic, and hydrogen bonds: Provide biologically significant examples of each.
Learning Objective: 02.01F Compare and contrast ionic and covalent bonds.
Section: 02.01
Topic: Atoms and molecules
Topic: Chemistry

12. After a neutral atom accepts an additional electron, it becomes
A. positively charged.
B. negatively charged.
C. an ion.
D. a molecule.
E. both negatively charged and an ion at the same time.

Blooms Level: 3. Apply
HAPS Learning Outcome: C02.1a With respect to non-polar covalent, polar covalent, ionic, and hydrogen bonds: List each type of bond in order by relative strength.
HAPS Learning Outcome: C02.1b With respect to non-polar covalent, polar covalent, ionic, and hydrogen bonds: Explain the mechanism of each type of bond.
HAPS Learning Outcome: C02.1c With respect to non-polar covalent, polar covalent, ionic, and hydrogen bonds: Provide biologically significant examples of each.
Learning Objective: 02.01F Compare and contrast ionic and covalent bonds.
Section: 02.01
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Topic: Chemistry

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13. Two atoms with the same number of protons and electrons, but different numbers of neutrons, are called
A. isotopes.
B. ions.
C. electrolytes.
D. compounds.
E. Both ions and electrolytes are correct names.

Blooms Level: 2. Understand
HAPS Learning Outcome: C01.3 Compare and contrast the terms atoms, molecules, elements, and compounds.
Learning Objective: 02.01C Distinguish between an element and an atom.
Section: 02.01
Topic: Atoms and molecules
Topic: Chemistry

14. The chemical symbol Ca^{2+} indicates that a calcium atom has
A. two protons in its nucleus.
B. lost two neutrons.
C. gained two protons.
D. lost two electrons.
E. an atomic number greater than 2.

Blooms Level: 3. Apply
HAPS Learning Outcome: C02.1a With respect to non-polar covalent, polar covalent, ionic, and hydrogen bonds: List each type of bond in order by relative strength.
HAPS Learning Outcome: C02.1b With respect to non-polar covalent, polar covalent, ionic, and hydrogen bonds: Explain the mechanism of each type of bond.
HAPS Learning Outcome: C02.1c With respect to non-polar covalent, polar covalent, ionic, and hydrogen bonds: Provide biologically significant examples of each.
Learning Objective: 02.01F Compare and contrast ionic and covalent bonds.
Section: 02.01
Topic: Atoms and molecules
Topic: Chemistry

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15. If an iron atom (Fe) lost three electrons, what would be the charge of the resulting ion?
A. Fe^{-3}
B. Fe^{+6}
C. Fe^{+1}
D. Fe^{+2}
E. Fe^{+3}

Blooms Level: 6. Create
HAPS Learning Outcome: C02.1a With respect to non-polar covalent, polar covalent, ionic, and hydrogen bonds: List each type of bond in order by relative strength.
HAPS Learning Outcome: C02.1b With respect to non-polar covalent, polar covalent, ionic, and hydrogen bonds: Explain the mechanism of each type of bond.
HAPS Learning Outcome: C02.1c With respect to non-polar covalent, polar covalent, ionic, and hydrogen bonds: Provide biologically significant examples of each.
Learning Objective: 02.01F Compare and contrast ionic and covalent bonds.
Section: 02.01
Topic: Atoms and molecules
Topic: Chemistry

16. Atom X has an atomic number of 20 and has a mass number of 40. The number of protons in atom X is equal to
A. 10.
B. 20.
C. 30.
D. 40.
E. 60.

Blooms Level: 4. Analyze
HAPS Learning Outcome: C01.1d With respect to the structure of an atom: Distinguish among the terms atomic number, mass number and atomic weight.
Learning Objective: 02.01D Define atomic number and mass number.
Section: 02.01
Topic: Atoms and molecules
Topic: Chemistry

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17. Atom Y has 11 protons, 11 electrons, and 12 neutrons. What is the atomic number of Atom Y?
A. 11
B. 12
C. 22
D. 23
E. 24

Blooms Level: 6. Create
HAPS Learning Outcome: C01.1d With respect to the structure of an atom: Distinguish among the terms atomic number, mass number and atomic weight.
Learning Objective: 02.01D Define atomic number and mass number.
Section: 02.01
Topic: Atoms and molecules
Topic: Chemistry

18. Atom Y has 11 protons, 11 electrons, and 12 neutrons. What is the mass number of Atom Y?
A. 11
B. 12
C. 22
D. 23
E. 24

Blooms Level: 6. Create
HAPS Learning Outcome: C01.1d With respect to the structure of an atom: Distinguish among the terms atomic number, mass number and atomic weight.
Learning Objective: 02.01D Define atomic number and mass number.
Section: 02.01
Topic: Atoms and molecules
Topic: Chemistry

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19. _____ is a form of potential energy resulting from positions and interactions among subatomic particles.
A. Chemical
B. Mechanical
C. Radiant
D. Electric
E. Heat

Blooms Level: 2. Understand
HAPS Learning Outcome: C01.3 Compare and contrast the terms atoms, molecules, elements, and compounds.
Learning Objective: 02.01H Differentiate between a molecule and a compound.
Section: 02.01
Topic: Atoms and molecules
Topic: Chemistry

20. Energy
A. is the capacity to do work.
B. can neither be created nor destroyed.
C. is constantly being converted into different forms by the body.
D. can be stored in the chemical bonds between molecules/subatomic particles.
E. All of these choices are correct.

Blooms Level: 4. Analyze
Learning Objective: 02.02C Distinguish between chemical reactions that release energy and those that take in energy.
Section: 02.02
Topic: Chemical bonding
Topic: Chemistry

21. Which of the following analogies does not illustrate the energy type it is paired with?
A. the cocking back of the trigger on a starters pistol before a race - potential energy
B. picking up speed as you roll down a snow covered hill in winter - kinetic energy
C. the stretching of a bungee chord without releasing it - mechanical energy
D. the spring up you get when you jump on a pogo stick - kinetic energy
E. basketball players bending their knees before they do a lay-up - mechanical energy

Blooms Level: 4. Analyze
Learning Objective: 02.02C Distinguish between chemical reactions that release energy and those that take in energy.
Section: 02.02
Topic: Chemical bonding
Topic: Chemistry

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22. If the products of a chemical reaction contain less potential energy than the reactants,
A. energy has been stored in the molecular bonds of the product.
B. energy has been released by the breaking of molecular bonds.
C. the reaction will be reversible without additional energy input.
D. a synthesis reaction is likely to have occurred.
E. All of these choices are correct.

Blooms Level: 3. Apply
Learning Objective: 02.02C Distinguish between chemical reactions that release energy and those that take in energy.
Section: 02.02
Topic: Chemical bonding
Topic: Chemistry

23. The conversion of ATP into ADP
A. adds a phosphate group.
B. stores energy in the release of an inorganic phosphate group.
C. is an example of a exchange reaction.
D. is reversible.
E. requires the input of energy.

Blooms Level: 2. Understand
HAPS Learning Outcome: C04.4a With respect to carbohydrates, proteins, lipids and nucleic acids: Identify the monomers and polymers.
HAPS Learning Outcome: C04.4b With respect to carbohydrates, proteins, lipids and nucleic acids: Compare and contrast general molecular structure.
HAPS Learning Outcome: C04.4c With respect to carbohydrates, proteins, lipids and nucleic acids: Provide specific examples.
HAPS Learning Outcome: C04.4d With respect to carbohydrates, proteins, lipids and nucleic acids: Identify dietary sources.
HAPS Learning Outcome: C04.4e With respect to carbohydrates, proteins, lipids and nucleic acids: Discuss physiological and structural roles in the human body.
HAPS Learning Outcome: C04.5 Describe the four levels of protein structure and discuss the importance of protein shape for protein function.
Learning Objective: 02.05A Describe the structural organization and major functions of carbohydrates, lipids, proteins, and nucleic acids.
Section: 02.05
Topic: Chemistry
Topic: Energy transfer using ATP

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24. According to the law of conservation of energy, the total energy of the universe is:
A. constant
B. increasing exponentially
C. decreasing exponentially
D. increasing linearly
E. decreasing linearly.

Blooms Level: 2. Understand
Learning Objective: 02.02C Distinguish between chemical reactions that release energy and those that take in energy.
Section: 02.02
Topic: Chemical bonding
Topic: Chemistry

25. The conversion between different states of energy (e.g. potential energy to kinetic energy):
A. is not 100% efficent
B. is 100% efficent
C. typically generates heat
D. is not possible, energy can not change its state.
E. is not 100% efficent **and** typically generates heat

Blooms Level: 3. Apply
Learning Objective: 02.02C Distinguish between chemical reactions that release energy and those that take in energy.
Section: 02.02
Topic: Chemical bonding
Topic: Chemistry

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26. When there is an equal sharing of electrons between atoms, the bond that is formed is called:
A. an ionic bond.
B. a polar covalent bond.
C. a non-polar covalent bond.
D. a hydrogen bond.
E. none of these

Blooms Level: 2. Understand
HAPS Learning Outcome: C02.1a With respect to non-polar covalent, polar covalent, ionic, and hydrogen bonds: List each type of bond in order by relative strength.
HAPS Learning Outcome: C02.1b With respect to non-polar covalent, polar covalent, ionic, and hydrogen bonds: Explain the mechanism of each type of bond.
HAPS Learning Outcome: C02.1c With respect to non-polar covalent, polar covalent, ionic, and hydrogen bonds: Provide biologically significant examples of each.
Learning Objective: 02.01F Compare and contrast ionic and covalent bonds.
Section: 02.01
Topic: Chemical bonding
Topic: Chemistry

27. Non polar molecules:
A. are created when the bonding atoms share electrons equally between themselves.
B. have an asymmetrical electrical charge.
C. are also considered ions.
D. result from polar covalent bonds.
E. all of these

Blooms Level: 2. Understand
HAPS Learning Outcome: C01.3 Compare and contrast the terms atoms, molecules, elements, and compounds.
HAPS Learning Outcome: C02.1a With respect to non-polar covalent, polar covalent, ionic, and hydrogen bonds: List each type of bond in order by relative strength.
HAPS Learning Outcome: C02.1b With respect to non-polar covalent, polar covalent, ionic, and hydrogen bonds: Explain the mechanism of each type of bond.
HAPS Learning Outcome: C02.1c With respect to non-polar covalent, polar covalent, ionic, and hydrogen bonds: Provide biologically significant examples of each.
Learning Objective: 02.01F Compare and contrast ionic and covalent bonds.
Learning Objective: 02.01H Differentiate between a molecule and a compound.
Section: 02.01
Topic: Chemical bonding
Topic: Chemistry

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28. Which of the following statements is FALSE about molecules?
A. In order to be considered a molecule, a structure must be an independent unit.
B. All compounds are automatically considered molecules.
C. Molecules are formed when two or more atoms chemically combine to form a structure that behaves as an independent unit.
D. The atoms that make up a molecule can either be the same or different.
E. The atoms that make up a molecule must be chemically bound to one another.

Blooms Level: 4. Analyze
HAPS Learning Outcome: C01.3 Compare and contrast the terms atoms, molecules, elements, and compounds.
Learning Objective: 02.01H Differentiate between a molecule and a compound.
Section: 02.01
Topic: Chemical bonding
Topic: Chemistry

29. Which of the following is considered a compound but not a molecule?
A. water (H_20).
B. sodium chloride (NaCl).
C. calcium (Ca^{2+})
D. glucose ($C_6H_{12}O_6$)
E. all of these are compounds and molecules.

Blooms Level: 5. Evaluate
HAPS Learning Outcome: C01.3 Compare and contrast the terms atoms, molecules, elements, and compounds.
Learning Objective: 02.01H Differentiate between a molecule and a compound.
Section: 02.01
Topic: Atoms and molecules
Topic: Chemistry

30. Which of the following is NOT considered a compound?
A. water (H_20).
B. sodium chloride (NaCl).
C. hydrogen chloride (HCl)
D. a hydrogen molecule (H_2)
E. all of these are compounds.

Blooms Level: 5. Evaluate
HAPS Learning Outcome: C01.3 Compare and contrast the terms atoms, molecules, elements, and compounds.
Learning Objective: 02.01H Differentiate between a molecule and a compound.
Section: 02.01
Topic: Atoms and molecules
Topic: Chemistry

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31. When one atom loses an electron and another atom accepts that electron a(n) _____ bond between the two atoms results.
A. covalent
B. hydrogen
C. ionic
D. explosive
E. radioactive

Blooms Level: 3. Apply
HAPS Learning Outcome: C02.1a With respect to non-polar covalent, polar covalent, ionic, and hydrogen bonds: List each type of bond in order by relative strength.
HAPS Learning Outcome: C02.1b With respect to non-polar covalent, polar covalent, ionic, and hydrogen bonds: Explain the mechanism of each type of bond.
HAPS Learning Outcome: C02.1c With respect to non-polar covalent, polar covalent, ionic, and hydrogen bonds: Provide biologically significant examples of each.
Learning Objective: 02.01F Compare and contrast ionic and covalent bonds.
Section: 02.01
Topic: Chemical bonding
Topic: Chemistry

32. Covalent bonds occur when
A. one atom loses an electron.
B. two substances dissociate in water.
C. two atoms share electrons.
D. ions are formed.
E. one atom gains an electron.

Blooms Level: 2. Understand
HAPS Learning Outcome: C02.1a With respect to non-polar covalent, polar covalent, ionic, and hydrogen bonds: List each type of bond in order by relative strength.
HAPS Learning Outcome: C02.1b With respect to non-polar covalent, polar covalent, ionic, and hydrogen bonds: Explain the mechanism of each type of bond.
HAPS Learning Outcome: C02.1c With respect to non-polar covalent, polar covalent, ionic, and hydrogen bonds: Provide biologically significant examples of each.
Learning Objective: 02.01F Compare and contrast ionic and covalent bonds.
Section: 02.01
Topic: Chemical bonding
Topic: Chemistry

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33. The unequal, asymmetric sharing of electrons which results in one end (pole) of the molecule having a small electrical charge opposite the other end is called
A. hydrogen bonding.
B. polar covalent bonding.
C. double covalent bonding.
D. ionic bonding.
E. non-polar covalent bonding.

Blooms Level: 2. Understand
HAPS Learning Outcome: C02.1a With respect to non-polar covalent, polar covalent, ionic, and hydrogen bonds: List each type of bond in order by relative strength.
HAPS Learning Outcome: C02.1b With respect to non-polar covalent, polar covalent, ionic, and hydrogen bonds: Explain the mechanism of each type of bond.
HAPS Learning Outcome: C02.1c With respect to non-polar covalent, polar covalent, ionic, and hydrogen bonds: Provide biologically significant examples of each.
Learning Objective: 02.01F Compare and contrast ionic and covalent bonds.
Section: 02.01
Topic: Chemical bonding
Topic: Chemistry

34. If a molecule consists of two or more different kinds of atoms, it is a(n)
A. atom.
B. ion.
C. isotope.
D. compound.
E. Both atom and ion are correct names.

Blooms Level: 2. Understand
HAPS Learning Outcome: C01.3 Compare and contrast the terms atoms, molecules, elements, and compounds.
Learning Objective: 02.01H Differentiate between a molecule and a compound.
Section: 02.01
Topic: Chemistry

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35. Ionic compounds
A. are held together by the force of attraction between oppositely charged ions.
B. are not considered to be molecules.
C. do not have distinct units.
D. All of these choices are correct.
E. None of these choices are correct.

Blooms Level: 3. Apply
HAPS Learning Outcome: C02.1a With respect to non-polar covalent, polar covalent, ionic, and hydrogen bonds: List each type of bond in order by relative strength.
HAPS Learning Outcome: C02.1b With respect to non-polar covalent, polar covalent, ionic, and hydrogen bonds: Explain the mechanism of each type of bond.
HAPS Learning Outcome: C02.1c With respect to non-polar covalent, polar covalent, ionic, and hydrogen bonds: Provide biologically significant examples of each.
Learning Objective: 02.01F Compare and contrast ionic and covalent bonds.
Section: 02.01
Topic: Chemical bonding
Topic: Chemistry

36. When the hydrogen bonds that maintain a protein's three-dimensional shape are broken, the protein becomes nonfunctional, and is said to be
A. essential.
B. denatured.
C. structural.
D. unsaturated.
E. saturated.

Blooms Level: 2. Understand
HAPS Learning Outcome: C02.1b With respect to non-polar covalent, polar covalent, ionic, and hydrogen bonds: Explain the mechanism of each type of bond.
HAPS Learning Outcome: C02.1c With respect to non-polar covalent, polar covalent, ionic, and hydrogen bonds: Provide biologically significant examples of each.
Learning Objective: 02.01G Explain what creates a hydrogen bond and relate its importance.
Learning Objective: 02.05A Describe the structural organization and major functions of carbohydrates, lipids, proteins, and nucleic acids.
Section: 02.01
Topic: Chemical bonding
Topic: Chemistry

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37. The chemical compound that is represented by the acronym DNA
A. contains the sugar deoxyribose.
B. has two chains that form a double helix.
C. is composed of nucleotides.
D. is responsible for controlling cell activities.
E. has all of the properties listed here.

Blooms Level: 4. Analyze
HAPS Learning Outcome: C04.4a With respect to carbohydrates, proteins, lipids and nucleic acids: Identify the monomers and polymers.
HAPS Learning Outcome: C04.4b With respect to carbohydrates, proteins, lipids and nucleic acids: Compare and contrast general molecular structure.
HAPS Learning Outcome: C04.4c With respect to carbohydrates, proteins, lipids and nucleic acids: Provide specific examples.
HAPS Learning Outcome: C04.4d With respect to carbohydrates, proteins, lipids and nucleic acids: Identify dietary sources.
HAPS Learning Outcome: C04.4e With respect to carbohydrates, proteins, lipids and nucleic acids: Discuss physiological and structural roles in the human body.
HAPS Learning Outcome: C04.5 Describe the four levels of protein structure and discuss the importance of protein shape for protein function.
Learning Objective: 02.05A Describe the structural organization and major functions of carbohydrates, lipids, proteins, and nucleic acids.
Section: 02.05
Topic: Chemistry
Topic: Nucleic acids: DNA and RNA

38. Given that sodium bicarbonate dissociates to form Na^+ and HCO_3^- when mixed with water, which of these would be part of the explanation for taking bicarbonate ($NaHCO_3$) for excess stomach acid?
A. $NaHCO_3$ will not release hydrogen ions when mixed with water.
B. HCO_3^- will be a hydrogen ion acceptor.
C. Free hydrogen ions increase the acidity of a solution.
D. When bicarbonate ions combine with hydrogen ions, the pH increases.
E. All of these are necessary to fully explain how sodium bicarbonate works to counter excess stomach acid.

Blooms Level: 4. Analyze
HAPS Learning Outcome: C03.4 Define the terms pH, acid, base, and buffer and give examples of physiological significance.
Learning Objective: 02.03B Explain the importance of buffers in organisms.
Section: 02.03
Topic: Chemical bonding
Topic: Chemistry

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39. A(n) _____ is formed when one atom loses an electron and another atom accepts that electron.
A. ion
B. ionic bond
C. hydrogen bond
D. covalent bond
E. atom

Blooms Level: 2. Understand
HAPS Learning Outcome: C02.1a With respect to non-polar covalent, polar covalent, ionic, and hydrogen bonds: List each type of bond in order by relative strength.
HAPS Learning Outcome: C02.1b With respect to non-polar covalent, polar covalent, ionic, and hydrogen bonds: Explain the mechanism of each type of bond.
HAPS Learning Outcome: C02.1c With respect to non-polar covalent, polar covalent, ionic, and hydrogen bonds: Provide biologically significant examples of each.
Learning Objective: 02.01F Compare and contrast ionic and covalent bonds.
Section: 02.01
Topic: Chemical bonding
Topic: Chemistry

40. A(n) _____ is formed when two atoms share electrons.
A. ion
B. ionic bond
C. hydrogen bond
D. covalent bond
E. atom

Blooms Level: 2. Understand
HAPS Learning Outcome: C02.1a With respect to non-polar covalent, polar covalent, ionic, and hydrogen bonds: List each type of bond in order by relative strength.
HAPS Learning Outcome: C02.1b With respect to non-polar covalent, polar covalent, ionic, and hydrogen bonds: Explain the mechanism of each type of bond.
HAPS Learning Outcome: C02.1c With respect to non-polar covalent, polar covalent, ionic, and hydrogen bonds: Provide biologically significant examples of each.
Learning Objective: 02.01F Compare and contrast ionic and covalent bonds.
Section: 02.01
Topic: Chemical bonding
Topic: Chemistry

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41. Substances that donate hydrogen ions (protons) to a solution are called
A. acids.
B. bases.
C. alkaline.
D. salts.

Blooms Level: 1. Remember
HAPS Learning Outcome: C03.4 Define the terms pH, acid, base, and buffer and give examples of physiological significance.
HAPS Learning Outcome: C03.5 State acidic, neutral, and alkaline pH values.
Learning Objective: 02.03A Describe the pH scale and its relationship to acidic and basic solutions.
Section: 02.03
Topic: Chemical bonding
Topic: Chemistry

42. A solution with a pH of 7 is considered to be
A. acidic.
B. basic or alkaline.
C. neutral.
D. in equilibrium.

Blooms Level: 2. Understand
HAPS Learning Outcome: C03.4 Define the terms pH, acid, base, and buffer and give examples of physiological significance.
HAPS Learning Outcome: C03.5 State acidic, neutral, and alkaline pH values.
Learning Objective: 02.03A Describe the pH scale and its relationship to acidic and basic solutions.
Section: 02.03
Topic: Chemistry
Topic: Inorganic compounds and solutions

43. Chemicals that resist changes in pH when acids or bases are added to a solution are
A. acids.
B. bases.
C. salts.
D. buffers.

Blooms Level: 1. Remember
HAPS Learning Outcome: C03.4 Define the terms pH, acid, base, and buffer and give examples of physiological significance.
Learning Objective: 02.03B Explain the importance of buffers in organisms.
Section: 02.03
Topic: Chemistry
Topic: Inorganic compounds and solutions

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44. A solution with a greater concentration of hydroxide ions than hydrogen ions is
A. a buffer.
B. a salt.
C. basic.
D. acidic.
E. hydrophobic.

Blooms Level: 2. Understand
HAPS Learning Outcome: C03.4 Define the terms pH, acid, base, and buffer and give examples of physiological significance.
HAPS Learning Outcome: C03.5 State acidic, neutral, and alkaline pH values.
Learning Objective: 02.03A Describe the pH scale and its relationship to acidic and basic solutions.
Section: 02.03
Topic: Chemistry
Topic: Inorganic compounds and solutions

45. Given that $MgCl_2$ is composed of Mg^{+2} ions and Cl^- ions, $MgCl_2$ would be considered to be
A. an acid.
B. a base.
C. a salt.
D. a buffer.

Blooms Level: 3. Apply
HAPS Learning Outcome: C03.3 Define the term salt and give examples of physiological significance.
HAPS Learning Outcome: C03.4 Define the terms pH, acid, base, and buffer and give examples of physiological significance.
Learning Objective: 02.04A Distinguish between inorganic and organic molecules.
Section: 02.04
Topic: Chemistry
Topic: Inorganic compounds and solutions

46. _____ is formed by the reaction of an acid and a base.
A. An acid
B. A base
C. A salt
D. A buffer

Blooms Level: 2. Understand
HAPS Learning Outcome: C03.3 Define the term salt and give examples of physiological significance.
HAPS Learning Outcome: C03.4 Define the terms pH, acid, base, and buffer and give examples of physiological significance.
Learning Objective: 02.03A Describe the pH scale and its relationship to acidic and basic solutions.
Section: 02.03
Topic: Chemistry
Topic: Inorganic compounds and solutions

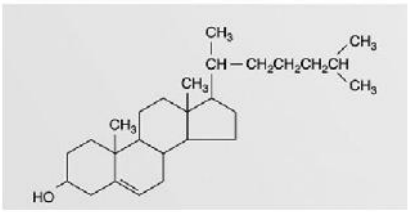
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47. A solution with a pH of 4 would have _____ hydrogen ions than a solution with a pH of 6.
A. 2 times more
B. 2 times fewer
C. 20 times more
D. 20 times fewer
E. 100 times more

Blooms Level: 3. Apply
HAPS Learning Outcome: C03.4 Define the terms pH, acid, base, and buffer and give examples of physiological significance.
HAPS Learning Outcome: C03.5 State acidic, neutral, and alkaline pH values.
Learning Objective: 02.03A Describe the pH scale and its relationship to acidic and basic solutions.
Section: 02.03
Topic: Chemistry
Topic: Inorganic compounds and solutions

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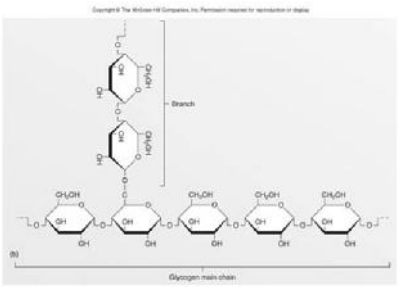
48. 

This figure represents an example of a(n)
A. steroid.
B. triglyceride.
C. phospholipids.
D. wax.
E. fatty acid.

Blooms Level: 5. Evaluate
HAPS Learning Outcome: C04.4a With respect to carbohydrates, proteins, lipids and nucleic acids: Identify the monomers and polymers.
HAPS Learning Outcome: C04.4b With respect to carbohydrates, proteins, lipids and nucleic acids: Compare and contrast general molecular structure.
HAPS Learning Outcome: C04.4c With respect to carbohydrates, proteins, lipids and nucleic acids: Provide specific examples.
HAPS Learning Outcome: C04.4d With respect to carbohydrates, proteins, lipids and nucleic acids: Identify dietary sources.
HAPS Learning Outcome: C04.4e With respect to carbohydrates, proteins, lipids and nucleic acids: Discuss physiological and structural roles in the human body.
HAPS Learning Outcome: C04.5 Describe the four levels of protein structure and discuss the importance of protein shape for protein function.
Learning Objective: 02.05A Describe the structural organization and major functions of carbohydrates, lipids, proteins, and nucleic acids.
Section: 02.05
Topic: Chemistry
Topic: Organic compounds

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49. 

This figure represents an example of a(n)

A. protein.
B. nucleic acid.
C. lipid.
D. carbohydrate.
E. ATP molecule.

Blooms Level: 5. Evaluate
HAPS Learning Outcome: C04.4a With respect to carbohydrates, proteins, lipids and nucleic acids: Identify the monomers and polymers.
HAPS Learning Outcome: C04.4b With respect to carbohydrates, proteins, lipids and nucleic acids: Compare and contrast general molecular structure.
HAPS Learning Outcome: C04.4c With respect to carbohydrates, proteins, lipids and nucleic acids: Provide specific examples.
HAPS Learning Outcome: C04.4d With respect to carbohydrates, proteins, lipids and nucleic acids: Identify dietary sources.
HAPS Learning Outcome: C04.4e With respect to carbohydrates, proteins, lipids and nucleic acids: Discuss physiological and structural roles in the human body.
HAPS Learning Outcome: C04.5 Describe the four levels of protein structure and discuss the importance of protein shape for protein function.
Learning Objective: 02.05A Describe the structural organization and major functions of carbohydrates, lipids, proteins, and nucleic acids.
Section: 02.05
Topic: Chemistry
Topic: Organic compounds

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50. Monosaccharides are the building blocks for
A. carbohydrates.
B. fats (triglycerides).
C. nucleic acids.
D. proteins.

Blooms Level: 1. Remember
HAPS Learning Outcome: C04.4a With respect to carbohydrates, proteins, lipids and nucleic acids: Identify the monomers and polymers.
HAPS Learning Outcome: C04.4b With respect to carbohydrates, proteins, lipids and nucleic acids: Compare and contrast general molecular structure.
HAPS Learning Outcome: C04.4c With respect to carbohydrates, proteins, lipids and nucleic acids: Provide specific examples.
HAPS Learning Outcome: C04.4d With respect to carbohydrates, proteins, lipids and nucleic acids: Identify dietary sources.
HAPS Learning Outcome: C04.4e With respect to carbohydrates, proteins, lipids and nucleic acids: Discuss physiological and structural roles in the human body.
HAPS Learning Outcome: C04.5 Describe the four levels of protein structure and discuss the importance of protein shape for protein function.
Learning Objective: 02.05A Describe the structural organization and major functions of carbohydrates, lipids, proteins, and nucleic acids.
Section: 02.05
Topic: Chemistry
Topic: Organic compounds

51. Glycerol and fatty acids are the building blocks for
A. carbohydrates.
B. fats (triglycerides).
C. nucleic acids.
D. proteins.

Blooms Level: 1. Remember
HAPS Learning Outcome: C04.4a With respect to carbohydrates, proteins, lipids and nucleic acids: Identify the monomers and polymers.
HAPS Learning Outcome: C04.4b With respect to carbohydrates, proteins, lipids and nucleic acids: Compare and contrast general molecular structure.
HAPS Learning Outcome: C04.4c With respect to carbohydrates, proteins, lipids and nucleic acids: Provide specific examples.
HAPS Learning Outcome: C04.4d With respect to carbohydrates, proteins, lipids and nucleic acids: Identify dietary sources.
HAPS Learning Outcome: C04.4e With respect to carbohydrates, proteins, lipids and nucleic acids: Discuss physiological and structural roles in the human body.
HAPS Learning Outcome: C04.5 Describe the four levels of protein structure and discuss the importance of protein shape for protein function.
Learning Objective: 02.05A Describe the structural organization and major functions of carbohydrates, lipids, proteins, and nucleic acids.
Section: 02.05
Topic: Chemistry
Topic: Organic compounds

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52. Nucleotides are the building blocks for
A. carbohydrates.
B. fats (triglycerides).
C. nucleic acids.
D. proteins.

Blooms Level: 1. Remember
HAPS Learning Outcome: C04.4a With respect to carbohydrates, proteins, lipids and nucleic acids: Identify the monomers and polymers.
HAPS Learning Outcome: C04.4b With respect to carbohydrates, proteins, lipids and nucleic acids: Compare and contrast general molecular structure.
HAPS Learning Outcome: C04.4c With respect to carbohydrates, proteins, lipids and nucleic acids: Provide specific examples.
HAPS Learning Outcome: C04.4d With respect to carbohydrates, proteins, lipids and nucleic acids: Identify dietary sources.
HAPS Learning Outcome: C04.4e With respect to carbohydrates, proteins, lipids and nucleic acids: Discuss physiological and structural roles in the human body.
HAPS Learning Outcome: C04.5 Describe the four levels of protein structure and discuss the importance of protein shape for protein function.
Learning Objective: 02.05A Describe the structural organization and major functions of carbohydrates, lipids, proteins, and nucleic acids.
Section: 02.05
Topic: Chemistry
Topic: Organic compounds

53. The macromolecules that function as the genetic material and are involved in protein synthesis are
A. carbohydrates
B. lipids
C. proteins
D. nucleic acids

Blooms Level: 2. Understand
HAPS Learning Outcome: C04.4a With respect to carbohydrates, proteins, lipids and nucleic acids: Identify the monomers and polymers.
HAPS Learning Outcome: C04.4b With respect to carbohydrates, proteins, lipids and nucleic acids: Compare and contrast general molecular structure.
HAPS Learning Outcome: C04.4c With respect to carbohydrates, proteins, lipids and nucleic acids: Provide specific examples.
HAPS Learning Outcome: C04.4d With respect to carbohydrates, proteins, lipids and nucleic acids: Identify dietary sources.
HAPS Learning Outcome: C04.4e With respect to carbohydrates, proteins, lipids and nucleic acids: Discuss physiological and structural roles in the human body.
HAPS Learning Outcome: C04.5 Describe the four levels of protein structure and discuss the importance of protein shape for protein function.
Learning Objective: 02.05A Describe the structural organization and major functions of carbohydrates, lipids, proteins, and nucleic acids.
Section: 02.05
Topic: Chemistry
Topic: Organic compounds

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54. _____ are a common fuel nutrient that has glycogen as a storage form.
A. Carbohydrates
B. Lipids
C. Proteins
D. Nucleic acids

Blooms Level: 2. Understand
HAPS Learning Outcome: C04.4a With respect to carbohydrates, proteins, lipids and nucleic acids: Identify the monomers and polymers.
HAPS Learning Outcome: C04.4b With respect to carbohydrates, proteins, lipids and nucleic acids: Compare and contrast general molecular structure.
HAPS Learning Outcome: C04.4c With respect to carbohydrates, proteins, lipids and nucleic acids: Provide specific examples.
HAPS Learning Outcome: C04.4d With respect to carbohydrates, proteins, lipids and nucleic acids: Identify dietary sources.
HAPS Learning Outcome: C04.4e With respect to carbohydrates, proteins, lipids and nucleic acids: Discuss physiological and structural roles in the human body.
HAPS Learning Outcome: C04.5 Describe the four levels of protein structure and discuss the importance of protein shape for protein function.
Learning Objective: 02.05A Describe the structural organization and major functions of carbohydrates, lipids, proteins, and nucleic acids.
Section: 02.05
Topic: Chemistry
Topic: Organic compounds

55. A large organic molecule was analyzed and found to contain carbon, hydrogen, oxygen, nitrogen, and sulfur. Of these choices, which would most likely have been the type of molecule analyzed?
A. carbohydrate
B. lipid
C. protein
D. nucleic acid
E. steroid

Blooms Level: 3. Apply
HAPS Learning Outcome: C04.4a With respect to carbohydrates, proteins, lipids and nucleic acids: Identify the monomers and polymers.
HAPS Learning Outcome: C04.4b With respect to carbohydrates, proteins, lipids and nucleic acids: Compare and contrast general molecular structure.
HAPS Learning Outcome: C04.4c With respect to carbohydrates, proteins, lipids and nucleic acids: Provide specific examples.
HAPS Learning Outcome: C04.4d With respect to carbohydrates, proteins, lipids and nucleic acids: Identify dietary sources.
HAPS Learning Outcome: C04.4e With respect to carbohydrates, proteins, lipids and nucleic acids: Discuss physiological and structural roles in the human body.
HAPS Learning Outcome: C04.5 Describe the four levels of protein structure and discuss the importance of protein shape for protein function.
Learning Objective: 02.05A Describe the structural organization and major functions of carbohydrates, lipids, proteins, and nucleic acids.
Section: 02.05
Topic: Chemistry
Topic: Organic compounds

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56. The building blocks for proteins are
A. monosaccharides.
B. disaccharides.
C. glycerol + fatty acids.
D. nucleotides.
E. amino acids.

Blooms Level: 2. Understand
HAPS Learning Outcome: C04.4a With respect to carbohydrates, proteins, lipids and nucleic acids: Identify the monomers and polymers.
HAPS Learning Outcome: C04.4b With respect to carbohydrates, proteins, lipids and nucleic acids: Compare and contrast general molecular structure.
HAPS Learning Outcome: C04.4c With respect to carbohydrates, proteins, lipids and nucleic acids: Provide specific examples.
HAPS Learning Outcome: C04.4d With respect to carbohydrates, proteins, lipids and nucleic acids: Identify dietary sources.
HAPS Learning Outcome: C04.4e With respect to carbohydrates, proteins, lipids and nucleic acids: Discuss physiological and structural roles in the human body.
HAPS Learning Outcome: C04.5 Describe the four levels of protein structure and discuss the importance of protein shape for protein function.
Learning Objective: 02.05A Describe the structural organization and major functions of carbohydrates, lipids, proteins, and nucleic acids.
Section: 02.05
Topic: Chemistry
Topic: Organic compounds

57. Which of these statements is true?
A. Carbohydrates are organic molecules formed from amino acid building blocks.
B. Monosaccharides become bound together by hydrolysis reactions to form polysaccharides.
C. Monosaccharides, disaccharides, and polysaccharides are large inorganic molecules.
D. The building blocks for lipids are nucleotides.
E. Essential amino acids are those that cannot be synthesized by the body.

Blooms Level: 4. Analyze
HAPS Learning Outcome: C04.4a With respect to carbohydrates, proteins, lipids and nucleic acids: Identify the monomers and polymers.
HAPS Learning Outcome: C04.4b With respect to carbohydrates, proteins, lipids and nucleic acids: Compare and contrast general molecular structure.
HAPS Learning Outcome: C04.4c With respect to carbohydrates, proteins, lipids and nucleic acids: Provide specific examples.
HAPS Learning Outcome: C04.4d With respect to carbohydrates, proteins, lipids and nucleic acids: Identify dietary sources.
HAPS Learning Outcome: C04.4e With respect to carbohydrates, proteins, lipids and nucleic acids: Discuss physiological and structural roles in the human body.
HAPS Learning Outcome: C04.5 Describe the four levels of protein structure and discuss the importance of protein shape for protein function.
Learning Objective: 02.05A Describe the structural organization and major functions of carbohydrates, lipids, proteins, and nucleic acids.
Section: 02.05
Topic: Chemistry
Topic: Organic compounds

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58. The chemical compound that is represented by the acronym ATP
A. is synthesized using energy released during the breakdown of food molecules.
B. can be broken down to ADP and a fatty acid.
C. has nothing to do with stored energy.
D. is a common temporary storage form of immediately usable energy within cells.
E. is synthesized using energy released during the breakdown of food molecules and is a common temporary storage form of immediately usable energy within cells.

Blooms Level: 2. Understand
HAPS Learning Outcome: C04.4a With respect to carbohydrates, proteins, lipids and nucleic acids: Identify the monomers and polymers.
HAPS Learning Outcome: C04.4b With respect to carbohydrates, proteins, lipids and nucleic acids: Compare and contrast general molecular structure.
HAPS Learning Outcome: C04.4c With respect to carbohydrates, proteins, lipids and nucleic acids: Provide specific examples.
HAPS Learning Outcome: C04.4d With respect to carbohydrates, proteins, lipids and nucleic acids: Identify dietary sources.
HAPS Learning Outcome: C04.4e With respect to carbohydrates, proteins, lipids and nucleic acids: Discuss physiological and structural roles in the human body.
HAPS Learning Outcome: C04.5 Describe the four levels of protein structure and discuss the importance of protein shape for protein function.
Learning Objective: 02.05A Describe the structural organization and major functions of carbohydrates, lipids, proteins, and nucleic acids.
Section: 02.05
Topic: Chemistry
Topic: Energy transfer using ATP

59. Sucrose is an example of
A. a monosaccharide.
B. a lipid.
C. a disaccharide.
D. an inorganic molecule.
E. a polysaccharide.

Blooms Level: 3. Apply
HAPS Learning Outcome: C04.4a With respect to carbohydrates, proteins, lipids and nucleic acids: Identify the monomers and polymers.
HAPS Learning Outcome: C04.4b With respect to carbohydrates, proteins, lipids and nucleic acids: Compare and contrast general molecular structure.
HAPS Learning Outcome: C04.4c With respect to carbohydrates, proteins, lipids and nucleic acids: Provide specific examples.
HAPS Learning Outcome: C04.4d With respect to carbohydrates, proteins, lipids and nucleic acids: Identify dietary sources.
HAPS Learning Outcome: C04.4e With respect to carbohydrates, proteins, lipids and nucleic acids: Discuss physiological and structural roles in the human body.
HAPS Learning Outcome: C04.5 Describe the four levels of protein structure and discuss the importance of protein shape for protein function.
Learning Objective: 02.05A Describe the structural organization and major functions of carbohydrates, lipids, proteins, and nucleic acids.
Section: 02.05
Topic: Chemistry
Topic: Organic compounds

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60. Glycogen and starch are examples of
A. monosaccharides.
B. nucleic acids.
C. proteins.
D. polysaccharides.
E. lipids.

Blooms Level: 3. Apply
HAPS Learning Outcome: C04.4a With respect to carbohydrates, proteins, lipids and nucleic acids: Identify the monomers and polymers.
HAPS Learning Outcome: C04.4b With respect to carbohydrates, proteins, lipids and nucleic acids: Compare and contrast general molecular structure.
HAPS Learning Outcome: C04.4c With respect to carbohydrates, proteins, lipids and nucleic acids: Provide specific examples.
HAPS Learning Outcome: C04.4d With respect to carbohydrates, proteins, lipids and nucleic acids: Identify dietary sources.
HAPS Learning Outcome: C04.4e With respect to carbohydrates, proteins, lipids and nucleic acids: Discuss physiological and structural roles in the human body.
HAPS Learning Outcome: C04.5 Describe the four levels of protein structure and discuss the importance of protein shape for protein function.
Learning Objective: 02.05A Describe the structural organization and major functions of carbohydrates, lipids, proteins, and nucleic acids.
Section: 02.05
Topic: Chemistry
Topic: Organic compounds

61. Which of these statements concerning lipids is NOT true?
A. The building blocks of fats (triglycerides) are fatty acids and glycerol.
B. A fatty acid that contains only single covalent bonds between the carbon atoms is called unsaturated.
C. Fats, phospholipids, and steroids are lipids.
D. Lipids are substances that dissolve in nonpolar solvents.

Blooms Level: 4. Analyze
HAPS Learning Outcome: C04.4a With respect to carbohydrates, proteins, lipids and nucleic acids: Identify the monomers and polymers.
HAPS Learning Outcome: C04.4b With respect to carbohydrates, proteins, lipids and nucleic acids: Compare and contrast general molecular structure.
HAPS Learning Outcome: C04.4c With respect to carbohydrates, proteins, lipids and nucleic acids: Provide specific examples.
HAPS Learning Outcome: C04.4d With respect to carbohydrates, proteins, lipids and nucleic acids: Identify dietary sources.
HAPS Learning Outcome: C04.4e With respect to carbohydrates, proteins, lipids and nucleic acids: Discuss physiological and structural roles in the human body.
HAPS Learning Outcome: C04.5 Describe the four levels of protein structure and discuss the importance of protein shape for protein function.
Learning Objective: 02.05A Describe the structural organization and major functions of carbohydrates, lipids, proteins, and nucleic acids.
Section: 02.05
Topic: Chemistry
Topic: Organic compounds

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62. When two or more atoms, ions, or molecules combine to form a new and larger molecule, the process is called a
A. decomposition reaction.
B. synthesis reaction.
C. reversible reaction.
D. buffer reaction.
E. equilibrium reaction.

Blooms Level: 2. Understand
Learning Objective: 02.02A Summarize the characteristics of synthesis, decomposition, and exchange reactions.
Section: 02.02
Topic: Chemical bonding
Topic: Chemistry

63. Which of the following processes represents a synthesis reaction?
A. glycolysis
B. the creation of a protein from amino acids
C. glycogenolysis
D. All of these are synthesis reactions.

Blooms Level: 4. Analyze
Learning Objective: 02.02A Summarize the characteristics of synthesis, decomposition, and exchange reactions.
Section: 02.02
Topic: Chemical bonding
Topic: Chemistry

64. Chemical reactions with the property of being able to proceed from reactants to products and from products to reactants are called
A. exchange reactions.
B. synthesis reactions.
C. decomposition reactions.
D. reversible reactions.
E. net reaction rates.

Blooms Level: 2. Understand
Learning Objective: 02.02B Explain how reversible reactions produce chemical equilibrium.
Section: 02.02
Topic: Chemical bonding
Topic: Chemistry

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65. In a reversible reaction, when the rate of product formation is equal to the rate of reactant formation, the reaction is
A. stopped.
B. at equilibrium.
C. in danger of exploding.
D. a net decomposition reaction.
E. a net synthesis reaction.

Blooms Level: 2. Understand
Learning Objective: 02.02B Explain how reversible reactions produce chemical equilibrium.
Section: 02.02
Topic: Chemical bonding
Topic: Chemistry

66. A substance that increases the rate at which a reaction proceeds, without itself being changed or depleted is a
A. catalyst.
B. reactant.
C. buffer.
D. base.
E. product.

Blooms Level: 2. Understand
HAPS Learning Outcome: C04.6 Demonstrate factors that affect enzyme activity, including denaturation, and interpret graphs showing the effects of various factors on the rate of enzyme-catalyzed reactions.
Learning Objective: 02.02D Describe the factors that can affect the rate of chemical reactions.
Section: 02.02
Topic: Chemical bonding
Topic: Chemistry

67. Enzymes
A. are globular proteins.
B. function as biological catalysts.
C. lower the activation energy of a reaction.
D. can be used to regulate chemical reactions.
E. All of these choices are correct.

Blooms Level: 4. Analyze
Learning Objective: 02.05B Explain how enzymes work.
Section: 02.05
Topic: Chemistry
Topic: Organic compounds

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68. Which of the following will **decrease** the rate at which a reaction occurs?
A. decreasing the concentration of reactants
B. increasing the concentration of reactants
C. increasing the temperature
D. increasing the amount of the required catalyst
E. All of these will decrease the rate at which the reaction occurs.

Blooms Level: 4. Analyze
HAPS Learning Outcome: C04.6 Demonstrate factors that affect enzyme activity, including denaturation, and interpret graphs showing the effects of various factors on the rate of enzyme-catalyzed reactions.
Learning Objective: 02.02D Describe the factors that can affect the rate of chemical reactions.
Section: 02.02
Topic: Chemical bonding
Topic: Chemistry

69. In living things, which of these is most important for regulating the rate of chemical reactions?
A. changing concentration of reactants
B. changing temperature
C. changing concentration and activity of enzymes catalyzing the reactions
D. nature of reacting substances - carbohydrates react faster than lipids, for example

Blooms Level: 4. Analyze
HAPS Learning Outcome: C04.6 Demonstrate factors that affect enzyme activity, including denaturation, and interpret graphs showing the effects of various factors on the rate of enzyme-catalyzed reactions.
Learning Objective: 02.02D Describe the factors that can affect the rate of chemical reactions.
Section: 02.02
Topic: Chemical bonding
Topic: Chemistry

70. Enzymes function by
A. increasing the activation energy needed to start a chemical reaction.
B. having a specific shape that allows them to bind to particular reactants.
C. each enzyme acting as a catalyst for many different reaction types.
D. greatly decreasing reaction rates.
E. doing all of these.

Blooms Level: 2. Understand
Learning Objective: 02.05B Explain how enzymes work.
Section: 02.05
Topic: Chemistry
Topic: Organic compounds

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71. Which of these is NOT a property of water that makes it useful for living organisms?
A. Water allows body temperature to increase or decrease rapidly.
B. Water causes ionic substances to dissociate.
C. Water acts as a lubricant.
D. Water is necessary for the transport of nutrients, gases, and waste products.
E. Water is necessary for many chemical reactions.

Blooms Level: 3. Apply
HAPS Learning Outcome: C03.1 Discuss the physiologically important properties of water.
Learning Objective: 02.04B Describe how the properties of oxygen, carbon dioxide, and water contribute to their physiological functions.
Section: 02.04
Topic: Chemistry
Topic: Inorganic compounds and solutions

72. Which of these is an organic molecule?
A. H_2O
B. H_2CO_3
C. CO_2
D. NaCl
E. $CaCl_2$

Blooms Level: 5. Evaluate
HAPS Learning Outcome: C04.1 Define the term organic molecule.
Learning Objective: 02.04A Distinguish between inorganic and organic molecules.
Section: 02.04
Topic: Chemistry
Topic: Organic compounds

73. Which of the following pairs correctly matches the example with its classification?
A. compound - two atoms of hydrogen combined
B. molecule - sodium chloride
C. molecule - two hydrogen atoms and one oxygen atom combined
D. compound - two hydrogen atoms and one oxygen atom combined
E. molecule - two hydrogen atoms and one oxygen atom combined **and** compound - two hydrogen atoms and one oxygen atom combined

Blooms Level: 5. Evaluate
HAPS Learning Outcome: C01.3 Compare and contrast the terms atoms, molecules, elements, and compounds.
Learning Objective: 02.01H Differentiate between a molecule and a compound.
Section: 02.01
Topic: Atoms and molecules
Topic: Chemistry

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True / False Questions

74.

Chemistry is the scientific discipline that is concerned with cellular composition and the structure of their substances and the reactions they undergo.

FALSE

Blooms Level: 1. Remember
HAPS Topic: Module C01 Atoms and molecules.
Learning Objective: 2.01A Learning Outcome: 02.01A Define chemistry and state its relevance to anatomy and physiology.
Section: 02.01: Basic Chemistry
Topic: Atoms and molecules
Topic: Chemistry
Type: True/False

Multiple Choice Questions

75. Which of the following statements is true?
A.

Ionic compounds dissociate in water because the positive ions are attracted to the negative ends of the water molecules and negative ions are attracted to the positive ends of water molecules.

B.

Ionic compounds dissociate in water because negative ions are attracted to the negative ends of the water molecules and positive ions are attracted to the positive ends of water molecules.

Blooms Level: 1. Remember
HAPS Learning Outcome: C03.1 Discuss the physiologically important properties of water.
HAPS Learning Outcome: C03.2 Distinguish among the terms solution, solute, solvent, colloid suspension, and emulsion.
HAPS Learning Outcome: C03.3 Define the term salt and give examples of physiological significance.
Learning Outcome: 02.01I Describe the process of dissociation.
Section: 02.01: Basic Chemistry
Topic: Inorganic compounds and solutions
Type: Multiple Choice

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