

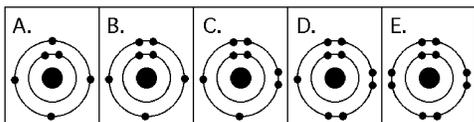
AP Bio Unit 1 Study Guide Chapter 2**Multiple Choice**

Identify the letter of the choice that best completes the statement or answers the question.

- _____ 1. About 25 of the 92 natural elements are known to be essential to life. Which four of these 25 elements make up approximately 96% of living matter?
- carbon, sodium, chlorine, nitrogen
 - carbon, sulfur, phosphorus, hydrogen
 - oxygen, hydrogen, calcium, sodium
 - carbon, hydrogen, nitrogen, oxygen
 - carbon, oxygen, sulfur, calcium
- _____ 2. Trace elements are those required by an organism in only minute quantities. Which of the following is a trace element that is required by humans and other vertebrates?
- nitrogen
 - calcium
 - iodine
 - sodium
 - phosphorus
- _____ 3. Each element is unique and different from other elements because of the number of protons in the nuclei of its atoms. Which of the following indicates the number of protons in an atom's nucleus?
- atomic mass
 - atomic weight
 - atomic number
 - mass weight
 - mass number
- _____ 4. The mass number of an element can be easily approximated by adding together the number of _____ in an atom of that element.
- protons and neutrons
 - energy levels
 - protons and electrons
 - neutrons and electrons
 - isotopes
- _____ 5. Oxygen has an atomic number of 8 and a mass number of 16. Thus, the atomic mass of an oxygen atom is
- exactly 8 grams.
 - exactly 8 daltons.
 - approximately 16 grams.
 - approximately 16 daltons.
 - 24 amu (atomic mass units).

- _____ 6. The nucleus of a nitrogen atom contains 7 neutrons and 7 protons. Which of the following is a *correct statement concerning nitrogen*?
- The nitrogen atom has a mass number of approximately 7 daltons and an atomic mass of 14.
 - The nitrogen atom has a mass number of approximately 14 daltons and an atomic mass of 7.
 - The nitrogen atom has a mass number of 14 and an atomic mass of 7 grams.
 - The nitrogen atom has a mass number of 7 grams and an atomic number of 14.
 - The nitrogen atom has a mass number of 14 and an atomic mass of approximately 14 daltons.
- _____ 7. Different atomic forms of an element contain the same number of protons but a different number of neutrons. What are these different atomic forms called?
- ions
 - isotopes
 - neutronic atoms
 - isomers
 - radioactive atoms
- _____ 8. Which of the following best describes the relationship between the atoms described below?
- | Atom 1 | Atom 2 |
|------------------|------------------|
| ${}^1_1\text{H}$ | ${}^3_1\text{H}$ |
- They are isomers.
 - They are polymers.
 - They are isotopes.
 - They contain 1 and 3 protons, respectively.
 - They each contain 1 neutron.
- _____ 9. ${}^3_1\text{H}$ is a radioactive isotope of hydrogen. One difference between hydrogen-1 (${}^1_1\text{H}$) and hydrogen-3 (${}^3_1\text{H}$) is that hydrogen-3 has
- one more neutron and one more proton than hydrogen-1.
 - one more proton and one more electron than hydrogen-1.
 - one more electron and one more neutron than hydrogen-1.
 - two more neutrons than hydrogen-1.
 - two more protons than hydrogen-1.
- _____ 10. The atomic number of carbon is 6. Carbon-14 is heavier than carbon-12 because the atomic nucleus of carbon-14 contains _____ neutrons.
- 6
 - 7
 - 8
 - 12
 - 14

Use the figure below to answer the following questions.



- _____ 11. Which drawing depicts the electron configuration of neon ($^{20}_{10}\text{Ne}$)?
- Drawing A
 - Drawing B
 - Drawing C
 - Drawing D
 - Drawing E
- _____ 12. Which drawing is of an atom with the atomic number of 6?
- Drawing A
 - Drawing B
 - Drawing C
 - Drawing D
 - Drawing E
- _____ 13. Which drawing depicts an atom that is inert or chemically unreactive?
- Drawing A
 - Drawing B
 - Drawing C
 - Drawing D
 - Drawing E
- _____ 14. What does the reactivity of an atom depend on?
- number of valence shells in the atom
 - number of orbitals found in the atom
 - number of electrons in each orbital in the atom
 - presence of unpaired electrons in the outer valence shell of the atom
 - presence of hybridized orbitals in the atom
- _____ 15. Atoms whose outer electron shells contain eight electrons tend to
- form ionic bonds in aqueous solutions.
 - form covalent bonds in aqueous solutions.
 - be stable and chemically nonreactive, or inert.
 - be unstable and chemically very reactive.
 - be isotopes and very radioactive.

Use the information extracted from the periodic table in the figure below to answer the following questions.

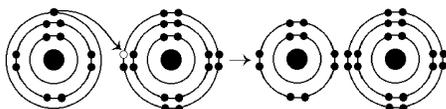
Atomic mass →	12	16	1	14	32	31
	C	O	H	N	S	P
Atomic number →	6	8	1	7	16	15

- ____ 16. How many electrons does nitrogen have in its valence shell?
- 2
 - 5
 - 7
 - 8
 - 14
- ____ 17. How many electrons does phosphorus have in its valence shell?
- 1
 - 2
 - 3
 - 4
 - 5
- ____ 18. How many electrons does an atom of sulfur have in its valence shell?
- 4
 - 6
 - 8
 - 16
 - 32
- ____ 19. Based on electron configuration, which of these elements would exhibit chemical behavior most like that of oxygen?
- carbon
 - hydrogen
 - nitrogen
 - sulfur
 - phosphorus
- ____ 20. The atomic number of each atom is given to the left of each of the elements below. Which of the atoms has the same valence as carbon (${}^{12}_{6}\text{C}$)?
- 7nitrogen
 - 9fluorine
 - 10neon
 - 12magnesium
 - 14silicon

- _____ 21. What is the valence of an atom with six electrons in its outer electron shell?
- 1
 - 2
 - 3
 - 4
 - 5
- _____ 22. What is the maximum number of electrons in the *1s orbital of an atom*?
- 1
 - 2
 - 3
 - 4
 - 5
- _____ 23. If an atom of sulfur (atomic number 16) were allowed to react with atoms of hydrogen (atomic number 1), which of the molecules below would be formed?
- S-H
 - H-S-H
 - H-S-H
 - $\begin{array}{c} | \\ \text{H} \\ | \\ \text{H} \end{array}$
 - $\begin{array}{c} | \\ \text{H-S-H} \\ | \\ \text{H} \end{array}$
 - H=S=H
- _____ 24. A molecule of carbon dioxide (CO₂) is formed when one atom of carbon (atomic number 6) is covalently bonded with two atoms of oxygen (atomic number 8). What is the total number of electrons that must be shared between the carbon atom and the oxygen atoms in order to complete the outer electron shell of all three atoms?
- 1
 - 2
 - 3
 - 4
 - 5
- _____ 25. Nitrogen (N) is much more electronegative than hydrogen (H). Which of the following statements is *correct* about the atoms in ammonia (NH₃)?
- Each hydrogen atom has a partial positive charge.
 - The nitrogen atom has a strong positive charge.
 - Each hydrogen atom has a slight negative charge.
 - The nitrogen atom has a partial positive charge.
 - There are covalent bonds between the hydrogen atoms.

- _____ 26. When two atoms are equally electronegative, they will interact to form
- equal numbers of isotopes.
 - ions.
 - polar covalent bonds.
 - nonpolar covalent bonds.
 - ionic bonds.
- _____ 27. What results from an unequal sharing of electrons between atoms?
- a nonpolar covalent bond
 - a polar covalent bond
 - an ionic bond
 - a hydrogen bond
 - a hydrophobic interaction
- _____ 28. A covalent bond is likely to be polar when
- one of the atoms sharing electrons is much more electronegative than the other atom.
 - the two atoms sharing electrons are equally electronegative.
 - the two atoms sharing electrons are of the same element.
 - it is between two atoms that are both very strong electron acceptors.
 - the two atoms sharing electrons are different elements.

Use the figure below to answer the following questions. .



- _____ 29. What results from the chemical reaction?
- a cation with a net charge of +1
 - a cation with a net charge of -1
 - an anion with a net charge of +1
 - an anion with a net charge of -1
 - A and D
- _____ 30. What is the atomic number of the cation formed in the reaction?
- 1
 - 8
 - 10
 - 11
 - 16

- _____ 31. What is the difference between covalent bonds and ionic bonds?
- Covalent bonds involve the sharing of protons between atoms, and ionic bonds involve the sharing of electrons between atoms.
 - Covalent bonds involve the sharing of neutrons between atoms, and ionic bonds involve the sharing of electrons between atoms.
 - Covalent bonds involve the sharing of electrons between atoms, and ionic bonds involve the electrical attraction between atoms.
 - Covalent bonds involve the sharing of protons between atoms, and ionic bonds involve the sharing of neutrons between atoms.
 - Covalent bonds involve the transfer of electrons between atoms, and ionic bonds involve the sharing of neutrons between atoms.
- _____ 32. Van der Waals interactions result when
- hybrid orbitals overlap.
 - electrons are not symmetrically distributed in a molecule.
 - molecules held by ionic bonds react with water.
 - two polar covalent bonds react.
 - a hydrogen atom loses an electron.
- _____ 33. A van der Waals interaction is the weak attraction between
- the electrons of one molecule and the electrons of a nearby molecule.
 - the nucleus of one molecule and the electrons of a nearby molecule.
 - a polar molecule and a nearby nonpolar molecule.
 - a polar molecule and a nearby molecule that is also polar.
 - a nonpolar molecule and a nearby molecule that is also nonpolar.
- _____ 34. Which of the following best describes chemical equilibrium?
- Forward and reverse reactions continue with no effect on the concentrations of the reactants and products.
 - Concentrations of products are higher than the concentrations of the reactants.
 - Forward and reverse reactions have stopped so that the concentration of the reactants equals the concentration of the products.
 - Reactions stop only when all reactants have been converted to products.
 - There are equal concentrations of reactants and products, and the reactions have stopped.
- _____ 35. Which of the following describes any reaction that has attained chemical equilibrium?
- The concentration of the reactants equals the concentration of the products.
 - The rate of the forward reaction is equal to the rate of the reverse reaction.
 - All of the reactants have been converted to the products of the reaction.
 - All of the products have been converted to the reactants of the reaction.
 - Both the forward and the reverse reactions have stopped with no net effect on the concentration of the reactants and the products.