

Name: _____

- 1) What is the total number of electrons in a Cr^{3+} ion?
 A) 24 B) 27 C) 21 D) 18
- 2) In comparison to an atom of $^{19}_9\text{F}$ in the ground state, an atom of $^{12}_6\text{C}$ in the ground state has
 A) three more valence electrons C) three more neutrons
 B) three fewer neutrons D) three fewer valence electrons
- 3) Which symbols represent atoms that are isotopes of each other?
 A) ^{14}C and ^{14}N B) ^{222}Rn and ^{222}Ra C) ^{131}I and ^{131}I D) ^{16}O and ^{18}O
- 4) When the electrons of an excited atom return to a lower energy state, the energy emitted can result in the production of
 A) protons B) alpha particles C) isotopes D) spectra
- 5) What is the total number of protons in the nucleus of an atom of potassium-42?
 A) 42 B) 39 C) 19 D) 15
- 6) Which conclusion is based on the "gold foil experiment" and the resulting model of the atom?
 A) An atom is mainly empty space, and the nucleus has a negative charge.
 B) An atom has hardly any empty space, and the nucleus has a negative charge.
 C) An atom has hardly any empty space, and the nucleus has a positive charge.
 D) An atom is mainly empty space, and the nucleus has a positive charge.
- 7) All atoms of a given element must contain the same number of
 A) protons C) neutrons
 B) electrons plus neutrons D) protons plus neutrons
- 8) Which nucleus is from an isotope of an atom with the nucleus $\begin{pmatrix} 6n \\ 6p \end{pmatrix}$?
 A) $\begin{pmatrix} 8n \\ 6p \end{pmatrix}$ B) $\begin{pmatrix} 6n \\ 8p \end{pmatrix}$ C) $\begin{pmatrix} 6n \\ 6p \end{pmatrix}$ D) $\begin{pmatrix} 4n \\ 8p \end{pmatrix}$
- 9) During a flame test, ions of a specific metal are heated in the flame of a gas burner. A characteristic color of light is emitted by these ions in the flame when the electrons
 A) emit energy as they move to higher energy levels C) emit energy as they return to lower energy levels
 B) gain energy as they return to lower energy levels D) gain energy as they move to higher energy levels
- 10) The atomic mass of an element is the weighted average of the masses of
 A) all of its radioactive isotopes C) its two most abundant isotopes
 B) its two least abundant isotopes D) all of its naturally occurring isotopes

- 11) What is the mass number of the nuclear symbol ${}^{19}_{9}\text{F}$?
 A) 28 B) 9 C) 10 D) 19
- 12) The atomic number of an atom is *always* equal to the number of its
 A) protons plus neutrons C) protons plus electrons
 B) protons, only D) neutrons, only
- 13) What is the mass number of an atom that contains 19 protons, 19 electrons, and 20 neutrons?
 A) 20 B) 58 C) 39 D) 19
- 14) Compared to a proton, an electron has
 A) a greater quantity of charge and the same sign C) a greater quantity of charge and the opposite sign
 B) the same quantity of charge and the opposite sign D) the same quantity of charge and the same sign
- 15) An atom of carbon-12 and an atom of carbon-14 differ in
 A) number of electrons C) nuclear charge
 B) mass number D) atomic number
- 16) The modern model of the atom shows that electrons are
 A) found in regions called orbitals C) orbiting the nucleus in fixed paths
 B) located in a solid sphere covering the nucleus D) combined with neutrons in the nucleus
- 17) What is the total number of electrons in the valence shell of an atom of aluminum in the ground state?
 A) 8 B) 2 C) 3 D) 10
- 18) Element *X* has two isotopes. If 72.0% of the element has an isotopic mass of 84.9 atomic mass units, and 28.0% of the element has an isotopic mass of 87.0 atomic mass units, the average atomic mass of element *X* is numerically equal to
 A) $(72.0 - 84.9) \times (28.0 + 87.0)$ C) $(72.0 + 84.9) \times (28.0 + 87.0)$
 B) $\frac{(72.0 \times 84.9)}{100} + \frac{(28.0 \times 87.0)}{100}$ D) $(72.0 \times 84.9) + (28.0 \times 87.0)$
- 19) Which Lewis electron-dot diagram represents a boron atom in the ground state?
 A) $\cdot\text{B}$ B) $:\ddot{\text{B}}$ C) $:\ddot{\text{B}}\cdot$ D) $:\ddot{\text{B}}:$
- 20) Which electron configuration represents the electrons of an atom in an excited state?
 A) 2-8-1 B) 2-8-17-6 C) 2-8-18-5 D) 2-8-6