

Review Questions

- Which two particles each have a mass approximately equal to one atomic mass unit?
 - electron and neutron
 - electron and positron
 - proton and electron
 - proton and neutron
- Which subatomic particles are located in the nucleus of a neon atom?
 - electrons and positrons
 - electrons and neutrons
 - protons and neutrons
 - protons and electrons
- Which statement best describes the nucleus of an aluminum atom?
 - It has a charge of +13 and is surrounded by a total of 10 electrons.
 - It has a charge of + 13 and is surrounded by a total of 13 electrons.
 - It has a charge of -13 and is surrounded by a total of 10 electrons.
 - It has a charge of -13 and is surrounded by a total of 13 electrons.
- What is the charge and mass of a proton?
 - charge of +1 and mass of 1 amu
 - charge of +1 and mass of $\frac{1}{1836}$ amu
 - charge of -1 and mass of 1 amu
 - charge of -1 and mass of $\frac{1}{1836}$ amu
- Experimental evidence indicates that the nucleus of an atom
 - contains most of the mass of the atom
 - contains a small percentage of the mass of the atom
 - has no charge
 - has a negative charge
- What was concluded about the structure of the atom as the result of the gold foil experiment?
 - A positively charged nucleus is surrounded by positively charged particles.
 - A positively charged nucleus is surrounded by mostly empty space.
 - A negatively charged nucleus is surrounded by positively charged particles.
 - A negatively charged nucleus is surrounded by mostly empty space.
- Which sequence represents a correct order of historical developments leading to the modern model of the atom?
 - the atom is a hard sphere → most of the atom is empty space → electrons exist in orbitals outside the nucleus
 - the atom is a hard sphere → electrons exist in orbitals outside the nucleus → most of the atom is empty space
 - most of the atom is empty space → electrons exist in orbitals outside the nucleus → the atom is a hard sphere
 - most of the atom is empty space → the atom is a hard sphere → electrons exist in orbitals outside the nucleus
- An atom is electrically neutral because the
 - number of protons equals the number of electrons
 - number of protons equals the number of neutrons
 - ratio of the number of neutrons to the number of electrons is 1:1
 - ratio of the number of neutrons to the number of protons is 2:1
- A sample composed only of atoms having the same atomic number is classified as
 - a compound
 - a solution
 - a element
 - an isomer
- What is the total charge of the nucleus of a carbon atom?
 - 6
 - 0
 - +6
 - +12
- Two atoms will always have the same atomic number if they have the same
 - mass number
 - number of protons
 - number of neutrons
 - number of nucleons
- Which of the Group 17 elements listed below has the greatest nuclear charge?
 - F
 - Cl
 - Br
 - I
- An atom of ${}^{40}_{18}\text{Ar}$ has a nucleus that contains a total of
 - 18 electrons
 - 18 protons
 - 18 neutrons
 - 18 nucleons
- Which two particles make up most of the mass of a hydrogen-2 atom?
 - electron and neutron
 - electron and proton
 - proton and neutron
 - proton and positron

Review Questions

15. What is the total number of neutrons in an atom of ${}^7_3\text{Li}$?
 A) 7 B) 10 C) 3 D) 4
16. The atomic mass of an atom is measured in atomic mass units. This unit is based on
 A) ${}^1\text{H}$ B) ${}^{14}\text{N}$ C) ${}^{16}\text{O}$ D) ${}^{12}\text{C}$
17. Atoms of different isotopes of the same element differ in their total number of
 A) electrons B) neutrons
 C) protons D) valence electrons
18. What is the structure of a krypton-85 atom?
 A) 49 electrons, 49 protons, and 85 neutrons
 B) 49 electrons, 49 protons, and 49 neutrons
 C) 36 electrons, 36 protons, and 85 neutrons
 D) 36 electrons, 36 protons, and 49 neutrons
19. Atoms of ${}^{16}\text{O}$, ${}^{17}\text{O}$, and ${}^{18}\text{O}$ have the same number of
 A) neutrons, but a different number of protons
 B) protons, but a different number of neutrons
 C) protons, but a different number of electrons
 D) electrons, but a different number of protons
20. Which isotopic notation represents an atom of carbon-14?
 A) ${}^6_8\text{C}$ B) ${}^8_6\text{C}$ C) ${}^{6}_{14}\text{C}$ D) ${}^{14}_6\text{C}$
21. Which two nuclides are isotopes of the same element?
 A) ${}^{20}_{11}\text{Na}$ and ${}^{20}_{10}\text{Ne}$ B) ${}^{39}_{19}\text{K}$ and ${}^{40}_{20}\text{Ca}$
 C) ${}^{39}_{19}\text{K}$ and ${}^{42}_{19}\text{K}$ D) ${}^{14}_6\text{C}$ and ${}^{14}_7\text{N}$
22. Which atoms are isotopes of the same element?
 A) ${}^{24}_{12}\text{X}$ and ${}^{25}_{12}\text{X}$ B) ${}^{20}_{10}\text{X}$ and ${}^{20}_{11}\text{X}$
 C) ${}^{31}_{15}\text{X}$ and ${}^{32}_{16}\text{X}$ D) ${}^{31}_{19}\text{X}$ and ${}^{31}_{19}\text{X}$
23. A 100.00-gram sample of naturally occurring boron contains 19.78 grams of boron-10 (atomic mass = 10.01 atomic mass units) and 80.22 grams of boron-11 (atomic mass = 11.01 atomic mass units). Which numerical setup can be used to determine the atomic mass of naturally occurring boron?
 A) $(0.1978)(10.01) + (0.8022)(11.01)$
 B) $(0.8022)(10.01) + (0.1978)(11.01)$
 C) $(0.1978)(10.01)/(0.8022)(11.01)$
 D) $(0.8022)(10.01)/(0.1978)(11.01)$
24. The atomic mass of an element is the weighted average of the
 A) number of protons in the isotopes of that element
 B) number of neutrons in the isotopes of that element
 C) atomic numbers of the naturally occurring isotopes of that element
 D) atomic masses of the naturally occurring isotopes of that element
25. The average isotopic mass of chlorine is 35.5. Which mixture of isotopes (shown as percents) produces this average mass?
 A) 50% ${}^{12}\text{C}$ and 50% ${}^{13}\text{C}$
 B) 50% ${}^{35}\text{Cl}$ and 50% ${}^{37}\text{Cl}$
 C) 75% ${}^{35}\text{Cl}$ and 25% ${}^{37}\text{Cl}$
 D) 75% ${}^{12}\text{C}$ and 25% ${}^{13}\text{C}$
26. A sample of element X contains 90. percent ${}^{35}\text{X}$ atoms, 8.0 percent ${}^{37}\text{X}$ atoms, and 2.0 percent ${}^{38}\text{X}$ atoms. The average isotopic mass is closest to
 A) 32 B) 35 C) 37 D) 38
27. How do the energy and the most probable location of an electron in the third shell of an atom compare to the energy and the most probable location of an electron in the first shell of the same atom?
 A) In the third shell, an electron has more energy and is closer to the nucleus.
 B) In the third shell, an electron has more energy and is farther from the nucleus.
 C) In the third shell, an electron has less energy and is closer to the nucleus.
 D) In the third shell, an electron has less energy and is farther from the nucleus.
28. Compared to an electron in the first electron shell of an atom, an electron in the third shell of the same atom has
 A) less mass B) less energy
 C) more mass D) more energy
29. What is the electron configuration of a sulfur atom in the ground state?
 A) 2–4 B) 2–6
 C) 2–8–4 D) 2–8–6
30. An atom of bromine is in the ground state. The outermost electrons are in principal energy level
 A) 1 B) 2 C) 3 D) 4
31. What is the total number of electrons in the second energy shell of a calcium atom in the ground state?
 A) 6 B) 2 C) 8 D) 18

Review Questions

32. Which electron configuration could represent a strontium atom in an excited state?
- A) 2-8-18-7-1 B) 2-8-18-7-3
C) 2-8-18-8-1 D) 2-8-18-8-2
33. Which electron configuration represents an atom of aluminum in an excited state?
- A) 2-7-4 B) 2-7-7 C) 2-8-3 D) 2-8-6
34. An electron in an atom moves from the ground state to an excited state when the energy of the electron
- A) decreases B) increases
C) remains the same
35. As an electron in a hydrogen atom moves from the second principal energy level to the first principal energy level, the energy of the atom
- A) decreases B) increases
C) remains the same
36. An atom of oxygen is in an excited state. When an electron in this atom moves from the third shell to the second shell, energy is
- A) emitted by the nucleus
B) emitted by the electron
C) absorbed by the nucleus
D) absorbed by the electron
37. The modern model of the atom shows that electrons are
- A) orbiting the nucleus in fixed paths
B) found in regions called orbitals
C) combined with neutrons in the nucleus
D) located in a solid sphere covering the nucleus
38. Which principal energy level can hold a maximum of 18 electrons?
- A) 5 B) 2 C) 3 D) 4
39. The atomic mass of element *A* is 63.6 atomic mass units. The only naturally occurring isotopes of element *A* are *A*-63 and *A*-65. The percent abundances in a naturally occurring sample of element *A* are closest to
- A) 31% *A*-63 and 69% *A*-65
B) 50% *A*-63 and 50% *A*-65
C) 69% *A*-63 and 31% *A*-65
D) 100% *A*-63 and 0% *A*-65
40. 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) $(72.0 + 84.9) \times (28.0 + 87.0)$
B) $(72.0 - 84.9) \times (28.0 + 87.0)$
C) $\frac{(72.0 \times 84.9)}{100} + \frac{(28.0 \times 87.0)}{100}$
D) $(72.0 \times 84.9) + (28.0 \times 87.0)$