Basics of General Organic and Biological Chemistry v3 1st edition Ball Test Bank

SKU: 9781453341148-TEST-BANK

Chapter 1
Elements, Atoms, and the Periodic Table

True/False

1. The mass number of an atom is the sum of the numbers of protons and neutrons in the nucleus.
   True; Easy

2. There are 90 man-made elements known today.
   False; Easy

3. Helium is the most abundant element in the universe.
   False; Easy

4. Oxygen is the most abundant element on the earth and the second most abundant in the universe.
   False; Easy

5. The relative amounts of elements in our body are directly proportional to their abundances on Earth.
   False; Easy

6. 'Sn' is the chemical symbol for strontium.
   False; Moderate

7. Modern atomic theory states that an electron is the smallest part of an element that maintains the identity of that element.
   False; Moderate

8. The electron was the first subatomic particle to be discovered and has a mass of 9.109×10^{-31} kg.
   True; Easy

9. A proton and a neutron have almost the same mass.
   True; Moderate

10. A proton and an electron have almost the same mass.
    False; Moderate

11. Rutherford's experiments showed some alpha particles that were deflected straight back, indicating that electrons were concentrated in the nucleus.
    False; Moderate

12. The orbiting electrons in an atom account for its size.
    True; Easy

13. In Rutherford's experiments, the deflection of some alpha rays prove that an atom is mostly empty space.
    False; Moderate

© 2025 FlatWorld

Basics of General Organic and Biological Chemistry v3 1st edition Ball Test Bank

14. In a neutral atom, the number of protons equal the number of electrons.
True; Moderate

15. Isotopes have the same mass number but a different atomic number.
False; Moderate

16. The mass of one carbon atom in atomic mass units is 12 u.
True; Moderate

17. The electronic configuration of silicon is $1s^2 2s^2 2p^6 3s^2 3p^2$.
True; Moderate

18. Elements in the same column will have similar chemical properties.
True; Easy

19. Increasing the number of electrons in a given shell of an atom will increase the atomic radius of that atom.
False; Moderate

20. All elements have the same abundance on Earth.
False; Easy

21. The rows of the periodic table are called periods.
True; Easy

Multiple Choice Questions

22. Which is the most abundant element in the universe?
    a. helium
    b. oxygen
    c. hydrogen
    d. silicon
    e. iron
    c; Easy

23. Which is the most abundant element present on Earth?
    a. oxygen
    b. silicon
    c. aluminum
    d. iron
    e. hydrogen
    d; Easy

24. What is the chemical symbol for copper?
    a. Co
    b. Cp
    c. Ce
    d. Cr
    e. Cu
    e; Easy

© 2025 FlatWorld

Basics of General Organic and Biological Chemistry v3 1st edition Ball Test Bank

25. The symbol of which of the following elements comes from its German name—wolfram?
    a. zirconium
    b. strontium
    c. platinum
    d. lithium
    e. tungsten
    e; Moderate

26. The chemical symbol for silver is derived from:
    a. arsenic
    b. aurum
    c. argentum
    d. aluminum
    e. armenium
    c; Easy

27. What is the chemical symbol for sodium?
    a. Su
    b. So
    c. S
    d. Ni
    e. Na
    e; Moderate

28. The chemical symbol 'Sn' stands for:
    a. strontium
    b. sodium
    c. silicon
    d. titanium
    e. tin
    e; Moderate

29. Which of the following is an element?
    a. wood
    b. juice
    c. air
    d. iron
    e. liquified CO_2
    d; Easy

30. What is the correct chemical symbol for gold?
    a. G
    b. Gl
    c. Sn
    d. Au
    e. Ag
    d; Easy

31. Which of the following elements exist as a diatomic molecule?
    a. iron

© 2025 FlatWorld

Basics of General Organic and Biological Chemistry v3 1st edition Ball Test Bank

b. neon
c. iodine
d. carbon
e. calcium
c; Moderate

32. What does the modern atomic theory state?
a. All elements are composed of molecules.
b. All molecules are composed of atoms.
c. All elements are composed of atoms.
d. All compounds are composed of molecules.
e. All atoms are of the same size.
c; Moderate

33. Which of the following was an incorrect assumption made by Dalton?
a. Elements are composed of atoms.
b. Compounds are composed of molecules.
c. All matter is composed of atoms.
d. Atoms cannot be divided further.
e. Atoms are of differing sizes.
d; Easy

34. Atoms are composed of _____ different kinds of particles.
a. one
b. two
c. three
d. four
e. six
c; Easy

35. The relative charge of an electron, neutron and proton are:
a. +1, 0, -1
b. 0, +1, -1
c. -1, +1, 0
d. -1, 0, +1
e. +1, -1, 0
d; Moderate

36. What is the mass, in kg, of a neutron?
a. 1.673×10^{-27}
b. 9.109×10^{-31}
c. 1.675×10^{-27}
d. 9.109×10^{-27}
e. 1.675×10^{-31}
c; Moderate

37. An alpha particle, a positively charged particle, is a combination of:
a. two protons and two neutrons
b. two electrons and two protons
c. two neutrons and two electrons
d. one proton and two electrons

© 2025 FlatWorld

Basics of General Organic and Biological Chemistry v3 1st edition Ball Test Bank

e. two electrons and one neutron
a; Easy

38. What did Rutherford conclude about the internal structure of an atom?
a. Electrons and neutrons are concentrated in the nucleus.
b. Protons and electrons are concentrated in the nucleus.
c. Only electrons are present in the nucleus.
d. Only neutrons are present in the nucleus.
e. Protons and neutrons are present in the nucleus.
e; Moderate

39. In Rutherford's experiments, most of the alpha particles traveled through the metal foil. Which of the following does this indicate?
a. Protons are present in the nucleus.
b. Neutrons are present in the nucleus.
c. An atom consists largely of empty space.
d. Electrons orbit the nucleus.
e. Protons are positively charged.
c; Easy

40. Which of the following is the smallest?
a. a hydrogen atom
b. a hydrogen nucleus
c. an electron
d. a helium atom
e. a helium nucleus
c; Moderate

41. The Rutherford model of the atom is called:
a. the plum pudding model
b. the gold foil model
c. the planetary model
d. the cloud model
e. the Geiger Marsden model
c; Easy

42. If an atom is electrically neutral, then
a. the number of electrons equals the number of neutrons.
b. the number of neutrons equals the number of protons.
c. the number of electrons equals the number of protons.
d. there are fewer number of electrons than protons.
e. there are fewer number of protons than electrons.
c; Easy

43. The atomic number of an atom is equal to
a. the number of neutrons and electrons in an atom.
b. the number of electrons in an atom.
c. the number of neutrons in an atom.
d. the number of protons in an atom.
e. the number of neutrons and protons in an atom.
d; Easy

© 2025 FlatWorld

Basics of General Organic and Biological Chemistry v3 1st edition Ball Test Bank

44. How many electrons are present in a neutral atom of carbon? (Hint: The atomic number of carbon is 6.)
    a. 12
    b. 6
    c. 3
    d. 18
    e. 9
    b; Moderate

45. What are isotopes?
    a. atoms of an element with different number of electrons
    b. atoms of an element with different number of protons
    c. atoms of an element with different number of neutrons
    d. atoms of an element with different atomic numbers
    e. atoms of an element with different number of nuclei
    c; Moderate

46. A neutral atom of hydrogen has a single electron and a single neutron. What is its atomic number and mass number?
    a. 1 and 1
    b. 1 and 0
    c. 1 and 3
    d. 1 and 2
    e. 0 and 1
    d; Easy

47. Which of the following statements is true of $^{56}_{26}Fe$?
    a. 56 is the number of electrons in iron.
    b. 56 is the number of protons in iron.
    c. 56 is the number of neutrons in iron.
    d. 26 is the number of protons in iron.
    e. 26 is the number of neutrons in iron.
    d; Moderate

48. What is the number of neutrons in $^{14}_{6}C$?
    a. 8
    b. 6
    c. 12
    d. 2
    e. 14
    a; Moderate

49. What is $^{3}_{1}H$ called?
    a. hydrogen
    b. cesium
    c. deuterium
    d. osmium
    e. tritium

© 2025 FlatWorld

Basics of General Organic and Biological Chemistry v3 1st edition Ball Test Bank

e; Moderate

50. How many neutrons does U-238 have?
    a. 98
    b. 238
    c. 236
    d. 146
    e. 144
    d; Easy

51. What is an atomic mass unit?
    a. the mass of twelve carbon atoms
    b. the mass of one carbon atom
    c. the mass of one hydrogen atom
    d. one twelfth of the mass of one carbon atom.
    e. the mass of twelve hydrogen atoms
    d; Moderate

52. If 90% of an element 'E' exists as ^{21}E and 10% as ^{24}E, then its atomic mass would be:
    a. 21 u
    b. 24 u
    c. 21.3 u
    d. 22.4 u
    e. 45 u
    c; Moderate

53. What is the average mass of an oxygen atom in grams? (Atomic mass of oxygen = 15.994 u)
    a. 2.657×10^{-23} g
    b. 16 g
    c. 15.995 g
    d. 8 g
    e. 26.57×10^{-23} g
    a; Moderate

54. Electrons are organized according to their energies into sets called:
    a. shells
    b. orbits
    c. cellars
    d. quanta
    e. levels
    a; Moderate

55. Which of the following has the biggest atomic radius?
    a. argon
    b. bromine
    c. chlorine
    d. phosphorus
    e. sulfur
    b; Moderate

© 2025 FlatWorld

Basics of General Organic and Biological Chemistry v3 1st edition Ball Test Bank

56. Which of the following represent the four subshells that make up a shell?
    a. *s*, *p*, *d*, *f*
    b. *a*, *b*, *c*, *d*
    c. *p*, *q*, *r*, *s*
    d. *k*, *l*, *p*, *d*
    e. *s*, *p*, *e*, *d*
    a; Moderate

57. Most of the elements in the periodic table can be classified as:
    a. nonmetals
    b. metals
    c. liquids
    d. diatomic
    e. molecules
    b; Moderate

Essay

58. Write a brief note on elements.
    An element is a substance that cannot be broken down into simpler chemical substances. There are about 90 naturally occurring elements known on Earth. Using technology, scientists have been able to create nearly 30 additional elements that do not occur in nature. Today, chemistry recognizes 118 elements—some of which were created an atom at a time.
    Easy

59. Describe the trends in the periodic table with respect to atomic radius.
    As we move down a column in the periodic table, the radius increases, while going across, the radius decreases. Going down a column adds valence shells, increasing the radius. Going across the rows adds more positively charged protons, which increases the attraction of more negative electrons pulling them closer to the nucleus, decreasing the radius.
    Easy

60. Briefly describe the chemical symbol for elements.
    By convention, the first letter of a chemical symbol is a capital letter, while the second letter (if there is one) is in lowercase. The first letter of the symbol is usually the first letter of the element's name, while the second letter is some other letter from the name. Some elements have symbols that derive from earlier, mostly Latin names, so the symbols may not contain any letters from the English name.
    Easy

61. Briefly describe the three subatomic particles.
    The first subatomic particle was identified in 1897 and called the electron. It is an extremely tiny particle, with a mass of about 9.109×10^{-31} kg. Experiments with magnetic fields showed that the electron has a negative electrical charge. A proton has the same amount of charge as an electron, but its charge is positive, not negative. Another major difference between a proton and an electron is mass. Although still incredibly small, the mass of a proton is 1.673×10^{-27} kg. The neutron is a particle with about the same mass as a proton but with no electrical charge.

© 2025 FlatWorld

Basics of General Organic and Biological Chemistry v3 1st edition Ball Test Bank

Easy

62. Describe the setup of Rutherford's gold leaf experiment.
Rutherford and his colleagues took a very thin metal foil, such as gold or platinum, and aimed a beam of positively charged particles (called alpha particles) from a radioactive source toward the foil. Surrounding the foil was a detector—either a scintillator (a material that glows when hit by such particles) or some unexposed film (which is exposed where the particles hit it). The detector allowed the scientists to determine the distribution of the alpha particles after they interacted with the foil.
Easy

63. In the Rutherford metal-foil experiment, alpha particles either went straight through the metal foil, were slightly deflected, or bounced back toward the source. Explain why these three things occurred.
Because most of an atom is empty space, most of the alpha particles went straight through the thin metal foil. Some alpha particles passed close to the positively charged nucleus, which slightly repelled the positively charged alpha particles and deflected them. A small number of alpha particles went straight into the nucleus and bounced back toward their source.
Moderate

64. Explain the difference between mass number and atomic number.
The number of protons in the nucleus of an atom is characteristic of a particular element. This discovery was so important to our understanding of atoms that the number of protons in the nucleus of an atom is called the atomic number. The mass number of an atom is the sum of the numbers of protons and neutrons in the nucleus. Given the mass number for a nucleus (and knowing the atomic number of that particular atom), you can determine the number of neutrons by subtracting the atomic number from the mass number.
Moderate

65. Explain the organization of electrons in an atom.
Electrons are organized according to their energies into sets called shells. Generally, the higher the energy of a shell, the farther it is (on average) from the nucleus. Shells do not have specific, fixed distances from the nucleus, but an electron in a higher-energy shell will spend more time farther from the nucleus than does an electron in a lower-energy shell. Shells are further divided into subsets of electrons called subshells. The first shell has only one subshell, the second shell has two subshells, the third shell has three subshells, and so on. The subshells of each shell are labeled, in order, with the letters *s*, *p*, *d*, and *f*. Thus, the first shell has only an *s* subshell, the second shell has an *s* and a *p* subshell, the third shell has *s*, *p*, and *d* subshells, and so forth.
Moderate

66. Define core and valence electrons with an example.
Valence shell electrons (or, more simply, the valence electrons) are the electrons in the highest-numbered shell, or valence shell, while core electrons are the electrons in lower-numbered shells. We can see from the electron configuration of a carbon atom—$1s^2 2s^2 2p^2$—that it has 4 valence electrons ($2s^2 2p^2$) and 2 core electrons ($1s^2$).
Moderate

67. Explain the classification of elements according to the periodic table.

© 2025 FlatWorld

Basics of General Organic and Biological Chemistry v3 1st edition Ball Test Bank

Every element can be classified as a metal, a nonmetal, or a semimetal. A metal is a substance that is shiny, typically (but not always) silvery in color, and an excellent conductor of electricity and heat. Metals are also malleable and ductile. A nonmetal is typically dull and a poor conductor of electricity and heat. Solid nonmetals are also very brittle. Metals occupy the left three-fourths of the periodic table, while nonmetals (except for hydrogen) are clustered in the upper right-hand corner of the periodic table. The elements with properties intermediately between those of metals and nonmetals are called semimetals (or metalloids).
Moderate

68. What explains the similarities of elements in a periodic table?
Starting with the first period and going from left to right, the table reproduces the order of filling of the electron subshells in atoms. Furthermore, elements in the same column share the same valence shell electron configuration. Chemistry is largely the result of interactions between the valence electrons of different atoms. Thus, atoms that have the same valence shell electron configuration will have similar chemistry.
Moderate

Fill in the Blanks

69. The most abundant element on the earth's crust is _____.
oxygen; Easy

70. The chemical symbol for iron is _____.
Fe; Easy

71. Another word for semimetals is _____.
metalloids; Easy

72. A(n) _____ is the smallest part of an element that maintains the identity of that element.
atom; Easy

73. _____ is a fundamental concept that states that all elements are composed of atoms.
Modern atomic theory; Easy

74. The mass number is the sum of protons and _____.
neutrons; Easy

75. $1s^2 2s^2 2p^6 3s^1$ is the electronic configuration of _____.
sodium; Moderate

76. Rutherford called his description of the atom the _____.
planetary model; Easy

77. Atomic radius _____ down a row in the periodic table.
increases; Easy

78. Carbon has 2 core and _____ valence electrons.
4; Easy

© 2025 FlatWorld

Basics of General Organic and Biological Chemistry v3 1st edition Ball Test Bank

79. The two particles that are found in the nucleus are the _____ and the _____.
proton, neutron; Easy

80. Isotopes of an element differ by having different numbers of _____ in their nuclei.
neutrons; Easy

81. Elements in the same column of the periodic table have similar _____ properties.
chemical; Easy

© 2025 FlatWorld

Basics of General Organic and Biological Chemistry v3 1st edition Ball Test Bank