

Atoms and Elements Practice Test

Chemistry

MULTIPLE CHOICE. Choose the one alternative that best completes the statement or answers the question.

- 1) Which statement below accurately describes the contributions of Democritus?
- A) created the modern periodic table
 - B) discovered the existence of electrons
 - C) proposed the modern Atomic Theory
 - D) ancient Greek philosopher who proposed that matter was not continuous
 - E) none of the above
- 2) Which statement below accurately describes the contributions of Dalton?
- A) proposed the modern Atomic Theory
 - B) discovered the existence of electrons
 - C) created the modern periodic table
 - D) ancient Greek philosopher who proposed that matter was continuous
 - E) none of the above
- 3) Which statement below accurately describes the contributions of Thomson?
- A) proposed the modern Atomic Theory
 - B) created the modern periodic table
 - C) ancient Greek philosopher who proposed that matter was continuous
 - D) discovered the existence of electrons
 - E) none of the above
- 4) Protons, neutrons, and electrons are examples of _____.
- A) elements
 - B) metals
 - C) subatomic particles
 - D) ions
 - E) compounds
- 5) The lightest of the subatomic particles is the _____.
- A) neutron
 - B) electron
 - C) proton
 - D) atom
 - E) nucleus
- 6) Which of the statements about the discovery of electrons is FALSE?
- A) The negatively charged electron is located outside the nucleus.
 - B) Because atoms are neutral, the existence of a negatively charged particle implied there must be a positively charged component of an atom.
 - C) Thomson proposed that electrons were small particles held within a positively charged sphere.
 - D) Rutherford proved the plum-pudding model correct.
 - E) All of the above statements are true.
- 7) Which statement below is NOT consistent with the nuclear theory of the atom as proposed by Rutherford?
- A) Electrical charge is a fundamental property of protons and electrons in which like charges repel and opposite charges attract.
 - B) Most of the atom's mass and all of its positive charge is contained in a small core called the nucleus.
 - C) There are as many electrons outside the nucleus as there are protons inside the nucleus in a neutral atom.
 - D) Most of the volume of the atom is empty space occupied by tiny, negatively charged electrons.
 - E) All of the above statements are consistent.
- 8) Which statement reflects the results of Rutherford's gold foil experiments?
- A) Almost all of the alpha particles passed directly through the foil.
 - B) Almost all of the alpha particles were deflected while passing through the foil.
 - C) Almost all of the alpha particles were deflected back in the direction from which they came.
 - D) Almost all of the alpha particles sputtered gold atoms off of the surface of the foil.
 - E) none of the above
- 9) An atom containing 7 protons, 8 neutrons, and 7 electrons:
- A) is an ion.
 - B) is an oxygen atom.
 - C) cannot exist.
 - D) is charge-neutral.
 - E) none of the above
- 10) Which of the following statements about the nature of electrical charge is FALSE?
- A) Positive-positive or negative-negative charges repel each other.
 - B) Positive and negative charges cancel each other so that a proton and electron, when paired, are charge neutral.
 - C) Positive and negative electrical charges attract each other.
 - D) Electrical charge is a fundamental property of protons and electrons.
 - E) All of the above statements are true.
- 11) Which of the following elements has only 12 protons?
- A) Zn
 - B) C
 - C) Mg
 - D) O
 - E) none of the above

12) Ions are formed when atoms:

- A) gain or lose electrons.
- B) gain or lose neutrons.
- C) gain or lose protons.
- D) Each of these results in ion formation.
- E) None of these results in ion formation.

13) Which of the following statements about ions is INCORRECT?

- A) Cations are positive ions and anions are negative ions.
- B) Cations always have the same number of protons as electrons.
- C) Anions are formed when an atom gains electrons.
- D) Cations are formed when an atom loses electrons.
- E) All statements are correct.

14) How many protons and electrons are present in O^{2-} ?

- A) 8 protons and 8 electrons
- B) 16 protons and 8 electrons
- C) 10 protons and 8 electrons
- D) 8 protons and 10 electrons
- E) none of the above

15) Isotopes are:

- A) atoms of the same element that have the same number of neutrons.
- B) atoms of the same element that have different number of neutrons.
- C) atoms of the same element that have different number of electrons.
- D) atoms of the same element that have different number of protons.
- E) none of the above

16) The nucleus of an atom consists mainly of:

- A) protons and neutrons.
- B) neutrons and electrons.
- C) protons, neutrons, and electrons.
- D) protons and electrons.
- E) none of the above

17) The atomic number of fluorine is _____.

- A) 19 B) 9 C) 10 D) 29 E) 28

18) The atomic mass of lithium is _____.

- A) 7.00 amu B) 7.41 amu C) 6.94 amu
- D) 3.00 amu E) 4.00 amu

19) The number of neutrons in an atom is equal to the _____.

- A) number of protons
- B) mass number
- C) mass number - the atomic number
- D) atomic number
- E) mass number + the atomic number

20) Which of the following gives the correct numbers of protons, neutrons, and electrons in a neutral atom of



- A) 68 protons, 68 neutrons, 50 electrons
- B) 118 protons, 50 neutrons, 118 electrons
- C) 50 protons, 50 neutrons, 50 electrons
- D) 118 protons, 118 neutrons, 50 electrons
- E) 50 protons, 68 neutrons, 50 electrons

21) How many neutrons are present in Ne-22?

- A) 10 B) 32
- C) 12 D) 22
- E) none of the above

22) What is the mass number of the hydrogen isotope that contains 2 neutrons?

- A) 4 B) 2
- C) 1 D) 3
- E) none of the above

23) An atom of a carbon-14 isotope would contain:

- A) 6 protons, 8 neutrons, and 6 electrons.
- B) 20 protons, 6 neutrons, and 20 electrons.
- C) 14 protons, 6 neutrons, and 6 electrons.
- D) 8 protons, 6 neutrons, and 8 electrons.
- E) 6 protons, 8 neutrons, and 8 electrons.

24) A fictional element has two naturally occurring isotopes with the natural abundances shown here:

ISOTOPE	ABUNDANCE
18	40.0%
20	60.0%

Which statement is TRUE for this element?

- A) The atomic mass would be closer to 18 than to 20.
- B) The atomic mass would be greater than 20.
- C) The atomic mass would be closer to 20 than to 18.
- D) The atomic mass would be exactly 19.
- E) The atomic mass would be less than 18.

25) What is the charge on an ion that has an atomic number of 24 and contains $22e^-$?

- A) 1- B) 2+
C) 2- D) 1+
E) none of the above

26) Which ion contains 18 electrons?

- A) Cl^{2-} B) Ca^+
C) P^{3-} D) Ar^-

27) How many neutrons are found in Ne-21?

- A) 21 B) 0
C) 11 D) 10
E) none of the above

28) Identify X in the expression $^{55}_{25}X$.

- A) iron B) cesium C) manganese D) iridium
E) zinc

29) Which of the following is the correct symbolic representation of the lead-209 isotope?

- A) $^{127}_{82}Pb$ B) $^{209}_{82}Li$
C) $^{209}_{82}Pb$ D) $^{291}_{82}Pb$

30) What is the relative charge on a neutron, proton, and electron?

- A) 0, -1, +1 B) 0, 0, -1
C) -1, +1, -1 D) 0, +1, -1

31) According to the experiments of Ernest Rutherford, where can a majority of a given atom's mass be found?

- A) scattered randomly throughout an approximately cube-shaped atom
B) as small pieces orbiting a common center in circular paths
C) at the center of an approximately spherical atom
D) in concentric layers of spherical shape

32) The structure of individual atoms can roughly be described as _____.

- A) positively charged pieces in orbit around a low-mass, negatively charged center
B) positively charged center and mostly empty space
C) an even mixture of mass and charge scattered throughout a spherical shape
D) positively charged, low-mass pieces in orbit around a massive, negatively charged center

33) Which cation has the atomic number of 20 and a charge of +2?

- A) S^{2+} B) Mg^{2+} C) C^{2+} D) Ca^{2+}

34) Which of the following pairs are isotopes?

- A) ^{238}U and ^{238}Np B) Ca^{2+} and Mg^{2+} C)
 ^{199}Hg and ^{200}Hg D) ^{18}O and ^{19}F

35) Which element, isotope, or ion listed below contains 35 protons, 46 neutrons, and 36 electrons?

- A) $^{81}Br^-$ B) ^{81}Kr C) ^{81}Br D) $^{81}Kr^+$

MATCHING. Choose the item in column 2 that best matches each item in column 1.

Match the scientist in the left column with his contribution to the chemistry field that appears in the right column.

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|--------------------|--------------------------------------------------------------|
| 36) Democritus | A) Postulated that matter is made up of tiny atoms |
| 37) Aristotle | B) Believed that the matter could be infinitely subdivided |
| 38) John Dalton | C) Demonstrated the existence of the neutron |
| 39) J.J. Thomson | D) Rationalized that matter is neither created nor destroyed |
| 40) James Chadwick | E) Discovered the electron |

Answers

- | | | | | | | | |
|-------|-------|-------|-------|-------|-------|-------|-------|
| 1) D | 2) A | 3) D | 4) C | 5) B | 6) D | 7) A | 8) A |
| 9) D | 10) E | 11) C | 12) A | 13) B | 14) D | 15) B | 16) A |
| 17) B | 18) C | 19) C | 20) E | 21) C | 22) D | 23) A | 24) C |
| 25) B | 26) C | 27) C | 28) C | 29) C | 30) D | 31) C | 32) B |
| 33) D | 34) C | 35) A | 36) A | 37) B | 38) D | 39) E | 40) C |