

- The major portion of an atom's mass consists of
  - electrons and protons
  - electrons and neutrons
  - neutrons and positrons
  - neutrons and protons**
- Which subatomic particle has no charge?
  - alpha particle
  - beta particle
  - neutron**
  - electron
- A student constructs a model for comparing the masses of subatomic particles. The student selects a small, metal sphere with a mass of 1 gram to represent an electron. A sphere with which mass would be most appropriate to represent a proton?
  - 1g
  - $\frac{1}{2}$ g
  - $\frac{1}{2000}$ g
  - 2000 g**
- Which statement concerning elements is true?
  - Different elements must have different numbers of isotopes.
  - Different elements must have different numbers of neutrons.
  - All atoms of a given element must have the same mass number.
  - All atoms of a given element must have the same atomic number.**
- 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 conclusion was a direct result of the gold foil experiment?
  - An atom is mostly empty space with a dense, positively charged nucleus.**
  - An atom is composed of at least three types of subatomic particles.
  - An electron has a positive charge and is located inside the nucleus.
  - An electron has properties of both waves and particles.
- An experiment in which alpha particles were used to bombard thin sheets of gold foil led to the conclusion that an atom is composed mostly of
  - empty space and has a small, negatively charged nucleus
  - empty space and has a small, positively charged nucleus**
  - a large, dense, positively charged nucleus
  - a large, dense, negatively charged nucleus
- Experiments performed to reveal the structure of atoms led scientists to conclude that an atom's
  - positive charge is evenly distributed throughout its volume
  - negative charge is mainly concentrated in its nucleus
  - mass is evenly distributed throughout its volume
  - volume is mainly unoccupied**
- Which statement describes the distribution of charge in an atom?
  - A neutral nucleus is surrounded by one or more negatively charged electrons.
  - A neutral nucleus is surrounded by one or more positively charged electrons.
  - A positively charged nucleus is surrounded by one or more negatively charged electrons.**
  - A positively charged nucleus is surrounded by one or more positively charged electrons.
- The gold foil experiment led to the conclusion that each atom in the foil was composed mostly of empty space because most alpha particles directed at the foil
  - passed through the foil**
  - remained trapped in the foil
  - were deflected by the nuclei in gold atoms
  - were deflected by the electrons in gold atoms

11. Which statement about one atom of an element identifies the element?
- A) **The atom has 1 proton.**  
B) The atom has 2 neutrons.  
C) The sum of the number of protons and neutrons in the atom is 3.  
D) The difference between the number of neutrons and protons in the atom is 1.
12. Compared to a proton, an electron has
- A) a greater quantity of charge and the same sign  
B) a greater quantity of charge and the opposite sign  
C) the same quantity of charge and the same sign  
D) **the same quantity of charge and the opposite sign**
13. Every chlorine atom has
- A) 7 electrons  
B) 17 neutrons  
C) a mass number of 35  
D) **an atomic number of 17**
14. What can be determined if only the atomic number of an atom is known?
- A) the total number of neutrons in the atom, only  
B) the total number of protons in the atom, only  
C) the total number of protons and the total number of neutrons in the atom  
D) **the total number of protons and the total number of electrons in the atom**
15. Which of the following atoms has the greatest nuclear charge?
- A)  ${}^{14}_7\text{N}$    B)  ${}^{12}_6\text{C}$    C)  ${}^2_1\text{H}$    D)  ${}^4_2\text{He}$
16. What is the total number of neutrons in the nucleus of a neutral atom that has 19 electrons and a mass number of 39?
- A) 19   **B) 20**   C) 39   D) 58
17. The weighted average of the atomic masses of the naturally occurring isotopes of an element is the
- A) **atomic mass of the element**  
B) atomic number of the element  
C) mass number of each isotope  
D) formula mass of each isotope
18. What is the mass number of an atom that consists of 20 protons, 20 neutrons, and 18 electrons?
- A) 18   B) 20   C) 38   **D) 40**
19. An atom that contains 8 protons, 8 electrons, and 9 neutrons has
- A) an atomic number of 9  
B) an atomic number of 16  
C) **a mass number of 17**  
D) a mass number of 25
20. Compared to an atom of C-12, an atom of C-14 has a greater
- A) number of electrons  
B) number of protons  
C) atomic number  
D) **mass number**
21. Atoms of different isotopes of the same element differ in their total number of
- A) electrons                      **B) neutrons**  
C) protons                         D) valence electrons
22. Which particle has two neutrons?
- A)  ${}^1_0\text{n}$    B)  ${}^1_1\text{H}$    C)  ${}^2_1\text{H}$    **D)  ${}^4_2\text{He}$**

23. The table below shows the number of subatomic particles in atom  $X$  and in atom  $Z$ .

Subatomic Particles in Two Atoms

Atom	Number of Protons	Number of Neutrons	Number of Electrons
$X$	6	6	6
$Z$	6	7	6

Atom  $X$  and atom  $Z$  are isotopes of the element

- A) aluminum      **B) carbon**      C) magnesium      D) nitrogen

24. The table below gives information about the nucleus of each of four atoms.

Nuclei of Four Atoms

Atom	Number of Protons	Number of Neutrons
A	6	6
D	6	7
E	7	7
G	7	8

How many different elements are represented by the nuclei in the table?

- A) 1      **B) 2**      C) 3      D) 4

25. 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**

26. Which correctly represents an atom of neon containing 11 neutrons?

- A)  $^{11}_{10}\text{Ne}$       B)  $^{20}_{11}\text{Ne}$   
C)  $^{21}_{10}\text{Ne}$       D)  $^{21}_{11}\text{Ne}$

27. An atom of carbon-14 contains

- A) 8 protons, 6 neutrons, and 6 electrons  
B) 6 protons, 6 neutrons, and 8 electrons  
C) 6 protons, 8 neutrons, and 8 electrons  
**D) 6 protons, 8 neutrons, and 6 electrons**

28. What is the total number of neutrons in an atom of  $^{39}_{19}\text{K}$ ?

- A) 19      **B) 20**      C) 39      D) 58

29. Which pair must represent atoms of the same element?

- A)  $^{14}_6\text{X}$  and  $^{14}_7\text{X}$       **B)  $^{12}_6\text{X}$  and  $^{13}_6\text{X}$**   
C)  $^2_1\text{X}$  and  $^4_2\text{X}$       D)  $^{13}_6\text{X}$  and  $^{14}_7\text{X}$

30. 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  $^{14}_7\text{N}$

31. The table below gives the atomic mass and the abundance of the two naturally occurring isotopes of chlorine.

Naturally Occuring Isotopes of Chlorine

Isotopes	Atomic Mass of the Isotopes (u)	Natural Abundance (%)
$^{35}\text{Cl}$	34.97	75.76
$^{37}\text{Cl}$	36.97	24.24

Which numerical setup can be used to calculate the atomic mass of the element chlorine?

- A)  $(34.97 \text{ u})(75.76) + (36.97 \text{ u})(24.24)$       B)  $(34.97 \text{ u})(0.2424) + (36.97 \text{ u})(0.7576)$   
C)  **$(34.97 \text{ u})(0.7576) + (36.97 \text{ u})(0.2424)$**       D)  $(34.97 \text{ u})(24.24) + (36.97 \text{ u})(75.76)$
32. The table below shows the atomic mass and natural abundance of the two naturally occurring isotopes of lithium.

Naturally Occurring Isotopes of Lithium

Isotope	Atomic Mass (u)	Natural Abundance (%)
Li-6	6.015	7.6
Li-7	7.016	92.4

Which numerical setup can be used to determine the atomic mass of naturally occurring lithium?

- A)  $(7.6)(6.015 \text{ u}) + (92.4)(7.016 \text{ u})$       B)  **$(0.076)(6.015 \text{ u}) + (0.924)(7.016 \text{ u})$**   
C)  $\frac{(7.6)(6.015 \text{ u}) + (92.4)(7.016 \text{ u})}{2}$       D)  $\frac{(0.076)(6.015 \text{ u}) + (0.924)(7.016 \text{ u})}{2}$

33. Hydrogen has three isotopes with mass numbers of 1, 2, and 3 and has an average atomic mass of 1.00794 amu. This information indicates that

- A) equal numbers of each isotope are present  
B) more isotopes have an atomic mass of 2 or 3 than of 1  
C) **more isotopes have an atomic mass of 1 than of 2 or 3**  
D) isotopes have only an atomic mass of 1

34. Which value of an element is calculated using both the mass and the relative abundance of each of the naturally occurring isotopes of this element?

- A) atomic number      B) **atomic mass**  
C) half-life      D) molar volume

35. 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**

36. An orbital is defined as a region of the most probable location of

- A) **an electron**      B) a neutron  
C) a nucleus      D) a proton

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37. Given the table below that shows student's examples of proposed models of the atom:

**Proposed Models of the Atom**

Model	Location of Protons	Location of Electrons
A	in the nucleus	specific shells
B	in the nucleus	regions of most probable location
C	dispersed throughout the atom	specific shells
D	dispersed throughout the atom	regions of most probable location

Which model correctly describes the locations of protons and electrons in the wave-mechanical model of the atom?

- A) *A*                      **B) *B***                      C) *C*                      D) *D*
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38. What is the total number of sublevels in the third principal energy level?

- A) 1      B) 2      **C) 3**      D) 4

39. According to the wave-mechanical model, an orbital is defined as the

- A) circular path for electrons  
B) circular path for neutrons  
**C) most probable location of electrons**  
D) most probable location of neutrons

40. The region that is the most probable location of an electron in an atom is

- A) the nucleus              **B) an orbital**  
C) the excited state      D) an ion

41. Which of these phrases best describes an atom?

- A) a positive nucleus surrounded by a hard negative shell  
**B) a positive nucleus surrounded by a cloud of negative charges**  
C) a hard sphere with positive particles uniformly embedded  
D) a hard sphere with negative particles uniformly embedded

42. In the electron cloud model of the atom, an orbital is defined as the most probable

- A) charge of an electron  
B) conductivity of an electron  
**C) location of an electron**  
D) mass of an electron
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**Answer Key**  
**Atomic Structure Practice test**

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

37. **B**
  38. **C**
  39. **C**
  40. **B**
  41. **B**
  42. **C**
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