Name: _____ Class: _____ Date: _____ ID: A

Chapter 3 Review

Multiple Choice

Identify the choice that best completes the statement or answers the question.

____ 1. Dalton incorporated the law of conservation of mass into his atomic theory by asserting that
a. atoms are indivisible.
b. atoms of different elements have different properties.
c. matter is composed of atoms.
d. atoms can not be destroyed in chemical reactions.

____ 2. If each atom of element D has 3 mass units and each atom of element E has 5 mass units, a molecule composed of one atom each of D and E has
a. 2 mass units.
b. 8 mass units.
c. 15 mass units.
d. 35 mass units.

____ 3. In oxides of nitrogen, such as N_2O, NO, NO_2, and N_2O_3, atoms combine in small whole-number ratios. This evidence supports the law of
a. conservation of mass.
b. multiple proportions.
c. definite composition.
d. mass action.

____ 4. If 63.5 g of copper (Cu) combine with 16 g of oxygen (O) to form the compound CuO, how many grams of oxygen will be needed to combine with the same amount of copper to form the compound CuO_2?
a. 16 g
b. 32 g
c. 64 g
d. 127 g

____ 5. According to the law of definite proportions, any two samples of KCl have
a. the same mass.
b. slightly different molecular structures.
c. the same melting point.
d. the same ratio of elements.

____ 6. According to the law of conservation of mass, when sodium, hydrogen, and oxygen react to form a compound, the mass of the compound is ____ the sum of the masses of the individual elements.
a. equal to
b. greater than
c. less than
d. either greater than or less than

____ 7. Which of the following is *not* part of Dalton's atomic theory?
a. Atoms cannot be divided, created, or destroyed.
b. The number of protons in an atom is its atomic number.
c. In chemical reactions, atoms are combined, separated, or rearranged.
d. All matter is composed of extremely small particles called atoms.

____ 8. Experiments with cathode rays led to the discovery of the
a. proton.
b. nucleus.
c. neutron.
d. electron.

____ 9. In Rutherford's experiments, alpha particles
a. passed through a tube containing gas.
b. were used to bombard a cathode plate.
c. collided with electrons.
d. were used to bombard thin metal foil.

____ 10. In Rutherford's experiments, most of the particles
a. bounced back.
b. passed through the foil.
c. were absorbed by the foil.
d. combined with the foil.

____ 11. Because most particles fired at metal foil passed straight through, Rutherford concluded that
a. atoms were mostly empty space.
b. atoms contained no charged particles.
c. electrons formed the nucleus.
d. atoms were indivisible.

____ 12. Because a few alpha particles bounced back from the foil, Rutherford concluded that they were
a. striking electrons.
b. indivisible.
c. repelled by densely packed regions of positive charge.
d. magnetic.

____ 13. A nuclear particle that has about the same mass as a proton, but with no electrical charge, is called a(n)
a. nuclide.
b. neutron.
c. electron.
d. isotope.

____ 14. The nucleus of an atom has all of the following characteristics *except* that it
a. is positively charged.
b. is very dense.
c. contains nearly all of the atom's mass.
d. contains nearly all of the atom's volume.

____ 15. Which part of an atom has a mass approximately equal to 1/2000 of the mass of a common hydrogen atom?
a. nucleus
b. electron
c. proton
d. neutron

____ 16. Protons within a nucleus are held together by
a. the nuclear force.
b. opposite charges.
c. their energy levels.
d. electron repulsion.

____ 17. An atom is electrically neutral because
a. neutrons balance the protons and electrons.
b. nuclear forces stabilize the charges.
c. the numbers of protons and electrons are equal.
d. the numbers of protons and neutrons are equal.

____ 18. Most of the volume of an atom is occupied by the
a. nucleus.
b. nuclides.
c. electrons.
d. protons.

____ 19. The charge of the electrons form a neutral atom by
a. preventing compounds from forming.
b. balances the charge on the nucleus.
c. attracting electrons in other atoms.
d. do not exist.

____ 20. The radius of an atom extends to the outer edge of the
a. nucleus.
b. region occupied by the electrons.
c. region occupied by the neutrons.
d. positive charges.

____ 21. Isotopes are atoms of the same element that have different
a. principal chemical properties.
b. masses.
c. numbers of protons.
d. numbers of electrons.

____ 22. The atomic number of oxygen, 8, indicates that there are eight
a. protons in the nucleus of an oxygen atom.
b. oxygen nuclides.
c. neutrons outside the oxygen atom's nucleus.
d. energy levels in the oxygen atom's nucleus.

____ 23. The total number of protons and neutrons in the nucleus of an atom is its
a. atomic number.
b. Avogadro number.
c. mass number.
d. average atomic mass.

____ 24. As the mass number of an element's isotopes of an element increases, the number of protons
a. decreases.
b. increases.
c. remains the same.
d. doubles each time the mass number increases.

____ 25. All atoms of the same element have the same
a. atomic mass.
b. number of neutrons.
c. mass number.
d. atomic number.

____ 26. In determining the atomic mass of elements, the standard is the
a. C-12 atom.
b. C-14 atom.
c. H-1 atom.
d. O-16 atom.

____ 27. The average atomic mass of an element is the average of the atomic masses of its
a. naturally occurring isotopes.
b. two most abundant isotopes.
c. radioactive isotopes.
d. artificial isotopes.

____ 28. An aluminum isotope consists of 13 protons, 13 electrons, and 14 neutrons. Its mass number is
a. 13.
b. 14.
c. 27.
d. 40.

____ 29. Chlorine has atomic number 17 and mass number 35. It has
a. 17 protons, 17 electrons, and 18 neutrons.
b. 35 protons, 35 electrons, and 17 neutrons.
c. 17 protons, 17 electrons, and 52 neutrons.
d. 18 protons, 18 electrons, and 17 neutrons.

____ 30. Carbon-14 (atomic number 6), the radioactive nuclide used in dating fossils, has
a. 6 neutrons.
b. 8 neutrons.
c. 10 neutrons.
d. 14 neutrons.

____ 31. Phosphorus-33 (atomic number 15) contains
a. 33 protons.
b. 18 neutrons.
c. 33 neutrons.
d. 18 protons.

____ 32. The number of atoms in 1 mol of carbon is
a. 6.022×10^{22}.
b. 6.022×10^{23}.
c. 5.022×10^{22}.
d. 5.022×10^{23}.

____ 33. To determine the molar mass of an element, one must know the element's
a. Avogadro constant.
b. atomic number.
c. number of isotopes.
d. average atomic mass.

____ 34. Molar mass
a. is the mass in grams of one mole of a substance.
b. is numerically equal to the average atomic mass of the element.
c. Both (a) and (b)
d. Neither (a) nor (b)

____ 35. The mass of 1 mol of chromium (atomic mass 51.996 amu) is
a. 12 g.
b. 198 g.
c. 51.996 g.
d. 6.02×10^{23} g.

Short Answer

36. Describe the law of definite proportions.

37. What is the law of conservation of mass?

38. What is the atomic number of an atom?

39. What is the mass number of an atom?

40. What is the relationship between isotopes, mass number, and neutrons?

41. Complete the following tables.

Element	Symbol	Atomic Number	Mass Number	No. of Protons	No. of Electrons	No. of Neutrons
Copper			65		29	
	Na	11				12
		12		12		12
Calcium 2- ion		20	40			
Boron 3+ ion		5		5		6

Isotope	Symbol	Atomic Number	Mass Number	Number of Neutrons
Carbon-13				
	$^{22}_{10}Ne$			
Lithium-8				

Problem

42. Complete the alpha decay of Gold-201.

43. Complete the beta decay of Silicon-30.

44. Uranium is used in nuclear reactors and is a rare element on earth. Uranium has three common isotopes. If the abundance of Uranium-234 is 0.10%, the abundance of Uranium-235 is 0.61%, and the abundance of Uranium-238 is 99.28%, what is the average atomic mass of uranium?

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45. If the half life of a particular isotope is 12 minutes and we have 40.0 g of it to begin, how much of the sample is left after 36 minutes?

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46. A scientist started with 200.0 g of substance X, if he only had 12.5g left after 32 days what is the half-life?

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47. If an isotope of turkium-300 has a half life of 1 hour how much of a 250.0g sample will be left after 5 hours?

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48. Complete the following chart:

	IA	IIA	IIIA	IVA	VA	VIA	VIIA	VIIIA
# of valence e-								
# of e- lost/gain								
Charge								