(2)

Atomic Theory Exam Name _____

Multiple Choice – 1 pt. each

1) What is the total number of valence electrons in an atom with the electron configuration 2-8-5?
   a) 2 b) 5 c) 8 d) 15

2) A Ca^{2+} ion differs from a Ca^{0} atom in that the Ca^{2+} ion has
   a) more electrons b) more protons c) fewer protons d) fewer electrons

3) Which particles are referred to as nucleons (subatomic particles located in the nucleus)?
   a) protons and neutrons
   b) protons and electrons
   c) neutrons, only
   d) neutrons and electrons

4) What is the mass number of an atom that contains 19 protons, 19 electrons, and 20 neutrons?
   a) 39 b) 19 c) 58 d) 20

5) What term refers to the region of an atom where an electron is most likely to be found?
   a) quantum b) spectrum c) orbital d) orbit

6) The nucleus of an atom consists of 8 protons and 6 neutrons. The total number of electrons present in a neutral atom of this element is
   a) 6 b) 8 c) 2 d) 14

7) What is the maximum number of electrons that can occupy the third principle energy level?
   a) 18 b) 8 c) 10 d) 3

8) Atoms of ^{16}O, ^{17}O, and ^{18}O have the same number of
   a) protons, but a different number of electrons
   b) electrons, but a different number of protons
   c) protons, but a different number of neutrons
   d) neutrons, but a different number of protons

9) All atoms of an element have the same
   a) number of neutrons
   b) atomic mass
   c) atomic number
   d) mass number

10) The atomic number is always equal to the total number of
   a) neutrons in the nucleus
   b) protons in the nucleus
   c) neutrons plus protons in the atom
   d) protons plus electrons in the atom

11) How many protons are in the nucleus of an atom of beryllium?
   a) 2 b) 4 c) 9 d) 5

12) Which subatomic particle is negative?
   a) proton b) neutron c) electron d) nucleus

13) Which of the following particles has the least mass?
   a) neutron b) proton c) electron d) hydrogen nucleus

14) A sample of element X contains 90% X-35 atoms, 8.0% X-37 atoms, and 2.0% X-38 atoms. The average atomic mass will be closest to which value?
   a) 35 b) 36 c) 37 d) 38

15) What is the total number of electrons in an Mg^{+2} ion?

a) 10 b) 24 c) 2 d) 12

16) Which of the following electron configurations represents an atom in the excited state?

a) 2-8 b) 2-8-1 c) 2-6-1 d) 2-1

17) Which principal energy level of an atom contains an electron with the lowest energy?

a) 3 b) 4 c) 1 d) 2

18) The atomic mass of an element is defined as the weighted average mass of that element's

a) naturally occurring isotopes
b) least abundant isotope
c) radioactive isotopes
d) most abundant isotope

19) Compared to the entire atom, the nucleus of the atom is

a) smaller and contains most of the atom's mass
b) smaller and contains little of the atom's mass
c) larger and contains most of the atom's mass
d) larger and contains little of the atom's mass

20) What is the nuclear charge in an atom of boron?

a) +11 b) +6 c) +5 d) +12

21) What subatomic particle was discovered in the cathode ray tube experiment?

a) proton b) electron c) neutron d) gravitron

Short Answer

22) In 1909, a team of British scientists led by Ernest Rutherford, carried out the Gold Foil Experiment to determine the arrangement of particles in the atom. In this experiment, alpha particles were used to bombard gold foil.

a) Most of the alpha particles passed through the gold foil undeflected. What conclusion was made about the structure of the atom based on this observation? **(1 pt.)**

b) A few of the alpha particles were deflected back at the source and toward the screen. What did this observation reveal about the structure of the atom? **(1 pt.)**

23) An element has two isotopes. 90% of the isotopes have a mass number of 20 amu, while 10% have a mass number of 22 amu. Calculate the atomic mass of the element. Show all work with units. **(3 pts.)**

24) Complete the chart below: **(9 pts.)**

Substance	Atom or Ion?	# protons	# neutrons	# electrons	Atomic #	Mass number
Mg^{+2}						
Rb						
Cl^{-}						

25) What is the electron configuration for a neutral sulfur atom? **(1 pt.)**

26) What is the electron configuration for S^{2-}? **(1 pt.)**

27) Based on the two given substances in question 25 and 26, how can you tell the difference between an atom and an ion? **(2 pts.)**

28) Draw **Bohr Diagrams** for the following substances **(1 pt. each):**

magnesium	Na^{+}

29) Draw **Lewis Dot Diagrams** for the following substances **(1 pt. each):**

carbon	S^{-2}

30) What is the total number of valence electrons in an atom of Mg-26 in the ground state? **(1 pt.)**

31) What is the total number of kernel electrons in an atom of Mg-26 in the ground state? **(1 pt.)**

32) Write a possible electron configuration that could represent magnesium in the excited state. **(1 pt.)**