ANSWERS

Chapter 4 Quiz

Name: _____ October 2014

Part I – Matching: Match each item with the correct statement below. [10 pts]

a. proton
b. nucleus
c. atom
d. mass number
e. atomic mass unit
f. electron
g. neutron
h. atomic number
i. atomic mass
j. isotope

C 1. the smallest particle of an element that retains the properties of that element
A 2. a positively charged subatomic particle
F 3. a negatively charged subatomic particle
G 4. a subatomic particle with no charge
B 5. the central part of an atom, containing protons and neutrons
J 6. atoms with the same number of protons, but different numbers of neutrons in the nucleus of an atom
D 7. the total number of protons and neutrons in the nucleus of an atom
H 8. the number of protons in the nucleus of an element
I 9. the weighted average of the masses of the isotopes of an element
E 10. one-twelfth the mass of a carbon atom having six protons and six neutrons

Part II - Multiple Choice: *Identify the choice that best completes the statement or answers the question.* [20 pts]

A 1. The smallest particle of an element that retains the properties of that element is a(n) ____.
a. atom
b. electron
c. proton
d. neutron

C 2. Dalton hypothesized that atoms are indivisible and that all atoms of an element are identical. It is now known that ____.
a. all of Dalton's hypotheses are correct
b. atoms of an element can have different numbers of protons
c. atoms are divisible
d. all atoms of an element are not identical but they must all have the same mass

D 3. Which of the following is true about subatomic particles?
a. Electrons are negatively charged and are the heaviest subatomic particle.
b. Protons are positively charged and the lightest subatomic particle.
c. Neutrons have no charge and are the lightest subatomic particle.
d. The mass of a neutron nearly equals the mass of a proton.

C 4. All atoms are ____.
a. positively charged, with the number of protons exceeding the number of electrons
b. negatively charged, with the number of electrons exceeding the number of protons
c. neutral, with the number of protons equaling the number of electrons
d. neutral, with the number of protons equaling the number of electrons, which is equal to the number of neutrons

C 5. The particles that are found in the nucleus of an atom are ____.
a. neutrons and electrons
b. electrons only
c. protons and neutrons
d. protons and electrons

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C 6. As a consequence of the discovery of the nucleus by Rutherford, which model of the atom is thought to be true?
a. Protons, electrons, and neutrons are evenly distributed throughout the volume of the atom.
b. The nucleus is made of protons, electrons, and neutrons.
c. Electrons are distributed around the nucleus and occupy almost all the volume of the atom.
d. The nucleus is made of electrons and protons.

A 7. The nucleus of an atom is ____.
a. the central core and is composed of protons and neutrons
b. positively charged and has more protons than neutrons
c. negatively charged and has a high density
d. negatively charged and has a low density

D 8. An element has an atomic number of 76. The number of protons and electrons in a neutral atom of the element are ____.
a. 152 protons and 76 electrons
b. 76 protons and 0 electrons
c. 38 protons and 38 electrons
d. 76 protons and 76 electrons

B 9. What does the number 84 in the name krypton-84 represent?
a. the atomic number
b. the mass number
c. the sum of the protons and electrons
d. twice the number of protons

B 10. All atoms of the same element have the same ____.
a. number of neutrons
b. number of protons
c. mass numbers
d. mass

A 10. In which of the following sets is the symbol of the element, the number of protons, and the number of electrons given correctly?
a. In, 49 protons, 49 electrons
b. Zn, 30 protons, 60 electrons
c. Cs, 55 protons, 132.9 electrons
d. F, 19 protons, 19 electrons

B 12. The mass number of an element is equal to ____.
a. the total number of electrons in the nucleus
b. the total number of protons and neutrons in the nucleus
c. less than twice the atomic number
d. a constant number for the lighter elements

A 13. How many protons, electrons, and neutrons does an atom with atomic number 50 and mass number 125 contain?
a. 50 protons, 50 electrons, 75 neutrons
b. 75 electrons, 50 protons, 50 neutrons
c. 120 neutrons, 50 protons, 75 electrons
d. 70 neutrons, 75 protons, 50 electrons

B 14. Which of the following statements is NOT true?
a. Atoms of the same element can have different masses.
b. Atoms of isotopes of an element have different numbers of protons.
c. The nucleus of an atom has a positive charge.
d. Atoms are mostly empty space.

C 15. Which of the following sets of symbols represents isotopes of the same element?
a. $^{91}_{42}J$ $^{92}_{42}J$ $^{93}_{40}J$
b. $^{50}_{19}L$ $^{50}_{20}L$ $^{50}_{21}L$
c. $^{84}_{38}M$ $^{86}_{38}M$ $^{87}_{38}M$
d. $^{138}_{59}Q$ $^{133}_{55}Q$ $^{133}_{54}Q$

D 16. In which of the following is the number of neutrons correctly represented?
a. $^{19}_{9}F$ has 0 neutrons.
b. $^{75}_{33}As$ has 108 neutrons.
c. $^{24}_{12}Mg$ has 24 neutrons.
d. $^{238}_{92}U$ has 146 neutrons.

B 17. How do the isotopes hydrogen-1 and hydrogen-2 differ?
a. Hydrogen-2 has one more electron than hydrogen-1.
b. Hydrogen-2 has one neutron; hydrogen-1 has none.
c. Hydrogen-2 has two protons; hydrogen-1 has one.
d. Hydrogen-2 has one proton; hydrogen-1 has none.

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B 18. Which of the following isotopes has the same number of neutrons as phosphorus-31?
a. $^{32}_{15}P$
b. $^{32}_{16}S$
c. $^{29}_{14}Si$
d. $^{28}_{14}Si$

B 19. Which of the following statements is NOT true?
a. Protons have a positive charge.
b. Electrons are negatively charged and have a mass of 1 amu.
c. The nucleus of an atom is positively charged.
d. Neutrons are located in the nucleus of an atom.

D 20. Which of the following is necessary to calculate the atomic mass of an element?
a. the atomic mass of carbon-12
b. the atomic number of the element
c. the relative masses of the element's protons and neutrons
d. the masses of each isotope of the element

Part III - Short Answer: Answer each of the questions in the space provided. Show ALL work for questions involving calculations.

1. Chlorine has two naturally occurring isotopes, Cl-35 and Cl-37. The atomic mass of chlorine is 35.45. Which of these two isotopes of chlorine is more abundant? How do you know? [2 pts]

Cl-35 - the average atomic mass is closer to 35 than 37

2. There are three principal isotopes of Neon, $^{20}_{10}Ne$; $^{21}_{10}Ne$ and $^{22}_{10}Ne$. The atomic mass of the $^{20}_{10}Ne$ isotope is 19.9924amu, with a relative abundance of 90.475%. The atomic mass of an atom of $^{21}_{10}Ne$ is 20.994amu, with a relative abundance of 0.275%. The atomic mass of an atom of $^{22}_{10}Ne$ is 21.9914amu, with a relative abundance of 9.250%. What is the weighted average atomic mass of Ne (in amu)? Show **ALL** work. [4 pts]

0.90475 x 19.9924 = 18.088124
0.00275 x 20.994 = 0.0577335 (2)
0.09250 x 21.9914 = 2.0342045
20.1800615 amu (1)

AVG = 20.180 amu (1)

3. An element has an average atomic mass of 25.8 amu. It is known that one isotope has a releative abundance of 73.24% and has a mass of 26.25 amu. What is the mass of the other isotope? [4 pts]

Knowns
Ave mass = 25.8 amu
1st isotope → 73.24% mass = 26.25
2nd isotope → % = 100 − 73.24 = 26.76%
→ mass = ?

25.8 = (.7324 x 26.25) + (.2676 x ?)
25.8 = 19.2255 + .2676X

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4. Complete the following table [10 pts]

Nuclear Symbol	Atomic Number	Mass Number	Number of Protons	Number of Neutrons	Number of Electrons
210 Pb 82	82	210	82	128	82
9 Be 4	4	9	4	5	4
23 Na 11	11	23	11	12	11
18 F 9	9	18	9	9	9
39 K 19	19	39	19	20	19

Part IV - Essay

1. Explain how the atoms of one element differ from those of another element. [2 pts]

Different # of protons + electrons
May have same # of neutrons (isotopes)

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