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Chapter 02 - Atoms and Molecules

1. **Why is CaO the symbol for calcium oxide instead of CAO?**
   a. both can be the symbols for calcium oxide
   b. both are incorrect; the symbol is cao
   c. a capital letter means a new symbol
   d. both are incorrect as the symbol should be CaO_x

ANSWER: c
POINTS: 1
QUESTION TYPE: Multiple Choice
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2. **What is the meaning of the two (2) in ethyl alcohol, C_2H_5OH?**
   a. all alcohol molecules contain two carbon atoms
   b. there are two carbon atoms per molecule of ethyl alcohol
   c. carbon is diatomic
   d. all of these are correct statements

ANSWER: b
POINTS: 1
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3. **The symbols for elements with accepted names**
   a. consist of a single capital letter.
   b. consist of a capital letter and a small letter.
   c. consist of either a single capital letter or a capital letter and a small letter.
   d. No answer is correct.

ANSWER: c
POINTS: 1
QUESTION TYPE: Multiple Choice
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4. **A molecular formula**
   a. is represented using the symbols of the elements in the formula.
   b. is represented using a system of circles that contain different symbols.
   c. cannot be represented conveniently using symbols for the elements.
   d. is represented using words rather than symbols.

ANSWER: a
POINTS: 1
QUESTION TYPE: Multiple Choice

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5. **Which of the following uses the unit of "u" or “amu”?**

a. atomic weights of atoms b. relative masses of atoms
c. molecular weights of molecules d. more than one response is correct

ANSWER: d
POINTS: 1
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DATE MODIFIED: 3/4/2016 3:37 PM

6. **What is meant when the symbol C-12 (or ^{12}C) is used?**

a. the carbon atom weighs 12 grams b. the carbon atom weighs 12 pounds
c. the carbon atom weighs 12 amu d. the melting point of carbon is 12°C

ANSWER: c
POINTS: 1
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7. **Refer to a periodic table and tell how many helium atoms (He) would be needed to get close to the same mass as an average oxygen atom (O).**

a. six b. four c. twelve d. one-fourth

ANSWER: b
POINTS: 1
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8. **Determine the molecular weight of hydrogen peroxide, H_2O_2, in u (or amu).**

a. 17.01 b. 18.02 c. 34.02 d. 33.01

ANSWER: c
POINTS: 1
QUESTION TYPE: Multiple Choice
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9. **Using whole numbers, determine the molecular weight of calcium hydroxide, $Ca(OH)_2$.**

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a. 56 b. 57 c. 58 d. 74
ANSWER: d
POINTS: 1
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DATE MODIFIED: 3/4/2016 3:37 PM

10. **The average relative mass of an ozone molecule is 48.0 u. An ozone molecule contains only oxygen atoms. What does this molecular weight indicate about the formula of the ozone molecule?**
a. It is monoatomic. b. It is diatomic.
c. It is triatomic. d. Impossible to determine
ANSWER: c
POINTS: 1
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DATE MODIFIED: 3/4/2016 3:37 PM

11. **Which of the following pairs are about equal in mass?**
a. proton and electron b. electron and neutron
c. proton and neutron d. nucleus and surrounding electrons
ANSWER: c
POINTS: 1
QUESTION TYPE: Multiple Choice
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DATE MODIFIED: 3/4/2016 3:37 PM

12. **Which of the following particles is the smallest?**
a. proton b. electron
c. neutron d. they are all the same size
ANSWER: b
POINTS: 1
QUESTION TYPE: Multiple Choice
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13. **How many electrons are in a neutral atom of carbon-13 (^{13}C)?**
a. 6 b. 18 c. 12 d. no way to tell
ANSWER: a
POINTS: 1
QUESTION TYPE: Multiple Choice

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14. **Which of the following carries a negative charge?**
    a. a proton b. a neutron
    c. an electron d. both proton and neutron
ANSWER: c
POINTS: 1
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15. **Which of the following is located in the nucleus of an atom?**
    a. protons b. neutrons
    c. electrons d. protons and neutrons
ANSWER: d
POINTS: 1
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16. **Atoms are neutral. How can they have no charge?**
    a. equal numbers of protons and neutrons
    b. equal numbers of protons and electrons
    c. equal numbers of neutrons and electrons
    d. any charge has been drained out of the atom
ANSWER: b
POINTS: 1
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DATE MODIFIED: 3/4/2016 3:37 PM

17. **Isotopes differ from each other in what way?**
    a. They have different numbers of protons in the nucleus.
    b. They have different numbers of neutrons in the nucleus.
    c. They have different numbers of electrons outside the nucleus.
    d. More than one response is correct.
ANSWER: b
POINTS: 1
QUESTION TYPE: Multiple Choice

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18. **What is the reason that U-238 is different from U-235?**
a. three more electrons b. three more protons
c. three more neutrons d. there is no difference
ANSWER: c
POINTS: 1
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19. **How many protons are found in the nucleus of a boron-11 (^{11}B) atom?**
a. 11 b. 6 c. 5 d. 4
ANSWER: c
POINTS: 1
QUESTION TYPE: Multiple Choice
HAS VARIABLES: False
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20. **How many neutrons are found in the nucleus of a boron-11 (^{11}B) atom?**
a. 11 b. 6 c. 5 d. 4
ANSWER: b
POINTS: 1
QUESTION TYPE: Multiple Choice
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21. **What is the mass number of a carbon-13 (^{13}C) atom?**
a. 13 b. 12 c. 6 d. 7
ANSWER: a
POINTS: 1
QUESTION TYPE: Multiple Choice
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DATE MODIFIED: 3/4/2016 3:37 PM

22. **Naturally occurring neon (Ne) has the following isotopic composition (the mass of each isotope is given in parenthesis). Calculate the atomic weight of neon in u from these data: neon-20, 90.92% (19.99 u); neon-21, 0.257% (20.99 u); neon-22, 8.82% (21.99 u)**

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a. 28.97 b. 37.62 c. 2017 d. 20.17
ANSWER: d
POINTS: 1
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23. **Naturally occurring lithium (Li) consists of only two isotopes, Li-6 (6.02 u) and Li-7 (7.02 u), where the isotopic masses are given in parentheses. Use the periodic table and determine which isotope is present in the larger percentage in the natural element.**
a. Li-6
b. Li-7
c. each is present at 50%
d. cannot be determined from the information available
ANSWER: b
POINTS: 1
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DATE MODIFIED: 3/4/2016 3:37 PM

24. **What mass of arsenic (As) in grams contains the same number of atoms as 39.95 g of argon (Ar)?**
a. 33.0 b. 74.92 c. 4.16 d. 149.84
ANSWER: b
POINTS: 1
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DATE MODIFIED: 3/4/2016 3:37 PM

25. **The number of Cr atoms in a 26.0 g sample of chromium is x. How many atoms, expressed in terms of x, would be contained in 26.98 g of aluminum (Al)?**
a. x b. x/2 c. 2x d. x+2
ANSWER: c
POINTS: 1
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26. **The mass of mercury (Hg), a liquid at room temperature, is 200.6 amu/mol. A 200.6 gram sample of mercury is heated until it boils. What is the mass of one mole of mercury vapor (gas)?**
a. <200.6 or it wouldn't be a gas b. the same as Avogadro's number
c. the same as when it is a liquid d. none of the answers are correct

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ANSWER: c
POINTS: 1
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27. **The formula for dinitrogen monoxide is N_2O. If a sample of the oxide was found to contain 0.0800 g of oxygen, how many grams of nitrogen would it contain?**

a. 0.140 b. 0.280 c. 0.560 d. 0.0700

ANSWER: a
POINTS: 1
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DATE MODIFIED: 3/4/2016 3:37 PM

28. **One Avogadro's number of iron (Fe) atoms would weigh _____ .**

a. 55.9 g. b. 6.02×10^{23} g.
c. 55.9 u. d. 6.02×10^{-23} g.

ANSWER: a
POINTS: 1
QUESTION TYPE: Multiple Choice
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DATE MODIFIED: 3/4/2016 3:37 PM

29. **How many atoms are contained in a sample of krypton, Kr, that weighs 8.38 g?**

a. one Avogadro's number b. one-tenth Avogadro's number
c. one d. one-tenth

ANSWER: b
POINTS: 1
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DATE MODIFIED: 3/4/2016 3:37 PM

30. **Which of the following has the largest mass?**

a. 5.0 mol H_2O b. 3.5 mol NH_3 c. 8.0 mol C d. 6.0 mol C_2H_2

ANSWER: d
POINTS: 1
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31. **How many silicon atoms (Si) are contained in a 12.5 g sample of silicon?**

a. 2.68×10^{23} b. 5.83×10^{-22} c. 1.35×10^{24} d. 1.71×10^{21}

ANSWER: a
POINTS: 1
QUESTION TYPE: Multiple Choice
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DATE MODIFIED: 3/4/2016 3:37 PM

32. **What is the number of hydrogen atoms in a 18.016 gram sample of water?**

a. 2.000 b. 6.022×10^{23} c. 18.02 d. 1.204×10^{24}

ANSWER: d
POINTS: 1
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DATE MODIFIED: 3/4/2016 3:37 PM

33. **How many moles of oxygen atoms are in one mole of CO_2?**

a. 1 b. 2 c. 6.02×10^{23} d. 12.04×10^{23}

ANSWER: b
POINTS: 1
QUESTION TYPE: Multiple Choice
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34. **How many hydrogen atoms are in 1.00 mole of NH_3?**

a. 3.00 b. 6.02×10^{23} c. 12.0×10^{23} d. 18.1×10^{23}

ANSWER: d
POINTS: 1
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35. **How many moles of hydrogen molecules (H_2) would be required to produce two moles of hydrogen peroxide (H_2O_2)?**

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

ANSWER: b
POINTS: 1

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36. **Calculate the weight percentage of hydrogen in water.**
a. 33.3 b. 66.7 c. 2.00 d. 11.1
ANSWER: d
POINTS: 1
QUESTION TYPE: Multiple Choice
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DATE MODIFIED: 3/4/2016 3:37 PM

37. **What is the weight percentage of nitrogen in urea, CN_2H_4O?**
a. 46.7 b. 30.4 c. 32.6 d. 16.3
ANSWER: a
POINTS: 1
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DATE MODIFIED: 3/4/2016 3:37 PM

38. **How many carbon atoms are contained in 5.50 g of ethane, C_2H_6?**
a. 2.75×10^{-22} b. 3.29×10^{24} c. 1.10×10^{23} d. 2.21×10^{23}
ANSWER: d
POINTS: 1
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DATE MODIFIED: 3/4/2016 3:37 PM

39. **Which element is approximately 65 percent of sulfuric acid by weight?**
a. hydrogen b. sulfur c. oxygen d. any of these
ANSWER: c
POINTS: 1
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40. **How many moles of N_2O contain the same number of nitrogen atoms as 4.60 g of NO_2?**
a. 0.500 b. 0.0500 c. 0.100 d. 0.200
ANSWER: b

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41. **How many grams of iron (Fe) is contained in 15.8 g of $Fe(OH)_3$?**
a. 12.1 b. 8.26 c. 11.8 d. 5.21
ANSWER: b
POINTS: 1
QUESTION TYPE: Multiple Choice
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DATE MODIFIED: 3/4/2016 3:37 PM

42. **The symbol for bromine is _____ .**
a. B b. Br c. Be d. none of these
ANSWER: b
POINTS: 1
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DATE MODIFIED: 3/4/2016 3:37 PM

43. **The weight % of S in K_2SO_4 is _____ .**
a. 14.2% b. 18.4% c. 54.4% d. 22.4%
ANSWER: b
POINTS: 1
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DATE MODIFIED: 3/4/2016 3:37 PM

44. **What is the number of moles of water in one liter of water if one gram of water takes up one milliliter of space?**
a. 1 b. 18 c. 55.6 d. 1000
ANSWER: c
POINTS: 1
QUESTION TYPE: Multiple Choice
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45. **How many neutrons are in an atom that has a mass number of 75 and contains 35 protons?**
a. 40 b. 35 c. 75 d. can't tell

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ANSWER: a
POINTS: 1
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DATE MODIFIED: 3/4/2016 3:37 PM

46. **Atoms that have the same atomic number but differ by mass number are called?**
a. protons b. neutrons c. isotopes d. positrons
ANSWER: c
POINTS: 1
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DATE CREATED: 3/4/2016 3:37 PM
DATE MODIFIED: 3/4/2016 3:37 PM

47. **If you have 3.011×10^{23} atoms of carbon, what would you expect its mass to be?**
a. 12.01 g b. 6.005 g c. 3.003 g d. 1.000 g
ANSWER: b
POINTS: 1
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DATE MODIFIED: 3/4/2016 3:37 PM

48. **What is wrong with the following molecular formula: SOO (sulfur dioxide)?**
a. OSO is the correct form b. SO should be So
c. OO should be written as O2 d. OO should be written as O_2
ANSWER: d
POINTS: 1
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DATE MODIFIED: 3/4/2016 3:37 PM

49. **Determine the number of electrons and protons in the element Tc.**
a. 43 protons, 43 electrons b. 43 protons, 56 electrons
c. 56 protons, 43 electrons d. 99 protons, 43 electrons
ANSWER: a
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50. **The system of atomic mass units is based on**

a. assigning ^{12}C as weighing exactly 12 u & comparing other elements to it.
b. measuring the true mass of each subatomic particle.
c. comparing the differences in protons and electrons.
d. viewing how atoms are affected by electromagnetic fields.

ANSWER: a
POINTS: 1
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HAS VARIABLES: False
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DATE MODIFIED: 3/4/2016 3:37 PM

51. **How many moles of $Na_2Cr_2O_7$ contain 14 moles of oxygen atoms?**

a. 2 mol $Na_2Cr_2O_7$ b. 14 mol $Na_2Cr_2O_7$
c. 7 mol $Na_2Cr_2O_7$ d. 1 mol $Na_2Cr_2O_7$

ANSWER: a
POINTS: 1
QUESTION TYPE: Multiple Choice
HAS VARIABLES: False
DATE CREATED: 3/4/2016 3:37 PM
DATE MODIFIED: 3/4/2016 3:37 PM

52. **An isotope of a given element has a mass number equal to twice the atomic number. This neutral isotope contains twelve electrons. This isotope is _____ .**

a. magnesium-12. b. magnesium-24.
c. chromium-24. d. chromium-12.

ANSWER: b
POINTS: 1
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HAS VARIABLES: False
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DATE MODIFIED: 3/4/2016 3:37 PM

53. **Approximately, how many atoms of beryllium would be required to equal the mass of 10 atoms of aluminum?**

a. 3 atoms of beryllium b. 10 atoms of beryllium
c. 30 atoms of beryllium d. 4 atoms of beryllium

ANSWER: c
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54. **If calcium carbonate found in limestone is 40.0% calcium, how many grams of calcium are in 485 g of calcium carbonate?**

a. 12.1 g of calcium b. 291 g of calcium
c. 19,400 g of calcium d. 194 g of calcium

ANSWER: d
POINTS: 1
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DATE MODIFIED: 3/4/2016 3:37 PM

55. **Which of the following correctly describes subatomic particles?**

1. Mass: $e^- < p^+ = n$

2. Magnitude of charge: $n < e^- = p^+$

3. Location: outside nucleus e^- , p^+, **inside nucleus** n

a. 1 only b. 2 only c. 3 only d. 1 and 2

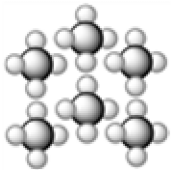
ANSWER: d
POINTS: 1
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HAS VARIABLES: False
DATE CREATED: 3/4/2016 3:37 PM
DATE MODIFIED: 3/4/2016 3:37 PM

56. **Write the formula for a compound consisting of 3 sodium atoms, 1 phosphorus atom, and 4 oxygen atoms.**

a. S_3PO_4 b. 3NaP4O c. $Na_3P2(O_2)$ d. Na_3PO_4

ANSWER: d
POINTS: 1
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HAS VARIABLES: False
DATE CREATED: 3/4/2016 3:37 PM
DATE MODIFIED: 3/4/2016 3:37 PM

57. **Consider the representation shown below. It should be classified as**



a. an element consisting of 6 atoms.
b. a compound containing atoms of two elements.
c. a homogenous mixture of two elements.
d. a homogenous mixture of two compounds.

ANSWER: b

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DATE MODIFIED: 3/4/2016 3:37 PM

58. **A neutral isotope of an element contains 21 electrons and 24 neutrons. What is the following representation for this nucleus?**

a. $^{24}_{21}Sc$ b. $^{45}_{21}Sc$ c. $^{45}_{21}Rh$ d. $^{24}_{21}Cr$

ANSWER: b
POINTS: 1
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HAS VARIABLES: False
DATE CREATED: 3/4/2016 3:37 PM
DATE MODIFIED: 3/4/2016 3:37 PM

59. **How many electrons are found around the species below?**

$^{4}_{2}He^{2+}$

a. -2 b. 0 c. 2 d. 4

ANSWER: b
POINTS: 1
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DATE CREATED: 3/4/2016 3:37 PM
DATE MODIFIED: 3/4/2016 3:37 PM

60. **What is the molar mass of $Ba_3(PO_4)_2$?**

a. 232.30 g/mol b. 327.27 g/mol c. 369.63 g/mol d. 601.92 g/mol

ANSWER: d
POINTS: 1
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HAS VARIABLES: False
DATE CREATED: 3/4/2016 3:37 PM
DATE MODIFIED: 3/4/2016 3:37 PM

61. $^{235}_{92}U$ **is the form of uranium used to make atomic bombs. One atom of this isotope consists of ___.**

a. 92 protons, 92 electrons, 92 neutrons
b. 92 protons, 143 electrons, 92 neutrons
c. 92 protons, 92 electrons. 143 neutrons
d. 143 protons, 143 electrons, 92 neutrons

ANSWER: c
POINTS: 1

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DATE MODIFIED: 3/4/2016 3:37 PM

62. **Oxalic acid is found in many plants, like spinach and black tea. What is the mass of the carbon found in one mole of oxalic acid, $H_2C_2O_4$?**

a. 12.01 g of C b. 24.02 g of Cl c. 45.01 g of C d. 90.02 g of C

ANSWER: b
POINTS: 1
QUESTION TYPE: Multiple Choice
HAS VARIABLES: False
DATE CREATED: 3/4/2016 3:37 PM
DATE MODIFIED: 3/4/2016 3:37 PM

63. **You discover a new element which consists of two isotopes. The first isotope, ^{243}X (mass = 242.45 u) comprises 40.000% of the total. The second isotope, ^{248}X (mass = 247.11 u) accounts for the rest. What would be the average atomic mass for your new element?**

a. 242.45 u b. 244.32 u c. 245.25 d. 247.11

ANSWER: c
POINTS: 1
QUESTION TYPE: Multiple Choice
HAS VARIABLES: False
DATE CREATED: 3/4/2016 3:37 PM
DATE MODIFIED: 3/4/2016 3:37 PM

64. **Individuals, ages 19-70, should include at least 1000 mg of calcium in their daily diet. What is the minimum number of one-gram calcium supplement tablets you would need to take each day to meet this requirement if a tablet is 40% by mass calcium?**

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

ANSWER: c
POINTS: 1
QUESTION TYPE: Multiple Choice
HAS VARIABLES: False
DATE CREATED: 3/4/2016 3:37 PM
DATE MODIFIED: 3/4/2016 3:37 PM

65. **The symbols for all of the elements are derived from the Latin names.**

a. True
b. False

ANSWER: False
POINTS: 1
QUESTION TYPE: True / False
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66. **The symbols for all of the elements always begin with a capital letter.**
    a. True
    b. False
ANSWER: True
POINTS: 1
QUESTION TYPE: True / False
HAS VARIABLES: False
DATE CREATED: 3/4/2016 3:37 PM
DATE MODIFIED: 3/4/2016 3:37 PM

67. **The first letter of the symbol for each of the elements is the first letter of its English name.**
    a. True
    b. False
ANSWER: False
POINTS: 1
QUESTION TYPE: True / False
HAS VARIABLES: False
DATE CREATED: 3/4/2016 3:37 PM
DATE MODIFIED: 3/4/2016 3:37 PM

68. **The most accurate way to determine atomic mass is with a mass spectrometer.**
    a. True
    b. False
ANSWER: True
POINTS: 1
QUESTION TYPE: True / False
HAS VARIABLES: False
DATE CREATED: 3/4/2016 3:37 PM
DATE MODIFIED: 3/4/2016 3:37 PM

69. **H_2O_2 contains equal parts by weight of hydrogen and oxygen.**
    a. True
    b. False
ANSWER: False
POINTS: 1
QUESTION TYPE: True / False
HAS VARIABLES: False
DATE CREATED: 3/4/2016 3:37 PM
DATE MODIFIED: 3/4/2016 3:37 PM

70. **Electrons do not make an important contribution to the mass of an atom.**
    a. True
    b. False

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ANSWER: True
POINTS: 1
QUESTION TYPE: True / False
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DATE CREATED: 3/4/2016 3:37 PM
DATE MODIFIED: 3/4/2016 3:37 PM

71. **The charge of the nucleus depends only on the atomic number.**
    a. True
    b. False
ANSWER: True
POINTS: 1
QUESTION TYPE: True / False
HAS VARIABLES: False
DATE CREATED: 3/4/2016 3:37 PM
DATE MODIFIED: 3/4/2016 3:37 PM

72. **Isotopes of the same element always have the same number of neutrons.**
    a. True
    b. False
ANSWER: False
POINTS: 1
QUESTION TYPE: True / False
HAS VARIABLES: False
DATE CREATED: 3/4/2016 3:37 PM
DATE MODIFIED: 3/4/2016 3:37 PM

73. **Isotopes of the same element always have the same atomic number.**
    a. True
    b. False
ANSWER: True
POINTS: 1
QUESTION TYPE: True / False
HAS VARIABLES: False
DATE CREATED: 3/4/2016 3:37 PM
DATE MODIFIED: 3/4/2016 3:37 PM

74. **Isotopes of the same element always have the same atomic mass.**
    a. True
    b. False
ANSWER: False
POINTS: 1
QUESTION TYPE: True / False
HAS VARIABLES: False

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DATE MODIFIED: 3/4/2016 3:37 PM

75. **A mole of copper contains the same number of atoms as a mole of zinc.**
    a. True
    b. False
ANSWER: True
POINTS: 1
QUESTION TYPE: True / False
HAS VARIABLES: False
DATE CREATED: 3/4/2016 3:37 PM
DATE MODIFIED: 3/4/2016 3:37 PM

76. **One mole of an element would weigh the same as a mole of an isotope of the same element.**
    a. True
    b. False
ANSWER: False
POINTS: 1
QUESTION TYPE: True / False
HAS VARIABLES: False
DATE CREATED: 3/4/2016 3:37 PM
DATE MODIFIED: 3/4/2016 3:37 PM

77. **One mole of silver would contain the same number of atoms as a mole of gold.**
    a. True
    b. False
ANSWER: True
POINTS: 1
QUESTION TYPE: True / False
HAS VARIABLES: False
DATE CREATED: 3/4/2016 3:37 PM
DATE MODIFIED: 3/4/2016 3:37 PM

78. **One mole of an element would weigh the same as a mole of an isotope of the same element.**
    a. True
    b. False
ANSWER: True
POINTS: 1
QUESTION TYPE: True / False
HAS VARIABLES: False
DATE CREATED: 3/4/2016 3:37 PM
DATE MODIFIED: 3/4/2016 3:37 PM

79. **One mole of H_2O contains 2.0 grams of hydrogen.**
    a. True

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b. False

ANSWER: True
POINTS: 1
QUESTION TYPE: True / False
HAS VARIABLES: False
DATE CREATED: 3/4/2016 3:37 PM
DATE MODIFIED: 3/4/2016 3:37 PM

80. **One mole of O_3 weighs 16 grams.**

a. True
b. False

ANSWER: False
POINTS: 1
QUESTION TYPE: True / False
HAS VARIABLES: False
DATE CREATED: 3/4/2016 3:37 PM
DATE MODIFIED: 3/4/2016 3:37 PM

81. **The pure substance, water, contains both hydrogen molecules and oxygen molecules.**

a. True
b. False

ANSWER: False
POINTS: 1
QUESTION TYPE: True / False
HAS VARIABLES: False
DATE CREATED: 3/4/2016 3:37 PM
DATE MODIFIED: 3/4/2016 3:37 PM

82. **A diet is planned for a trip on a space ship and is lacking in milk, but is rich in turnips and broccoli. Such a diet could provide a sufficient amount of calcium for adults.**

a. True
b. False

ANSWER: True
POINTS: 1
QUESTION TYPE: True / False
HAS VARIABLES: False
DATE CREATED: 3/4/2016 3:37 PM
DATE MODIFIED: 3/4/2016 3:37 PM

83. **Calcium supplements can be taken in 1,000 mg increments.**

a. True
b. False

ANSWER: False
POINTS: 1

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DATE CREATED: 3/4/2016 3:37 PM
DATE MODIFIED: 3/4/2016 3:37 PM

84. **Protons and neutrons have approximately the same mass.**
a. True
b. False
ANSWER: True
POINTS: 1
QUESTION TYPE: True / False
HAS VARIABLES: False
DATE CREATED: 3/4/2016 3:37 PM
DATE MODIFIED: 3/4/2016 3:37 PM

85. **Neutral isotopes of the same element have the same number of electrons.**
a. True
b. False
ANSWER: True
POINTS: 1
QUESTION TYPE: True / False
HAS VARIABLES: False
DATE CREATED: 3/4/2016 3:37 PM
DATE MODIFIED: 3/4/2016 3:37 PM

86. **An isotope of gallium consisting of 31 protons and 37 neutrons can be represented using the symbol shown below.**
$^{37}_{31}Ga$
a. True
b. False
ANSWER: False
POINTS: 1
QUESTION TYPE: True / False
HAS VARIABLES: False
DATE CREATED: 3/4/2016 3:37 PM
DATE MODIFIED: 3/4/2016 3:37 PM

87. **The atomic mass number is a whole number and indicates a specific isotope of an element.**
a. True
b. False
ANSWER: True
POINTS: 1
QUESTION TYPE: True / False
HAS VARIABLES: False

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DATE CREATED: 3/4/2016 3:37 PM
DATE MODIFIED: 3/4/2016 3:37 PM

88. **In naturally occurring samples, all elements exist as a mixture of isotopes.**
a. True
b. False
ANSWER: False
POINTS: 1
QUESTION TYPE: True / False
HAS VARIABLES: False
DATE CREATED: 3/4/2016 3:37 PM
DATE MODIFIED: 3/4/2016 3:37 PM

89. **One mole of any substance will contain one Avogadro's number of atoms of that substance.**
a. True
b. False
ANSWER: False
POINTS: 1
QUESTION TYPE: True / False
HAS VARIABLES: False
DATE CREATED: 3/4/2016 3:37 PM
DATE MODIFIED: 3/4/2016 3:37 PM

90. **A scanning tunneling microscope (STM) relies on a very strong light source to help see atoms.**
a. True
b. False
ANSWER: False
POINTS: 1
QUESTION TYPE: True / False
HAS VARIABLES: False
DATE CREATED: 3/4/2016 3:37 PM
DATE MODIFIED: 3/4/2016 3:37 PM

91. **An MRI instrument cause the hydrogens in your body to line up because they are exposed to a very strong magnetic field.**
a. True
b. False
ANSWER: True
POINTS: 1
QUESTION TYPE: True / False
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DATE CREATED: 3/4/2016 3:37 PM
DATE MODIFIED: 3/4/2016 3:37 PM

92.

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The _____ _____ of an atom is the number equal to the number of protons in the nucleus of an atom and is represented by Z.

a. neutron number
b. mass number
c. mass number
d. atomic number

ANSWER: d
POINTS: 1
QUESTION TYPE: Multiple Choice
HAS VARIABLES: False
DATE CREATED: 10/21/2016 12:57 AM
DATE MODIFIED: 10/21/2016 12:59 AM

93. **Which of the following units is the relative mass of a molecule expressed in atomic mass units and is calculated by adding together the atomic weights of the atoms in the molecule?**

a. Atomic number
b. Mass number
c. Mass number
d. Atomic weight

ANSWER: c
POINTS: 1
QUESTION TYPE: Multiple Choice
HAS VARIABLES: False
DATE CREATED: 10/21/2016 12:59 AM
DATE MODIFIED: 10/21/2016 1:05 AM

94. **Why are the atomic weights of elements defined as the relative masses of average atoms of the elements?**

ANSWER: The mass number of an isotope is the sum of the number of protons and neutrons in the nucleus of the atoms of the isotope. Also, both protons and neutrons have masses of 1 u. Since the masses of electrons are quite small, the atomic weights of isotopes are almost equal to their mass numbers. Therefore, the atomic weights of elements can be defined as the relative masses of average atoms of the elements.
POINTS: 1
QUESTION TYPE: Subjective Short Answer
HAS VARIABLES: False
DATE CREATED: 10/21/2016 1:01 AM
DATE MODIFIED: 10/21/2016 1:02 AM

95.
Which of the following units can be used to collect a sample of atoms of one element with a mass in grams equal to the atomic weight of another element?

a. Molecular weight
b. Avogadro’s number
c. Atomic number

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d. Atomic mass

ANSWER: b
POINTS: 1
QUESTION TYPE: Multiple Choice
HAS VARIABLES: False
DATE CREATED: 10/21/2016 1:02 AM
DATE MODIFIED: 10/21/2016 1:04 AM

96. **How many H atoms are there in 6.02×10^{23} H_2O molecules?**

a. 12.04×10^{23}
b. 12.04×10^{46}
c. 6.02×10^{23}
d. 6.02×10^{23}

ANSWER: a
POINTS: 1
QUESTION TYPE: Multiple Choice
HAS VARIABLES: False
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