CHM115 Exam #1 A

Name: _____

MULTIPLE CHOICE. Choose the one alternative that best completes the statement or answers the question.

1) The number with the most significant zeros is _____. 1) _____

A) 2.501×10^{-7}
B) 0.00002510
C) 250000001
D) 2.5100000
E) 0.02500001

Answer: C

2) Of the following, only _____ is a chemical reaction. 2) _____

A) dropping a penny into a glass of water
B) crushing of stone
C) melting of lead
D) tarnishing of silver
E) dissolving sugar in water

Answer: D

3) Which of the following are a physical properties? 3) _____

1) The density of a liquid
2) The temperature of the air
3) The color of a solution
4) The weight of a crystal

A) 1, 2 B) 1, 2, 3, 4 C) 2, 3 D) 1, 4

Answer: B

4) The number 0.000816 has _____ significant figures. 4) _____

A) 2 B) 3 C) 6 D) 7 E) 5

Answer: B

5) A combination of sand, salt, and water is an example of a _____. 5) _____

A) compound
B) heterogeneous mixture
C) homogeneous mixture
D) beach
E) pure substance

Answer: B

6) There should be _____ significant figures in the answer to the following computation. 6) _____

$$\frac{(10.07 + 7.395)}{2.5}$$

A) 1 B) 2 C) 3 D) 4 E) 5

Answer: B

7) For which of the following can the composition vary? 7) _____
A) homogeneous mixture
B) element
C) heterogeneous mixture
D) pure substance
E) both homogeneous and heterogeneous mixtures

Answer: E

8) In the following list, only _____ is not an example of matter. 8) _____
A) table salt
B) elemental phosphorus
C) planets
D) light
E) dust

Answer: D

9) Of the following, _____ is the largest mass. 9) _____
A) 2.5×10^{10} μg
B) 2.5×10^{12} ng
C) 5×10^{-2} mg
D) 2.5×10^{15} g
E) 7×10^{3} kg

Answer: D

10) Which of the following about atoms is NOT a true statement 10) _____
A) Atoms are the building blocks of matter
B) Each element is made up of various types of atoms
C) Molecules are the smallest units of a substance
D) A compound is made of two or more different kinds of elements

Answer: B

11) The STM was used in class to demostrate that while atoms are very small, they can be visualized with modern instrumentation. What does STM stand for? 11) _____
A) Scanning Tunneling Microscope
B) Small Technology Microscope
C) Scanning Electron Microscope
D) Electron Microscope

Answer: A

12) The formula for the compound formed between aluminum ions and sulfate ions is _____. 12) _____
A) $AlSO_4$ B) AlS C) $Al_3(SO_4)_3$ D) $Al(SO_4)_3$ E) $Al_2(SO_4)_3$

Answer: E

13) Predict the charge of the most stable ion of magnesium. 13) _____
A) –1 B) +2 C) +1 D) +3 E) –2

Answer: B

14) Elements in Group 1A are known as the _____. 14) _____

A) chalcogens
B) alkaline earth metals
C) halogens
D) alkali metals
E) noble gases

Answer: D

15) Of the three types of radioactivity characterized by Rutherford, which is/are not electrically charged? 15) _____

A) γ–rays
B) α–rays, β–rays, and γ–rays
C) α–rays and γ–rays
D) α–rays and β–rays
E) α–rays

Answer: A

16) The atom contains _____. 16) _____

A) protons
B) protons and neutrons
C) protons, neutrons, and electrons
D) electrons
E) protons and electrons

Answer: C

17) Which pair of elements would you expect to exhibit the greatest similarity in their physical and chemical properties? 17) _____

A) Si, P B) C, N C) K, Ca D) O, S E) F, He

Answer: D

18) Which formula/name pair is incorrect? 18) _____

A) FeS iron(II) sulfide
B) $FeSO_4$ iron(II) sulfate
C) $Fe_2(SO_3)_3$ iron(III) sulfite
D) $Fe_2(SO_4)_3$ iron(III) sulfide
E) $FeSO_3$ iron(II) sulfite

Answer: D

19) Of the following, the smallest and lightest subatomic particle is the _____. 19) _____

A) proton
B) electron
C) nucleus
D) neutron
E) alpha particle

Answer: B

20) Which species below is the nitrate ion? 20) _____

A) NO_3^- B) N^{3-} C) NH_4^+ D) N_3^- E) NO_2^-

Answer: A

21) Which species below is the sulfite ion? 21) _____

A) H_2S B) H_2SO_4 C) SO_2^{-2} D) SO_3^{-2} E) S^{2-}

Answer: D

22) Which one of the following is a nonmetal? 22) _____

A) Ca B) Au C) I D) Zn E) Pb

Answer: C

23) Cathode rays are _____. 23) _____

A) protons B) atoms C) electrons D) x-rays E) neutrons

Answer: C

24) The gold foil experiment performed in Rutherford's lab _____. 24) _____

A) confirmed the plum-pudding model of the atom
B) utilized the deflection of beta particles by gold foil
C) proved the law of multiple proportions
D) was the basis for Thompson's model of the atom
E) led to the discovery of the atomic nucleus

Answer: E

25) A molecular formula always indicates _____. 25) _____

A) which atoms are attached to which in a molecule
B) the isotope of each element in a compound
C) the geometry of a molecule
D) how many of each atom are in a molecule
E) the simplest whole-number ratio of different atoms in a compound

Answer: D

26) In the periodic table, the elements are arranged in _____. 26) _____

A) order of increasing metallic properties
B) reverse alphabetical order
C) order of increasing neutron content
D) alphabetical order
E) order of increasing atomic number

Answer: E

27) The correct name for $HClO_2$ is _____. 27) _____

A) hydrochlorous acid
B) chlorous acid
C) chloric acid
D) hydrochloric acid
E) perchloric acid

Answer: B

28) Fluorine is a _____ and calcium is a _____. 28) _____

A) metalloid, nonmetal
B) nonmetal, metal
C) metal, nonmetal
D) metal, metal
E) metal, metalloid

Answer: B

29) _____ typically form ions with a –1 charge. 29) _____

A) Chalcogens
B) Halogens
C) Alkaline earth metals
D) Transition metals
E) Alkali metals

Answer: B

30) Consider the following selected postulates of Dalton's atomic theory: 30) _____

(i) Each element is composed of extremely small particles called atoms.
(ii) Atoms are indivisible.
(iii) Atoms of a given element are identical.
(iv) Atoms of different elements are different and have different properties.

Which of the postulates is(are) no longer valid?

A) (ii) only
B) (ii) and (iii)
C) (iii) and (iv)
D) (iii) only
E) (i) and (ii)

Answer: B

31) The formula of a salt is XF. The X–ion in this salt has 36 electrons. The metal X is _____. 31) _____

A) Zn B) V C) Pd D) Rb E) Fe

Answer: D

32) A molecule of ammonia contains hydrogen and nitrogen in a 1:3 ratio by mass. This is a statement of _____. 32) _____

A) the law of conservation of energy
B) the law of multiple proportions
C) the law of constant composition
D) the law of conservation of mass
E) none of the above

Answer: C

33) The element _____ is the most similar to magnesium in chemical and physical properties. 33) _____

A) Li B) Rb C) Cs D) At E) Ba

Answer: E

34) When the following equation is balanced, the coefficient of H_2S is _____. 34) _____

$$FeCl_3\ (aq) + H_2S\ (g) \rightarrow Fe_2S_3\ (s) + HCl\ (aq)$$

A) 4 B) 1 C) 2 D) 5 E) 3

Answer: E

35) When the following equation is balanced, the coefficients are _____. 35) _____

$$Al(NO_3)_3 + Na_2S \rightarrow Al_2S_3 + NaNO_3$$

A) 4, 6, 3, 2 B) 2, 1, 3, 2 C) 2, 3, 2, 3 D) 2, 3, 1, 6 E) 1, 1, 1, 1

Answer: D

36) 6,020,000 neon atoms is _____ mol of neon atoms. 36) _____

A) 6.0×10^{23}

B) $1.0 \times 10^{+6}$

C) 1.7×10^{-18}

D) 1.0×10^{-17}

E) 3

Answer: D

37) The combustion of propane (C_4H_{10}) produces CO_2 and H_2O: 37) _____

$$2C_4H_{10}\ (g) + 13O_2\ (g) \rightarrow 8CO_2\ (g) + 10H_2O\ (g)$$

The reaction of 0.75 mol of C_4H_{10} will produce _____ mol of H_2O.

A) 0.75 B) 5.0 C) 1.5 D) 2.5 E) 3.75

Answer: E

38) The formula of nitrobenzene is $C_6H_5NO_2$. The molecular weight of this compound is _____ amu. 38) _____

A) 109.10 B) 107.11 C) 3.06 D) 43.03 E) 123.11

Answer: E

39) The formula weight of ammonium sulfate ($(NH_4)_2SO_4$) is _____ amu. 39) _____

A) 132 B) 100 C) 118 D) 264 E) 116

Answer: A

40) Of the reactions below, which one is a decomposition reaction? 40) _____

A) $2N_2 + 3H_2 \rightarrow 2NH_3$

B) $Cd(NO_3)_2 + Na_2S \rightarrow CdS + 2NaNO_3$

C) $2Mg + O_2 \rightarrow 2MgO$

D) $2CH_4 + 4O_2 \rightarrow 2CO_2 + 4H_2O$

E) $NH_4Cl \rightarrow NH_3 + HCl$

Answer: E

SHORT ANSWER. Write the word or phrase that best completes each statement or calculate the answer the question showing all work (for max. partial credit).

41) Isotopes can be separated using what type of spectroscopic equipment? 41) _____

Answer: Mass spectrometer

42) 3.435×10^{-4} L = _____ μL 42) _____

Answer: 343.5 uL

43) How many molecules of CO_2 are there in 1.64 moles of CO_2 43) _____

Answer: 9.87×10^{23}

44) 5.78 $\mu g/cm^3$ = _____ kg/m^3 44) _____

Answer: 5.75×10^{-3}

45) The density of gold is 19.3 g/cm^3. A piece of gold that occupies a volume of 21.4 mm^3 would have a mass of _____g. 45) _____

Answer: 0.413

46) The correct answer (reported to the proper number of significant figures) to the following is _____. 46) _____

(1815+1806) / (9.11 × 7.92) = _____

Answer: 50.2

47) If matter is uniform throughout, cannot be separated into other substances by physical processes, but can be decomposed into other substances by chemical processes, it is called a (an) _____. 47) _____

Answer: compound

48) Predict the formula of the ionic compound that forms from sulfite and magnesium. 48) _____

Answer: $MgSO_3$

49) There are _____ hydrogen atoms in 25 molecules of $C_4H_4S_2$. 49) _____

Answer: 100

50) Magnesium burns in air with a dazzling brilliance to produce magnesium oxide: 50) _____

$2Mg\ (s) + O_2\ (g) \rightarrow 2MgO\ (s)$

When 1.00 g of magnesium burn in excess O_2, the mass of magnesium oxide produced is _____ g.

Answer: 1.66

51) What is the coefficient of O_2 when the following equation is completed and balanced? If 10 moles of O_2 were consumed how many moles of CO_2 were produced? 51) _____

$C_4H_8O_2 + O_2 \rightarrow$ _____

Answer: 5, 8 moles CO2 produced

52) A sample of CH_2F_2 with a mass of 19 g contains _____ atoms of F. 52) _____

Answer: 4.4×10^{23}

53) Name the following:

A) Na_2S _____

B) NO_2 _____

C) CO_3^{-2}_____

D) SF_6_____

E) KI_____

Answer: A) sodium sulfide B) nitrogen dioxide C) carbonate ion D) sulfur hexafluoride E) potassium iodide