Chemistry 100 Final Exam

Fall 1995

____ 1. How many moles of oxygen are required to react with 3.0 moles of carbon monoxide to form carbon dioxide at STP?

STOICHIOMETRY

$$O_{2(g)} + 2CO_{(g)} \longrightarrow 2CO_{2(g)}$$

(a) 0.50 mol
(b) 1.0 mol
(c) 1.5 mol
(d) 2.0 mol
(e) 3.0 mol

____ 8. 8.0 grams of $CaCO_3$ is dissolved in a total volume of 500. ml. What is the molarity of the solution?

SOLUTIONS

(a) 0.072
(b) 0.16
(c) 0.29
(d) 0.036

____ 9. How many grams of KCl are in 10. ml of a 0.10 M solution?

SOLUTIONS

(a) 1.0×10^{-3}g
(b) 0.013g
(c) 0.075g
(d) 1.0g
(e) 75g

____ 10. 5.0 ml of a 0.20 M solution of KI is reacted with 4.0 ml of a 0.30 M solution of $Pb(NO_3)_2$.

STOICHIOMETRY

$$2\ KI + Pb(NO_3)_2 \longrightarrow PbI_2 + 2KNO_3$$

How many grams of solid PbI_2 will be formed?

(a) 0.23g
(b) 0.35g
(c) 0.46g
(d) 0.55g
(e) 0.82g

____ 11. 1 ml of a 5 M solution is diluted to give 500 ml. What is the new molarity?

SOLUTIONS

(a) 0.1
(b) 0.01
(c) 0.001
(d) 0.02

____ 14. How many moles of NaCl are present in 100. ml of a 0.125 M solution?

SOLUTIONS

(a) 1.25×10^{-3}
(b) 0.0800
(c) 0.0125
(d) 12.5
(e) 800

____ 15. A solution can be described as

SOLUTIONS

(a) a heterogenous mixture
(b) a homogeneous mixture
(c) a solute dissolved in solvent with fixed proportions
(d) difficult to separate its components physically
(e) having the same properties as its solvent

Pick the letter from the list below which best completes the following statements in 16-19.

SOLUTIONS

(a) saturated
(b) miscible
(c) concentrated
(d) solubility
(e) concentration

____ 16. Alcohol is infinitely _____ with water.

____ 17. A dilute solution has fewer solute particles dissolved in it than a _____ one.

____ 18. Molality, molarity and mass % are terms of _____.

____ 19. The maximum amount of solute that can be dissolved in a certain amount of solvent is its_____ .

____ 20. An aqueous nitric acid solution that is 70.0% HNO_3 by mass contains:

SOLUTIONS

(a) 70.0g HNO_3 and 100.g H_2O
(b) 70.0 mol HNO_3 1.00 L H_2O
(c) 70.0g HNO_3 and 30.0g H_2O
(d) 70.0g H_2O_3 and 30.0g HNO_3
(e) 1.11 mol HNO_3 in 1.00 L H_2O

____ 21. What is the weight percent of water in a solution made by dissolving 15.6g of NaCl in 135g water?

SOLUTIONS

(a) 0.104%
(b) 10.4%
(c) 11.6%
(d) 88.4%
(e) 89.6%

____ 22. The molecular geometry of the CO_2 molecule is:

VSEPR

(a) linear
(b) bent
(c) pyramidal
(d) trigonal planar
(e) tetrahedral

____ 23. The molecular geometry of the H_2O molecule is:

VSEPR

(a) linear
(b) bent
(c) pyramidal
(d) trigonal planar
(e) tetrahedral

____ 24. The <u>electron pair arrangement</u> around the N atom in the ammonia molecule NH_3 is:

VSEPR

(a) linear
(b) bent
(c) pyramidal
(d) trigonal planar
(e) tetrahedral

____ 25. The electron pair arrangement and the molecular geometry of SO_3 are:

VSEPR

(a) linear
(b) bent
(c) pyramidal
(d) trigonal planar
(e) tetrahedral

PART II

____ 26. Which is <u>not</u> a chemical change?

VOCABULARY

(a) A firefly lights up
(b) Tobacco is smoked in a pipe
(c) Moth balls sublime at room temperature
(d) A leaf turns color in autumn
(e) Butter left out at room temperature turns rancid

____ 27. By what process is a gas converted to a liquid?

VOCABULARY

(a) condensation
(b) evaporation
(c) sublimation
(d) melting

____ 28. Which of the following is <u>not</u> a diatomic gas?

FORMULA

(a) nitrogen
(b) hydrogen
(c) helium
(d) oxygen
(e) fluorine

____ 29. 425°C is how many degrees Fahrenheit?

ENERGY

(a) 218
(b) 425
(c) 765
(d) 797
(e) 823

____ 30. 0.05070 has _____ significant figures

MEASUREMENT

(a) 3
(b) 4
(c) 5
(d) 6
(e) 7

____ 31. The way to write the number of lead atoms in one million moles in scientific notation is:

MOLE

(a) 1×10^6 Pb atoms
(b) 1×10^{29} Pb atoms
(c) 6.022×10^6 Pb atoms
(d) 6.022×10^{23} Pb atoms
(e) 6.022×10^{29} Pb atoms

____ 32. How many significant figures in the answer to:

MEASUREMENT

$$6799.5 + 25 =$$

(a) 1 (b) 2 (c) 3 (d) 4 (e) 5

____ 33. Calculate the mass of a plastic brick measuring 2.00cm by 3.00cm by 1.50cm and having a density of $1.26 g/cm^3$.

MEASUREMENT

(a) 11.3 g
(b) 9.00 g
(c) 7.14 g
(d) 0.140 g
(e) 0.0882 g

____ 34. The element found in Period 4 Group VI A is:

PERIODIC TABLE

(a) Cr
(b) Sn
(c) Se
(d) Te
(e) S

____ 35. Pick the wrong statement.

ATOMIC STRUCTURE

(a) A large majority of the mass of the atom is in the nucleus.
(b) Electrons are in constant motion.
(c) Atoms that have lost electrons will be positively charged.
(d) The masses of the elements give in the periodic table are the actual masses of the elements.
(e) An atom is neutral when the number of protons is equal to the number of electrons.

____ 36. The chemical properties of an element are determined by its:

PERIODIC TABLE

(a) atomic mass
(b) atomic number
(c) number of neutrons
(d) symbol
(e) density

____ 37. A 5d orbital can contain a maximum of _____ electrons.

ELECTRON CONFIGURATION

(a) 2 (b) 6 (c) 8 (d) 10 (e) 14

____ 38. Nonmetals tend to _____ electrons when forming ionic compounds.

(a) gain
(b) lose
(c) share
(d) transfer

FORMULA

____ 39. The I^- ion is _____ than the I atom.

PERIODIC TRENDS

(a) smaller than
(b) larger than
(c) the same size as
(d) not enough information given

____ 40. N_2 has a _____ bond between the two nitrogen atoms.

BONDING

(a) single
(b) double
(c) triple
(d) ionic

____ 42. 40. grams of Br_2 contains how many atoms?

MOLE

(a) 0.25
(b) 0.50
(c) 1.5×10^{23}
(d) 3.0×10^{23}
(e) 6.0×10^{23}

____ 43. An atom is composed mostly of:

ATOMIC STRUCTURE

(a) protons
(b) electrons
(c) empty space
(d) neutrons
(e) nuclei

____ 44. An ion with atomic number 50 and 46 electrons is:

ATOMIC STRUCTURE

(a) Pd^{4+}
(b) Sn^{4+}
(c) Pd^{4-}
(d) Sn^{4-}
(e) unlikely to exist

____ 45. The number of valence electrons in CF_4 is:

VSEPR

(a) 5 (b) 9 (c) 23 (d) 32 (e) 40

____ 46. The number of bonds is CF_4 is:

VSEPR

(a) 1 (b) 2 (c) 3 (d) 4 (e) 5

____ 47. The oxidation number of C in CF_4 is:

FORMULA

(a) 0 (b) -1 (c) +1 (d) -4 (e) +4

____ 48. Each C-F bond in CF_4 can be described as:

VSEPR

(a) polar (b) non-polar (c) ionic (d) coordinate

____ 49. The compound CaF_2 is called:

FORMULA

(a) Difluorocalcium
(b) Calcium fluoride
(c) Calcium fluorine
(d) Calcium difluoride
(e) monocalcium difluoride

____ 51. The electron configuration of the O^{2-} ion is:

ELECTRON CONFIGURATION

(a) $1s^2 2s^2 2p^2$
(b) $1s^2 2s^2 2p^4$
(c) $1s^2 2s^2 2p^6$
(d) $2p^4$
(e) $2p^6$

____ 52. Molality is defined as:

(a) grams of solute per kilogram of solvent.
(b) moles of solute per kilograms of solution.
(c) moles of solute per kilograms of solvent.
(d) moles of solute per liter of solution.
(e) grams of solute per 100 grams of solution.

____ 54. The empirical formula for a compound with the composition 37.2%C, 7.82%H, and 55.0%Cl is:

MOLE

(a) HCCl
(b) H_2C_3Cl
(c) HC_5Cl_7
(d) H_3CCl_3
(e) H_5C_2Cl

____ 55. How many moles of nitrate ions are in 1.1×10^{-3} mol of $Ca(NO_3)_2$?

MOLE

(a) 1
(b) 2
(c) 1.1×10^{-3}
(d) 2.2×10^{-3}
(e) 3.3×10^{-3}

____ 56. Balance the following equation and report the number of moles of O_2 that can be formed starting with 5.0 moles of NaClO.

STOICHIOMETRY

$$\_\_\_NaClO_{(aq)} \rightarrow \_\_\_ NaCl_{(aq)} + \_\_\_O_{2(g)}$$

(a) 1.0
(b) 2.0
(c) 2.5
(d) 4.0
(e) 5.0

____ 57. The reaction in problem 54 is a/n:

REACTIONS

(a) combination reaction
(b) decomposition reaction
(c) single replacement reaction
(d) double replacement reaction
(e) acid-base reaction

____ 58. Oxidation-reduction reactions are those that always involve:

REACTIONS

(a) formation of a precipitate
(b) decomposition of reactants
(c) transfer of cations and anions
(d) transfer of electrons
(e) production of gas

____ 59. Given the equation:

$$MnO_2 + 4HCl \rightarrow MnCl_2 + Cl_2 + 2H_2O$$

How many grams of HCl are needed to make 3.00 grams of $MnCl_2$?

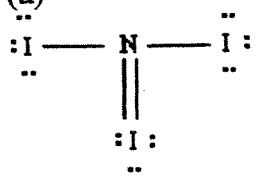
STOICHIOMETRY

(a) 12.0 g
(b) 3.48 g
(c) 0.750 g
(d) 0.0952 g

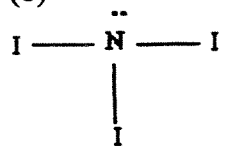
____ 62. The Lewis structure for the NI_3 molecule is:

VSEPR

(a)



(b)



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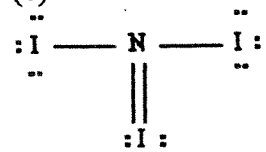

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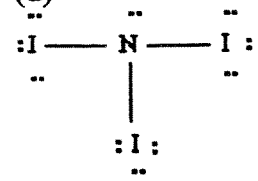
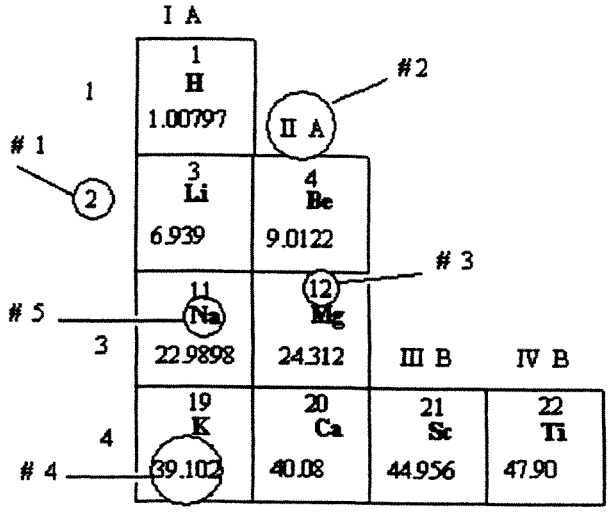


In this segment of the periodic table, several items are labeled. Use this to answer questions 63-65.



____ 63. The labeled item which identifies the number of protons in the nucleus of an atom is:

(a) #1 (b) #2 (c) #3 (d) #4 (e) #5

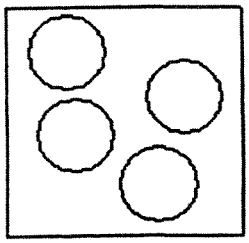
PERIODIC TABLE

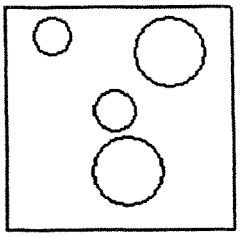
____ 64. The labeled item that identifies the group number is:

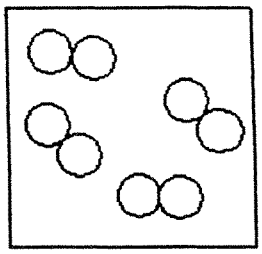
(a) #1 (b) #2 (c) #3 (d) #4 (e) #5

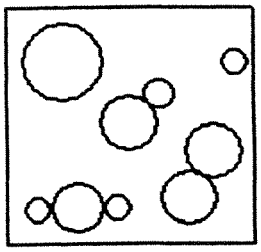
____ 65. The labeled item that identifies the relative mass of an element is:

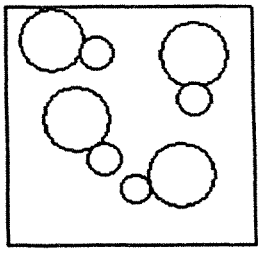
(a) #1 (b) #2 (c) #3 (d) #4 (e) #5

(a) 

(b) 

(c) 

(d) 

(e) 

VOCABULARY

____ 66. Which of the figures above best represent hydrogen gas?

____ 67. Which of the above figures represents a mixture of compounds and elements?