Chemistry 11

1. Conserving significant figures, 0.0250 m is equivalent to:

    A. 0.25 cm
    B. 2.5 cm
    C. 2.50 cm
    D. 25.0 cm
    E. none of the above

2. In which of the following sets of quantities do the numbers all have three significant figures?

A. 0.25	0.025	2.50×10^2
B. 0.0250	0.250	2.50
C. 25.0	250	0.0250
D. 2500	2.50	0.025
E. 0.025	2.50	250

3. A piece of aluminum foil is 10.2 cm wide, 14.3 cm long & 0.0075 cm thick. Considering significant figures, the best value for the volume of the foil is:

    A. 1.0 cm^3
    B. 1.09 cm^3
    C. 1.094 cm^3
    D. 1.1 cm^3
    E. 1.10 cm^3

4. Conserving significant figures, 4.40×10^{-2} is equal to:

    A. 0.440
    B. 0.044
    C. 0.0440
    D. 0.0044
    E. 0.00440

5. What is the place value of uncertainty in the above question?

    A. 10^0
    B. 10^{-1}
    C. 10^{-2}
    D. 10^{-3}
    E. 10^{-4}

6. Which of the following is not a property of table salt, NaCl?

    A. soluble in water
    B. forms cubic crystals
    C. white colour
    D. melts at a high temperature
    E. its aqueous solution is a poor conductor of electricity

7. Which of the following is most likely to be a heterogeneous mixture?

    A. air
    B. steel
    C. tap water
    D. gasoline
    E. salad dressing

8. Which of the following is an example of a compound?

    A. table sugar
    B. air
    C. steel
    D. gasoline
    E. gold

9. A reaction produces a mixture of different liquid alcohols. They could be most easily separated by:

    A. distillation
    B. chromatography
    C. filtration
    D. centrifugation
    E. electrolysis

10. When heated slowly, a white crystalline solid begins to liquefy at 43.0 °C. When the temperature reaches 44.5 °C, the material has changed completely to a colourless liquid. This information suggests that the material was most likely:

    A. a pure ionic compound
    B. an impure ionic compound
    C. a pure covalent compound
    D. an impure covalent compound
    E. a metallic element

11. For which of the following elements would it not be easy to predict its ion charge based on its location in the periodic table?

    A. Se (#34)
    B. Sr (#38)
    C. At (#85)
    D. Cs (#55)
    E. Pd (#46)

12. Based on its position in the periodic table, tellurium (#52) will likely:

    A. form a 3- ion
    B. not form ions at all
    C. form a positive ion
    D. acquire the same total number of electrons as xenon atom
    E. acquire a variety of ion charges

13. Most periodic tables have a zig-zag line that separates the table into two parts. The two parts consist of:

    A. metals & non-metals
    B. solids & liquids
    C. solids & gases
    D. natural & manmade elements
    E. radioactive & nonradioactive elements

14. $Ca(HS)_2$ is called:

    A. calcium (II) hydrogen sulphide
    B. calcium hydrogen sulphide
    C. calcium hydrogen sulphate
    D. calcium dihydrogen sulphide
    E. none of the above

15. $Cu_3(PO_4)_2$ is called:

    A. copper phosphate
    B. copper phosphorous oxide
    C. copper (II) phosphate
    D. copper (III) phosphate
    E. tricopper diphosphate

16. Dinitrogen tetrasulphide is:

    A. NS
    B. N_2S
    C. NS_2
    D. N_2S_4
    E. N_2S_5

17. One mole is equal to:

    A. 6.02×10^{23} particles
    B. 6.24×10^{18} particles
    C. 6.24×10^{24} particles
    D. a variable number of particles that depends on the element involved
    E. none of the above

18. Samples of He & Ne gas exist in separate, identical 2.0 L flasks. The temperature & pressure of the gas in each flash is the same. Which statement is false?

    A. the flask of Ne will have greater mass
    B. on average, the He particles move faster than the Ne particles
    C. the density of Ne is greater than that of He
    D. He particles are smaller than Ne particles
    E. the He flask contains more particles than the Ne flask

19. To obtain one mole of glucose, $C_6H_{12}O_6$, you would need:

    A. 29 g
    B. 60 g
    C. 90 g
    D. 180 g
    E. none of the above

20. 10.0 grams of $CaCO_3$ is equivalent to:

    A. 0.0999 mole
    B. 0.999 mole
    C. 9.99 mole
    D. 99.9 mole
    E. none of the above

21. The percent composition of glucose, $C_6H_{12}O_6$, is:

    A. 25% C, 50% H, 25% O
    B. 40% C, 10% H, 50% O
    C. 41% C, 3% H, 55% O
    D. 40% C, 7% H, 53% O
    E. none of the above

22. How many grams of carbon would form if 16.0 grams of CH_3OH was decomposed into its elements?

    A. 6.00 g
    B. 8.00 g
    C. 10.0 g
    D. 12.0 g
    E. none of the above

23. A compound is found to have the percent composition: 52.2% C, 13.0 % H & 34.8 % O. The simplest formula for this compound is:

    A. CHO
    B. CH_2O
    C. C_2H_6O
    D. C_2H_4O
    E. CH_6O_2

24. The molar mass of a substance is 70 g/mol & its empirical formula is CH_2. The actual formula for this substance is:

    A. CH_2
    B. C_2H_4
    C. C_3H_6
    D. C_4H_8
    E. C_5H_{10}

25. What concentration results when 6.8 g of $AgNO_3$ is dissolved in a total volume of 250 mL of solution?

    A. 0.16 M
    B. 0.027 M
    C. 0.037 M
    D. 6.3 M
    E. none of the above

26. How many grams of $CuSO_4$ must be dissolved in water to produce 25 mL of 1.5 M solution?

    A. 16 g
    B. 4.0 g
    C. 6.0 g
    D. 1.6 g
    E. none of the above

27. 25 mL of water is added to 75 mL of 2.4 M NaOH. The concentration of NaOH in the diluted solution is:

    A. 0.56 M
    B. 0.60 M
    C. 0.80 M
    D. 1.8 M
    E. none of the above

28. 25 mL of 0.60 M $CuBr_2$ is mixed with 35 mL of 1.2 M KBr. The concentration of bromide ion in the mixture is:

    A. 0.90 M
    B. 0.95 M
    C. 1.2 M
    D. 1.8 M
    E. none of the above

29. Which of the following does <u>not</u> occur during chemical change?

    A. atoms re-arrange to form new molecules
    B. atoms undergo a change in identity
    C. energy is absorbed or released by the substances involved
    D. the total number of atoms stays the same
    E. different properties become apparent as the reaction proceeds

30. When the following equation is balanced, what is the sum of the coefficients (i.e. the numbers used to balance the equation)?

$C_2H_5COOH + O_2 \rightarrow CO_2 + H_2O$

    A. 11
    B. 15
    C. 17
    D. 21
    E. none of the above

31. What kind of reaction is shown in the above equation?

    A. synthesis
    B. single replacement
    C. water formation
    D. double replacement
    E. combustion

32. When the following equation is balanced, what is the coefficient for H_2O?

$$C_2H_6 \; + \; O_2 \; \rightarrow \; CO_2 \; + \; H_2O$$

   A. 6
   B. 3
   C. 2
   D. 1
   E. none of the above

33. A piece of copper is placed in a solution of magnesium nitrate, $Mg(NO_3)_{2 \; (aq)}$ & left overnight. What would happen?

   A. Cu is more active than Mg & no reaction would occur
   B. Cu is less active than Mg & no reaction would occur
   C. Cu is more active than Mg & it would replace Mg2+ ions
   D. Cu is less active than Mg & it would replace Mg2+ ions
   E. A mixture of $Cu(NO_3)_{2 \; (aq)}$ & $Mg(NO_3)_{2 \; (aq)}$ would form

34. If the following reaction was attempted, what would happen?

$$Ca_{(s)} \; + \; HCl_{(aq)} \; \rightarrow$$

   A. hydrogen gas would be given off
   B. water would form
   C. no reaction would occur
   D. chlorine gas would be released
   E. none of the above

35. The following equation shows the burning of methane …

   A. endothermic & ΔH is +891 kJ
   B. endothermic & ΔH is -891 kJ
   C. exothermic & ΔH is +891 kJ
   D. exothermic & ΔH is -891 kJ
   E. ΔH cannot be determined from the equation given

36. In the reaction $4 \, Fe \; + \; 3 \, O_2 \; \rightarrow \; 2 \, Fe_2O_3$, the mole ratio that relates O_2 to Fe is:

   A. 3/4
   B. 4/3
   C. 2/3
   D. 3/2
   E. none of the above

37. Propane reacts with oxygen according to the following equation …

$$C_3H_8 \; + \; 5 \, O_2 \; \rightarrow \; 3 \, CO_2 \; + \; 4 \, H_2O$$

If 6.00 moles of carbon dioxide gas are produced in this reaction, the number of moles of oxygen consumed is:

   A. 3.60
   B. 6.00
   C. 8.00
   D. 10.0
   E. none of the above

38. How many grams of oxygen are needed to consume 10.0 g of aluminum according to the equation:

$$4 \, Al \; + \; 3 \, O_2 \; \rightarrow \; 2 \, Al_2O_3$$

   A. 4.44 g
   B. 7.90 g
   C. 8.89 g
   D. 15.8 g
   E. none of the above

39. Suppose 20 molecules of phosphorus & 20 molecules of oxygen are mixed & allowed to react according to the equation $4 \, P \; + \; 5 \, O_2 \; \rightarrow \; 2 \, P_2O_5$. Which of the following sets of numbers shows the number of molecules of each substance left after the reaction?

	P	O_2	P_2O_5
A.	0	4	4
B.	0	0	4
C.	0	4	8
D.	4	0	2
E.	4	0	8

40. Standard temperature & pressure for gases is:

   A. 0 °K & 101.3 atmospheres
   B. 0 °K & 101.3 kPa
   C. 0 °C & 1 atmosphere
   D. 0 °C & 1 kPa
   E. 25 °C & 101.3 kPa

41. For most gases, the volume of 1.00 mole at STP is:

    A. 1.00 L
    B. 44.0 L
    C. 22.4 L
    D. 0.100 L
    E. 0.760 L

42. At STP, the predicted density of nitrogen gas, N_2 is:

    A. 0.625 g/L
    B. 0.800 g/L
    C. 1.25 g/L
    D. 1.60 g/L
    E. none of the above

43. 5.1 g of copper & 1.6 g of oxygen gas are placed in a reaction vessel. When the vessel is heated, the elements react according to the equation $2\,Cu + O2 \rightarrow 2\,CuO$ … which of the following sets of numbers shows what remains after the reaction?

	mol Cu	mol O_2	mol CuO
A.	0.060	0.00	0.020
B.	0.00	0.010	0.080
C.	0.00	0.010	0.16
D.	0.070	0.00	0.010
E.	none of the above		

44. An ion of element A has 38 protons, 36 electrons & 52 neutrons. The mass number of element A is:

    A. 38
    B. 88
    C. 90
    D. 74
    E. 52

45. Which of the following describes the composition of $^{27}Al^{3+}$?

    A. 16 protons, 13 electrons & 11 neutrons
    B. 13 protons, 10 electrons & 14 neutrons
    C. 13 protons, 10 electrons & 27 neutrons
    D. 27 protons, 24 electrons & 0 neutrons
    E. none of the above

46. When we say that something is quantized, we mean:

    A. it can be measured
    B. it has only certain values
    C. it has a constant value
    D. its value keeps changing
    E. none of the above

47. Regions around the nucleus where there is a high probability of locating an electron are called:

    A. orbits
    B. orbitals
    C. ground states
    D. excited states
    E. none of the above

48. What kind of orbital always occurs in a set of 5 sub-orbitals?

    A. s-orbitals
    B. p-orbitals
    C. d-orbitals
    D. f-orbitals
    E. none of the above

49. The electron configuration of a calcium atom in its ground state is:

    A. $1s^22s^23s^64s^24d^8$
    B. $1s^22s^22p^63s^2$
    C. $1s^22s^22p^63s^23p^64p^2$
    D. $1s^22s^22p^63s^23d^8$
    E. $1s^22s^22p^63s^23p^64s^2$

50. $[Ar]3d^{10}$ is the ground state configuration of:

    A. Zn^{2+}
    B. Zn
    C. Ni^{2+}
    D. Ni
    E. none of the above

51. An element's chemical behaviour is largely determined by:

    A. its mass number
    B. its nuclear charge
    C. the number of neutrons in the atom
    D. its atomic radius
    E. its outer s & p electrons

52. A particle has 18 electrons. Which of the following could it not be?

    A. a potassium ion
    B. an argon atom
    C. a chloride ion
    D. a calcium atom
    E. a sulphide ion

53. The outermost electrons in an atom of tin (element #50) are in:

    A. s-orbitals
    B. p-orbitals
    C. d-orbitals
    D. f-orbitals
    E. g-orbitals

54. Shielding refers to:

    A. inner electrons repelling outer electrons
    B. repulsion between electrons in the same orbital
    C. the attraction between outer electrons & the nucleus
    D. repulsion between inner electrons
    E. decreasing nuclear charge as atomic number increases

55. Of the following, the element with the weakest attraction for electrons is:

    A. H
    B. Li
    C. Cs
    D. F
    E. I

56. Of the following, the element with the greatest ionization energy is:

    A. Li
    B. Cs
    C. F
    D. I
    E. Fe

57. Of the following, the element having the largest atomic radius is:

    A. Li
    B. Cs
    C. He
    D. Rn
    E. H

58. Which of the following statements is true concerning overall attraction for outer electrons as one proceeds down a chemical family from top to bottom?

    A. attraction increases due to increasing nuclear charge
    B. attraction decreases due to increasing nuclear charge
    C. attraction increases due to increasing shielding
    D. attraction decreases due to increasing shielding
    E. attraction stays about the same

59. Which of the following statements is true concerning the size of atoms as one proceeds across a period from left to right?

    A. size increases due to increasing repulsion among electrons
    B. size increases due to increasing shielding
    C. size decreases due to decreasing shielding
    D. size decreases due to increasing nuclear charge
    E. the size stays approximately constant

60. Which of the following statements is true concerning the relative attraction for outer electrons in Ne & Na^+?

    A. Na^+ has more attraction due to equal shielding & greater nuclear charge
    B. Na^+ has more attraction due to greater shielding & equal nuclear charge
    C. Na^+ has more attraction due to less shielding & equal nuclear charge
    D. Na^+ has more attraction due to less shielding & greater nuclear charge
    E. Ne has more attraction because it has a full set of s & p orbitals

61. Element Z is in the alkaline earth family & Y is a halogen. The formula for a compound of Z & Y is:

    A. ZY
    B. Z_2Y
    C. ZY_2
    D. Z_2Y_2
    E. Z_2Y_3

62. Ionic compounds are produced from the joining of elements that:

    A. are both metals
    B. have generally strong attractions for electrons
    C. have greatly different numbers of electrons
    D. have little attraction for electrons
    E. transfer electrons from one atom to another

63. Which of the following elements would form a nonpolar covalent bond?

    A. K & F
    B. O & Cl
    C. H & O
    D. C & S
    E. C & Cl

64. In which of the following compounds is the bond between the atoms most polar?

    A. HCl
    B. KCl
    C. CO
    D. CO_2
    E. NO

65. 1,4-dichlorobenzene is a colourless solid with a distinctive odour that is often used as 'potty mint' in public washrooms. Which of the following best describes this compound?

	melting point	solubility in H_2O	conductivity of solution
A.	low	low	low
B.	low	low	high
C.	low	high	high
D.	high	high	high
E.	high	low	low

66. The electron dot diagram for OF_2 has:

    A. O-F single bonds & one pair of unshared electrons on the O
    B. O-F single bonds & two pairs of unshared electrons on the O
    C. O-F double bonds & one pair of unshared electrons on the O
    D. O-F double bonds & two pairs of unshared electrons on the O
    E. a F-F single bond

67. In the structural diagram of carbon monoxide, CO:

    A. the bonding electrons come equally from both atoms
    B. a resonant structure is needed
    C. there is a double bond & carbon has only six electrons surrounding it
    D. there is a triple bond & oxygen contributes four electrons to the bond
    E. there is a triple bond & oxygen contributes six electrons to the bond

68. Carbon tetrafluoride, CF_4, is:

    A. polar, has polar bonds & is asymmetrical
    B. polar, has polar bonds & is symmetrical
    C. nonpolar, has nonpolar bonds & is asymmetrical
    D. nonpolar, has polar bonds & is symmetrical
    E. nonpolar, has nonpolar bonds & is symmetrical

69. The boiling point of hydrogen, H_2, is -253 °C. The intermolecular forces that exist between molecules of hydrogen are:

    A. strong hydrogen bonds
    B. weak hydrogen bonds
    C. strong dipole-dipole attractions
    D. weak dipole-dipole attraction
    E. weak London forces

70. In which of the following substances would hydrogen bonding be an important kind of intermolecular force?

    A. H_2O
    B. H_2
    C. HCl
    D. CH_4
    E. PH_3

71. Which of the following has the highest boiling point?

    A. He
    B. Ne
    C. Ar
    D. Kr
    E. Xe

72. To which hydrocarbon family does benzene belong?

    A. alkane
    B. alkene
    C. alkyne
    D. cycloalkane
    E. aromatic

73. Geometric isomers are similar molecules that differ in:

    A. the arrangement of atoms around a double bond
    B. the functional groups they contain
    C. the arrangement of substituted groups along a carbon chain
    D. their chemical formulas
    E. the kind of C-C bonds they contain

74. The number of possible isomers of butane, C_4H_{10} is:
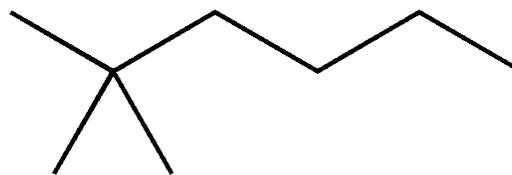
    A. 1
    B. 2
    C. 3
    D. 4
    E. 5

75. The following diagram gives a line structure for an organic molecule in which most of the hydrogen atoms have been omitted. What is its chemical formula?

    A. $C_{10}H_{10}$
    B. $C_{10}H_{12}$
    C. $C_{10}H_{18}$
    D. $C_{10}H_{20}$
    E. none of the above
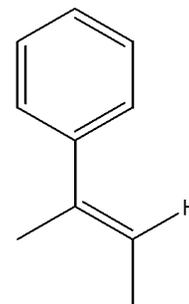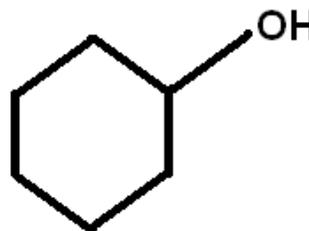
76. The best name for the following compound is:

    A. 1-ethyl-3,3-dimethylpentane
    B. 5-ethyl-5-methylpentane
    C. 2-dimethylpentane
    D. 2,2-dimethylhexane
    E. 2-dimethylhexane

77. $CH_3CH_2CH_2$-OH is an example of a(n):
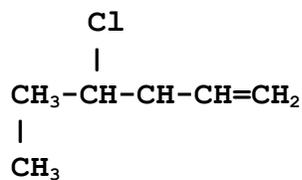
    A. ether
    B. alcohol
    C. ester
    D. acid
    E. aldehyde

78. The name of the following compound is:

    A. 1-benzenol
    B. 1-cycloheptanol
    C. 1-hexanol
    D. cyclohexanol
    E. cyclopentanol

79. The following structural diagram is an example of a(n):
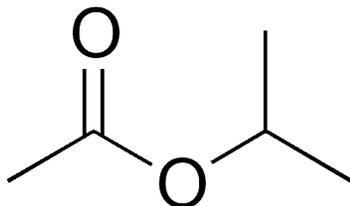
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     Cl
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CH₃-CH-CH-CH=CH₂
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     CH₃
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    A. aromatic hydrocarbon
    B. alkane
    C. alkene
    D. alkyne
    E. none of the above

80. The name of the compound in the previous question is:

    A. 2-chloro-1-methyl-4-pentene
    B. 4-chloro-5-methyl-1-pentene
    C. 4-chloro-5-methyl-2-pentene
    D. 4-chloro-1-hexene
    E. 3-chloro-5-hexene

81. What compounds would be reacted to make the following compound?

    A. ethanoic acid & 1-propanol
    B. ethanoic acid & 2-propanol
    C. ethanoic acid & propanol
    D. propanoic acid & ethanol
    E. ethanoic acid & methoxyethane

DATA SHEET
Activity Series

Metals	Decreasing Activity	Non-Metals
Lithium		Fluorine
Potassium		Chlorine
Calcium		Bromine
Sodium		Iodine
Magnesium		
Aluminum		
Zinc		
Chromium		
Iron		
Nickel		
Tin		
Lead		
Hydrogen		
Copper		
Silver		
Mercury		
Platinum		
Gold		

	Element	Electronegativity Value
1	H **Hydrogen**	2.1
2	He **Helium**	
3	Li **Lithium**	1.0
4	Be **Beryllium**	1.5
5	B **Boron**	2.0
6	C **Carbon**	2.5
7	N **Nitrogen**	3.0
8	O **Oxygen**	3.5
9	F **Fluorine**	4.0
10	Ne **Neon**	
11	Na **Sodium**	0.9
12	Mg **Magnesium**	1.2
13	Al **Aluminum**	1.5
14	Si **Silicon**	1.8
15	P **Phosphorus**	2.1
16	S **Sulfur**	2.5
17	Cl **Chlorine**	3.0
18	Ar **Argon**	
19	K **Potassium**	0.8
20	Ca **Calcium**	1.0

Density Formula

$$D = \frac{m}{V}$$

$$m = DV$$

$$V = \frac{m}{D}$$

Concentration Formula

$$c = \frac{n}{V}$$

$$n = cV$$

$$V = \frac{n}{C}$$

Dilution formula

$$C_1V_1 = C_2V_2$$

$$N_A = 6.02 \times 10^{23}$$

Molar Volume = 22.4 L

Chemistry 11
Practice: Final Exam

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