Chemistry 20: Practice final # 2

Name _____ Score _____ /76

1. The mass of 0.25 mol of iron (II) chloride is ____

a	65 g
b	37 g
c	32 g
d	1.3 kg

2. The volume of 4.50 mol of ammonia at STP is _____ L

a	112
b	4.98
c	5.51
d	101

3. The number of moles of $HNO_3(aq)$ in 3.75×10^{25} particles of $HNO_3(aq)$ is _____ mol

a	59.3
b	62.3
c	60.5
d	6.23×10^{47}

4. Which quantity is equivalent to the <u>smallest mass</u> of water vapor?

a	3.01×10^{23} particles
b	1.25 mol
c	19.8 L of gas at STP
d	45.14 g

5. When heated, calcium carbonate releases carbon dioxide gas and leaves behind a residue of solid calcium oxide. If 0.250 mol of residue is formed, then a mass of _____ g of calcium carbonate has been heated.

a	100
b	56.0
c	224
d	25.0

6. Propane ($C_3H_8(g)$ undergoes complete combustion with sufficient oxygen. If 7.5 mol of oxygen is consumed, then _____ mol of carbon dioxide will be formed .

a	13
b	2.0
c	4.5
d	9.0

7. When a 1.2 mol/L solution of copper (II) nitrate dissociates, the concentration of the anion will be _____ mol/L

a	2.4
b	0.60
c	1.2
d	0.40

8. The solute that is immiscible with its solvent is _____

a	Water in oil
b	Water in ethanol
c	NaCl(s) in water
d	Butanol in methanol

9. When making 200 mL solution of 1.00 mol/L NaOH(aq), one should begin by _____

a	Dissolving 8.00 g of solute in 200 mL of solvent
b	Dissolving 40.0 g of solute in 100 mL of solvent
c	Dissolving 8.00 g of solute in 100 mL of solvent
d	Dissolving 40.0 g of solute in 200 g of solvent

10. Samples of oxygen gas are compared. Which sample has the most particles?
    i. 12.0 g of oxygen
    ii. 8.50 L at STP
    iii. 2.53×10^{23} particles
    iv. 9.00 L at SATP

a	i
b	ii
c	iii
d	iv

11. In a formation reaction sufficient hydrogen gas reacts with 5.00 mol of oxygen gas to form hydrogen peroxide ($H_2O_2(l)$). If 12.0 mol of hydrogen peroxide is collected, then the percentage yield for this reaction is _____%

a	120
b	83.3
c	240
d	41.7

12. A 23.5 mg sample of a toxic compound is placed in 1.50 kg of water. The concentration of this toxic compound is _____ ppm.

a	23.5
b	15.7
c	0.282
d	3.54

13. An unknown volume of 0.90 mol/L solution has 60 mL of water added to it. If the new diluted concentration of the solution is 0.45 mol/L, then the initial volume of the solution was ____ mL

a	60
b	120
c	30
d	90

14. Choosing from the list of equipment below, the glassware that gives the most accurate measurement for a volume of 10.0 mL will be _____

a	Evaporating dish
b	Erlenmeyer flask
c	Burette
d	beaker

15. Michelle says that a 25.0 mL sample of a 5.00 % $\frac{V}{V}$ solution of hydrogen peroxide will have ____ mL of solute

a	30.0
b	5.00
c	25.0
d	1.25

16. A solution with a pH of 2.50 is added to three indicators: HBg, H_2Tb, and HBb. The colour of the indicators in the order given will be _____, _____, and _____

a	Blue	Yellow	Blue
b	Green	Orange	Blue
c	Yellow	Yellow	yellow
d	Yellow	Orange	yellow

17. The pOH of a 0.000 225 mol/L solution of nitric acid is _____

a	2.60
b	10.35
c	3.65
d	11.40

18. If an acid has a pH of 3.50. the $[OH^-(aq)]$ will be _____

a	3.16×10^{-4} mol/L
b	3.16×10^{-11} mol/L
c	3.2×10^{-4} mol/L
d	3.2×10^{-11} mol/L

19. A solution has less $H^+(aq)$ ions than $OH^-(aq)$ ions. Choose the statement below that is **TRUE**.

a	The pH of the solution will be low
b	The indicator HOr will turn orange.
c	The solution will feel slippery.
d	The indicator HPr will be yellow.

20. When an acid is diluted with distilled water, then the pH will _____, and the solution will become _____

a	Rise	More acidic
b	Rise	More basic
c	Fall	More acidic
d	Fall	More basic

21. The new volume of a fixed mass of an ideal gas whose pressure is increased from 100 kPa to 200 kPa at a constant temperature will be _____

a	One half the original volume
b	Two times the original volume
c	Four times the original volume
d	One fourth the original volume

22. A solution of Epsom salts (MgSO4(s)) is 7.50 % $\frac{W}{V}$. The mass of Epsom salts that will be present in 150 mL of solution will be _____ g .

a	5.00
b	15.0
c	11.3
d	50.0

23. The correct name for $Au_3(PO_4)(s)$ would be _____

a	Silver phosphate
b	Gold (III) phosphate
c	Gold (I) phosphate
d	Gold phosphate

24. A sample of lead (II) chloride is added to 100 mL of water at room temperature. The correct symbol for this compound will be ____

a	$PbCl_2(l)$
b	$PbCl_2(s)$
c	$PbCl_2(g)$
d	$PbCl_2(aq)$

25. Which of the following observations is <u>not</u> evidence for a chemical reaction?

a	$Cu(s) + 2HCl(aq) \rightarrow CuCl_2(aq) + H_2(g)$
b	$H_2(s) \rightarrow H_2(g)$
c	Precipitate is formed
d	HPr changes from pink to colourless

26. A <u>dilute</u> solution is one in which there is _____

a	Large amount of solute in a large amount of solvent
b	Large amount of solute in a small amount of solvent
c	Small amount of solute in a large amount of solvent
d	Small amount of solute in a small amount of solvent

27. Consider the following unbalanced reaction

____F_2(g) + ____ C_8H_{12}(l) ➜ _____C(s) + ____ HF(g)

When the above reaction is <u>balanced with the smallest whole numbers possible,</u> the numerical coefficient for HF(g) is _____

a	1
b	6
c	8
d	12

28. When an acid is diluted with a large quantity of water, the pH will _____ because the [H^+(aq)] is _____.

a	Rise	Falling
b	Rise	Rising
c	Fall	Falling
d	Fall	Rising

29. A compound has a formula of T_3M_2(s). If the molar mass of the compound is 155.9 g/mol and the molar mass of the element T(s) is 25.1 g/mol, then the molar mass of the element M(s) is _____ g/mol

a	35.2
b	130.8
c	40.3
d	26.9

30. The molar mass of $Mn(CO_3)_2$(s) is _____ g/mol

a	144.33
b	174.96
c	126.96
d	114.95

31. Use the reaction given below:

____ $Ca(OH)_2(s)$ + ____ HF(aq) ➜ ____$H_2O(l)$ + ____$CaF_2(s)$

Be sure to balance the reaction first.
If 150 g of water is formed, then the number of moles of $Ca(OH)_2(s)$ that is reacted is _____ mol

a	17
b	9.38
c	8.32
d	4.16

32. A quantity of ____ mol of NaCl(s) **is equal in mass** to 1.50 mol of CaO(s) .

a	1.56
b	1.44
c	1.50
d	1.04

33. Consider the following unbalanced equation
___ $Li_2S(s)$ + ____ $MnO_2(s)$ ➜ ____ Li_2O + _____MnS_2

The TRUE statement about the balanced reaction will be _____

a	When 4.0 mol of $Li_2S(s)$ is consumed, 2 mol of $MnS_2(s)$ will be formed.
b	When 0.5 mol of $MnO_2(s)$ is consumed, 2 mol of $Li_2O(s)$ will be formed.
c	If 3 mol $Li_2O(s)$ is formed, then 4 mol of Li_2S will be consumed.
d	If 3.0 mol of $Li_2O(s)$ forms, then 6.0 mol of $MnS_2(s)$ will be formed.

34. The concentration of a salt solution that contains 120 g of NaOH(s) in 200 mL of water is _____ mol/L

a	15.0
b	0.600
c	1.67
d	24.0

35. In order to dilute 70.0 mL of a 2.00 mol/LNaCl(aq) to a concentration of 0.750 mol/L, _____ mL of distilled water should be added.

a	187
b	21.4
c	48.6
d	117

36. A technician added 50.0 mL of distilled water to a 100 mL sample of 1.50 mol/L solution of $Na_3PO_4(aq)$. The diluted concentration of the compound, the anion, and the cation will be _____ mol/L, _____ mol/L, and _____ mol/L respectively.

a	0.500	1.50	0.500
b	1.00	1.00	3.00
c	0.500	0.500	1.50
d	1.00	3.00	1.00

37. Consider the following reaction
$Al^{3+}(aq) + 3Ag(s) \rightarrow 3Ag^{+}(aq) + Al(s)$
The chemical reagent that has undergone <u>reduction</u> is _____

a	Ag(s)
b	$Ag^{+}(aq)$
c	$Al^{3+}(aq)$
d	Al(s)

38. When a substance undergoes <u>oxidation,</u> it _____ electrons and becomes more _____ charged.

a	Gains	Negatively
b	Gains	Positively
c	Loses	Negatively
d	Loses	Positively

39. An atom of sulfur has _____ valence electrons and _____ lone pairs of electrons.

a	16	2
b	6	4
c	6	2
d	16	4

40. The element on the periodic table with the highest electronegativity is _____ and it commonly forms a(n) _____ because it wants to _____ outer electron(s).

a	F	Cation	Lose
b	F	Anion	Gain
c	Fr	Cation	Lose
d	Fr	Anion	Gain

41. NaCl(s), LiOH(s) and $Ca(NO_3)_2$(s) are all _____ compounds because electrons are _____.

a	Ionic	Shared
b	Molecular	Shared
c	Ionic	Transferred
d	molecular	transferred

42. The compound C_6H_6(l) has a common name of _____ and a scientific name of _____.

a	Hexacarbon hexahydride	Benzene
b	Benzene	Hexacarbon hexahydrate
c	Benzene	Hexacarbon hexahydride
d	Heptacarbon heptahydrate	Benzene

43. A molecule of methane (CH_4(g)) has a _____ shape with _____ single bond(s) between hydrogen and carbon.

a	Pyramidal	4
b	Tetrahedral	4
c	Linear	1
d	Trigonal planar	1

44. When separating the boiling points of CH_4(g) from that of C_3H_8(g), the most significant force is _____

a	Non polar covalent bonds
b	Dipole dipole forces
c	Hydrogen bonds
d	London dispersion forces

45. Intermolecular forces measure forces _____ particles while intramoleucular forces measure forces _____ particles. The stronger of the two types of forces is _____ forces.

a	Within	between	Intermolecular
b	Between	Within	Intramolecular
c	Within	Between	Intramolecular
d	between	within	Intermolecular

46. The compound that exhibits polar covalent bonds with NO hydrogen bonds is _____

a	CH_3F
b	NH_3
c	C_2H_2
d	F_2

47. A molecule that has dipole-dipole, but is a non polar molecule is_____

a	$H_2O(l)$
b	C_2Cl_2
c	$CH_3F(g)$
d	$N_2(g)$

48. The strongest bonding force is _____ while the weakest bonding force is _____.

a	Ionic	Dipole – dipole
b	Metallic	Non polar covalent
c	Network covalent	London dispersion
d	Non polar covalent	Network covalent

49. If the following chemicals were placed in order from the <u>lowest</u> boiling point to the <u>highest boiling point,</u> the chemical that would be listed last would be _____

Ammonia ($NH_3(g)$), sucrose ($C_{12}H_{22}O_{11}(s)$) , lithium hydroxide ($LiOH(s)$), nitrogen gas ($N_2(g)$)

a	Sucrose
b	Ammonia
c	Lithium hydroxide
d	Nitrogen gas

50. Audrey and Samantha match up compounds with sterochemical shapes.

i.	Methane	A.	linear
ii.	Water	B.	Bent
iii.	Ethene	C.	trigonal planar
iv.	Ammonia	D.	Pyramidal

The pair above that is FALSE is

a	i and A
b	ii and B
c	iii and C
d	Iv and D

51. A compound that has a coordinate covalent bond is _____

a	ammonia
b	Lithium sulfide
c	Ammonium chloride
d	methane

52. **Numerical response question:**
Left justify the answer in the boxes provided

A 340 g sample of chromium (II) oxide has _____ mol.

53. **Numerical r response question**
Left justify the answer in the boxes provided

The cation concentration of a 75.0 mL sample of 2.54 mol/L zinc sulfate solution will be ____ mol/L

54. **Numerical response question**

Left justify the answer in the boxes provided

A 20.0 L sample of nitrogen gas at 34.0 ^{o}C will have a volume of _____L if the temperature changes to 75.1^{o}C. Assume the pressure of the gas remains constant.

55. **Numerical response question**

Left justify the answer in the boxes provided

A 60 g sample of titanium (III) chloride has _____ particles. Express the answer as a.b x 10^{cd} where a,b,c,d are the four digits recorded in the boxes provided above.

56. **Numerical response question**

Left justify the answer in the boxes provided

Samples of 0.0054 mol/L Nitric acid are added to four indicators: thymol blue, orange IV, cresol red and bromothymol blue. Bert and James record the color for these indicators in the order given using the table below.

Number	Color
1	Red
2	Yellow
3	Orange
4	Blue
5	Green
6	Colorless

Their answer would be ____, _____, _____ and _____.

57. **Numerical response question**

Left justify the answer in the boxes provided

A pressure of 800 mm of mercury will be equivalent to _____ kPa.

1	
2	
3	
4	

58. **Numerical response question**

Left justify the answer in the boxes provided

Justin and Aaron have a 50 mL sample of 0.0036 mol/L $Ba(OH)_2(aq)$
Express the concentration of $[H^+(aq)]$ found in this solution in the form $a.b \times 10^{-cd}$.

59. **Numerical response question**

Left justify the answer in the boxes provided

Lynn and Carol build a three dimensional model of a molecule of acetylene ($C_2H_2(g)$). Record <u>ALL</u> the correct observations from the table below. The observations should be listed from the lowest number to the largest number.

1	The molecule is a symmetrical linear shape
2	The molecule has double bond(s)
3	The molecule is a non symmetrical angular shape
4	The molecule has triple bonds

60. **Numerical response question**

Left justify the answer in the boxes provided

Sarah and Erin react 45 g of oxygen gas with 3.5 mol of hydrogen gas to form water. The number of moles of <u>excess</u> reagent for this reaction will be _____ mol.

61. **Numerical response question**

Left justify the answer in the boxes provided

The number of polyprotic acids given in the list below is _____

Sulfuric acid, nitric acid, oxalic acid, hydrochloric acid, sulfurous acid

62. **<u>Long answer:</u>**

A 25.0 mL sample of 2.0 mol/L sodium oxalate is reacted with 30.0 mL of 1.50 mol/L copper (II) nitrate solution.

a) Write a balanced reaction (1 mark)
b) Find the limiting reagent (3 marks)
c) Find the mass of precipitate formed (2 marks)
d) Find the **<u>mmol</u>** of excess reagent left. (2 marks)

63. A 50 g sample of chlorine gas is placed in a 4.0 L container. Find the pressure inside the container if the temperature of the container is 300K. Express the answer in kPa. (2 marks)

64. Kent and Rhonda have 100 mL of a solution of $Na_2SO_3(aq)$. The concentration of the **cation** is 1.40 mol/L

a) Find the concentration of the **compound**. (1 mark)
b) Find the mass of solute that will be dissolved to make this solution. (2 marks)
c) If 150 mL of distilled water is added to the original solution, the new diluted concentration of the **cation** will be _____ mol/L (2 marks)

Answer Page

Multiple choice questions (1 mark each = 51)

1	C	16	D	31	D	46	A
2	D	17	B	32	B	47	B
3	B	18	D	33	A	48	C
4	A	19	C	34	A	49	C
5	D	20	B	35	D	50	A
6	C	21	A	36	B	51	C
7	A	22	C	37	c		
8	A	23	C	38	d		
9	C	24	B	39	c		
10	C	25	B	40	b		
11	C	26	C	41	c		
12	B	27	D	42	C		
13	A	28	A	43	B		
14	C	29	C	44	D		
15	D	30	B	45	B		

Numerical response questions (1 mark x 10 = 10)

52	5.00	57	107
53	2.54	58	1412
54	22.7	59	14
55	2323	60	0.69
56	3322	61	3

Long answer:

62. a) $Na_2OOCCOO(aq) + Cu(NO_3)_2(aq) \rightarrow 2NaNO_3(aq) + CuOOCCOO(s)$ (1 mark)

b) copper (II) nitrate (3 marks)

c) mass of CuOOCCOO(s) = 6.82 g (2 marks)

d) excess $Na_2OOCCOO(aq)$ = 0.500 mmol (2 marks)

63. p = 440 kPa (2 marks)

64. a) $[Na_2OO_3(aq)]$ = 0.700 mol/L (1 mark)

b) mass = 8.82 g (2 marks)

c) [cation] = 0.560 mol/L (2 marks)

Total: _____76 marks