CHERCHER SECONDARY SCHOOL

Chemistry worksheet For Grade 11 &12

I. <u>Choose the correct answer from the given alternatives and write your reason briefly for each and every answer.</u>

_____1. Which one of the following molecular species is paramagnetic? (At.No N=7, C=6,B=5,F=9)

A. N_2 B. B_2 C. F_2 D. C_2

_____2. What are the charge carriers in an electrolytic conduction?

A. Mobile electrons B. Ions C. Cations D. anions

_____3. Which group of crystalline solids have a low melting point?

A. Ionic crystals C. Covalent network crystals

B. Molecular crystals D. Metallic crystals

_____4. The type of hybridization in SF_4 is _____.

A. SP^3 B. SP^3d C. Sp^3d^2 D. SP^2

_____5. What is the bond order of C_2^{2-} (C=6)

A. 2 B. 2.5 C. 1.5 D. 3

_____6. The electron pair geometry is not tetrahedral in the molecule (ion) of _____

A. H_2O B. PCl_3 C. H_3O^+ D. SF_4

_____7. $E^0_{red}Al^{+3}/Al = -1.66_V$ $E^0_{red}Cr^{+3}/Cr$ =-0.74V $E^{Ni^{+2}}_{red}/Ni = -0.23V$ $E^0_{red}Pb^{+2}/Pb$ =-0.13V Which one of the metals is the strongest reducing agent?

A. Pb B. Al C. Cr D. Ni

_____8. An indicator, HIn has a dissociation constant equal to $1.0x10^{-11}$. The molecular form of the indicator, HIn is yellow and the In^- ion is blue. What would be the color of this indicator if it is a solution whose PH is 9?

A. Green B. Yellow C. Blue D. Orange

_____9. The reaction $ClO_3^- + N_2H_4 \rightarrow NO_3^- + Cl^-$ proceeds in basic medium. What is the coefficient of ClO_3^- when the equation is balanced?

A. 7 B. 6 C. 9 D. 3

_____10. In which one of the following reactions does water behave as a Lewis base?

A. $H^- + H_2O$ $2OH^-$ C. $K^+ + H_2O$ $[K[H_2O]^6]^+$

B. $NH_3 + H_2O$ $NH_4^+ + OH^-$ D. $H_2O + Hs^- OH^- + H_2S$

_____11. What happens to the PH value of a 0.25M CH_3COOH solution. if equal volume of a 0.1M CH3 cook solution is added to it?

A. The PH remains unchanged C. The PH decreases

B. The PH increases D. The PH can not be determined

_____12. When equivalent quantities of a strong acid and weak base are mixed, the PH value of the final solution is less than 7. This is due to the hydrolysis of _____.

A. of cation of the base C. of anion of the acid

B. of cation of the acid D. of anion of the base

_____13. Which substance is not obtained when a concentrated aqueous solution sodium chloride is electrolyzed using inert electrodes?

A. NaOH B. Cl_2 C. O_2 D. H_2

_____14. How long would it take to deposit 100 grams of aluminum for an electrolytic coll containing molten Al_2O_3 at a current of 125A? (At. mass Al=27, O=16, F=96500^{0}c/m)

A. 8.2hrs B. 7.2hrs C. 2.4 hrs D. 4.8hrs

_____15. The electron configuration of iron(II) ($_{26}Fe^{+2}$) is

A. $1S^22S^22P^63S^23P^64S^23d^4$ C. $1S^22S^22P^63S^23P^63d^6$

B. $1S^22S^22P^63S^22P^64S^13d^5$ D. $1S^22S^22P^63S^23P^64S^23d^6$

_____16. What is the bond order of O_2^-?

A. 2 B. 2.5 C. 1.5 D. 3

_____17. The type of hybridization in SO_3 is _____

A. Sp^3 B. SP^3d C. SP^3d^2 D. SP^2

_____18. Among the following molecules, which one has a net dipole moment?

A. H_2S B. CO_2 C. CCl_4 D. PCl_5

_____19. According to the Lewis concept of acids and bases, a base is a substance that ___.

A. accepts a proton C. releases hydroide ion in water

B. has a vacant orbital D. donates an electron pair

_____20. Which property of elements generally decreases from left to right across a given period?

A. Ionization energy C. Non-metallic character

B. Atomic size D. Electro negativity

_____21. A salt that undergoes hydrolysis to form a basic solution is _____.

A. NH_4Cl B. KNO_3 C. NaCN D. $Al_2(SO_4)_3$

_____22. A kind of polymer that cannot be recycled is called _____.

A. Thermoplastics B. Thermosetting C. Elastomer D. All

_____23. Which of the following is an example of addition polymer?

A. Nylon B. PVC C. Bakelite D. Dacron

_____24. Teflon is the commercial name for _____.

A. Poly vinyl chloride C. Polystyrene

B. Poly tetra floro ethane D. Poly ethane

_____25. Of the following acids, _____ is a weak acid.

A. HBr B. HF C. HClO4 D. HCl

_____26. Enthalpy is defined as the heat content of the system at constant

A. moles B. volume C. pressure D. heat

_____27. The electrolyte in a car battery is _____

A. NaOH B. HCl C. H_2SO_4 D. H_2O

_____28. Which of the following reactions is a redox-reaction?

A. $BaCO_3 \rightarrow BaO + CO_2$ C. $Cu + 8HNO_3 \rightarrow 3Cu(NO_3) + 2NO + 4H_2O$

B. $AgNO_3 + NaCl \rightarrow AgCl + NaNO_3$ D. $3Mg(OH)_2 + 2NH_3 \rightarrow Mg_3N_2 + 6H_2O$

_____29. The following two half cell reactions are given with their appropriate reduction potential

$Pb(s) \rightarrow Pb^{+2} + 2e \quad E_{red} = +0.13V$

$Ag(s) \rightarrow Ag^+(aq) + Ie^- \quad E_{red} = -0.80V$

Which of the following reactions takes place in the cell?

A. $2Ag^+(ag) + Pb(s) \rightarrow 2Ag(s) + Pb^{+2}(aq)$ C. $Ag^+(aq)+Pb(s) \rightarrow Ag(s) + Pb^{+2}(aq)$

B. $Pb^{+2}(aq) + 2Ag(s) \rightarrow 2Ag^+(aq) + Pb(s)$ D. $Pb^{+2}(aq) + Ag(s) \rightarrow Ag^+(aq)+Pb(s)$

_____30. What is the cathode material in leclanche cell?

A. lead (IV) oxide B. Zinc cup C. Graphite D. Lead

_____31. The reaction in which the yield of the products can not be increased by the application of high pressure is _____

A. $PCl_3(g) + Cl_2(g) \rightarrow PCl_5(g)$ C. $N_2(g) + 3H_2(g) \rightarrow 2NH_3(g)$

B. $N_2(g)+O_2(g) \rightarrow 2NO(g)$ D. $2SO_2(g) + O_2(g) \rightarrow 2SO_3(g)$

_____32. What is the number of components in a beaker containing an ice floating on water?

A. 1 B. 2 C. 3 D. 0

_____33. A 10 liter reaction vessel contains 0.1mole of PCl_5, 0.2 mole of PCl_3 and 0.2 mole of Cl_2 at 523k in an equilibrium. What is the value of the equilibrium constant for the reaction given below? $PCl_5(g) \rightarrow PCl_3(g) + Cl_2(g)$

A. 0.4 B. 0.05 C. 0.04 D. 0.02

_____34. The anode reaction is the same in all of the following electrolytic cells, except electrolysis of _____

A. diluted sodium chloride solution C. fused sodium chloride

B. brine D. concentrated hydrochloric acid.

_____35. What is the coefficient of H+ ion when the following reaction is balanced in acidic media? $MnO_4^- + SO_3^{2-} \rightarrow Mn^{+2} + SO_4^{2-}$

A. 2 B. 5 C. 3 D. 6

_____36. Which of the molecule listed below has two sigma (δ) and two pi(π) bonds?

A. N_2 B. C_2H_4 C. N_2F_2 D. HCN

_____37. An electro chemical cell constructed for the reaction:

$Cu^{+2}(aq)+M(s) \rightarrow Cu(s)+M^{+2}(aq)$ has an E^0_{cell} =0.75V. The standard E^0_{red} potential for $Cu^{+2}(aq)$ is 0.34V. What is the standard reduction potential for $M^{+2}(aq)$

A. -1.09V B. -0.410V C. 0.410V D. 1.09V

_____38. For preparing a buffer solution of PH=6.0 by mixing sodium acetate and acetic acid, what would be the ratio of the concentration of acid to salt ($Ka=10^{-4}$)

A. 1:10 B. 100:1 C. 1:100 D. 10:1

_____39. A polymer has the following structure

$$\begin{bmatrix} F & F & F & F & F & F \\ C & C & C & C & C & C \\ Cl & F & Cl & F & Cl & F \end{bmatrix}$$

What is the monomer of this polymer?

A. $CFCl = CF_2$ B. CF_3Cl C. CF_2Cl_2 D. CF_4

_____40. The most abundant metal on the surface of the earth is _____.

A. Silicon B. Oxygen C. Aluminum D. Iron

_____41. For the reaction $2H_2(g) + 2NO(g)$ $2H_2O(g) + N_2(g)$, given the following data, what is the rate law?

Trial	Initial concentration		Initial rate
	[NO]M	[H2]	m/s
1	0.50	0.09	0.025
2	0.50	0.18	0.050
3	1.00	0.18	0.050

A. Rate = $K[NO]^0[H_2]^2$ C. Rate = $K[NO][H_2]^0$
B. Rate = $K[NO]^2[H_2]^0$ D. Rate = $K[NO][H_2]^1$

_____42. A sub-shell with n=4, L=2 can accommodate a maximum of _____
A. 10 electrons B. 12 electrons C. 36 electrons D. 24 electrons

_____43. A gas does 116J of work while expanding and at the time, it absorbs 250J of heat What is the change in internal energy (ΔE)?
A. 366J B. -366J C. 134J D. -134J

_____44. How many kilo joules of heat are absorbed when 20g of NaCl(s) is decomposed into Na(s) and $Cl_2(g)$ at constant pressure according to the following reaction
$2Na(s) + Cl_2(g) \rightarrow 2NaCl(s) + \Delta H = -821.8KJ$
A. -281.0 B. -140.5 C. +140.5 D. +281.0

_____45. What is the number of orbitals is SP^3d type of hybridization?
A. 4 B. 3 C. 5 D. 6

_____46. What is the PH of a 0.1M NaOH?
A. 1 B. 6 C. 13 D. 0

_____47. A manganese has an oxidation number +4 in _____
A. MnO B. MnO_2 C. M_2O_3 D. Mn_2O_7

_____48. Which of the following changes will an oxidizing agent cause?
A. $PtO_2 \rightarrow PtO$ B. $Pt(OH)_2 \rightarrow Pt$ C. $PtO_3 \rightarrow PtO_2$ D. $Pt(OH)_2^{+2} \rightarrow PtO_3$

_____49. A molten binary salt $ZnCl_2$, undergoes electrolysis. The cathode reaction is _____
A. $Zn \rightarrow Zn^{+2} + 2e^-$ C. $2Cl^- \rightarrow Cl_2 + 2e^-$
B. $Cl_2 + 2e^- \rightarrow 2Cl^-$ D. $Zn^{+2} + 2e \rightarrow Zn$

_____50. A substance that is reduced during redox reaction_____.
A. loses mass C. is the anode
B. is the reducing agent D. is the oxidizing agent

_____51. A copper spoon was electroplated with silver. Which of the following reactions occurred at the cathode during electroplating?
A. $Ag \rightarrow Ag^+ + e^-$ C. $Ag^+ + e^- \rightarrow Ag$
B. $Cu \rightarrow Cu^{+2} + 2e^-$ D. $Cu^{+2} + 2e^- \rightarrow Cu$

_____52. Which of the following molecules has the shortest bond length?
A. O_2 B. Cl_2 C. N_2 D. Br_2

_____53. For the reaction: $Ni^{+2}(aq) + Fe(s) \rightarrow Ni(s) + Fe^{+2}(aq)$
E^0_{red} $Ni^{+2}/Ni = -0.25$
$Fe^{+2}/Fe = -0.44$
What is the standard potential of the cell?
A. -0.19 B. 0.19 C. -0.69 D. +0.69

_____54. Which of the following conditions leads to an increase in the internal energy of a system?
A. 3J of heal are gained by the system, and 6J of the work are done by the system
B. 6J of heat are gained by the system and 3J of the work are done by the system.
C. 6J of heat are released by the system and 3J of the work are done by the system.
D. 10J of heat are released by the system and 3J of the work are done by the system.

_____55. Consider the equilibrium system
$CaCO_3(s) + SO_2(g)$ $CaSO_3(s) + CO_2(g)$. Which of the following changes will shift

the equilibrium to the right?

A. Removing $CaSO_3$ as it is formed
B. Removing $CaCO_3$
C. Decreasing the volume of the container
D. Addition of CO_2 as it is formed

_____56. All of the following species can function as Bronsted lowery bases in solution, except

A. H_2O B. NH_3 C. S^{2-} D. NH_4^+

_____57. For a particular reaction ΔH^0=-38.3KJ and ΔS^0=-113J/k. This reaction is _____.

A. Spontaneous at all temperature
B. Non-spontaneous at temperatures below 66^0c
C. Spontaneous at a temperature above 66^0c
D. Non-spontaneous at all temperature

_____58. Which type of chemical reactions in automobile battery produces the electrical energy?

A. Decomposition
B. Oxidation reduction
C. Neutralization
D. Double displacement

_____59. $KClO_3$ decomposes according to the reaction: $2KClO_3 \rightarrow 3KCl + 3O_2$
If the rate of decomposition of potassium chlorate at a certain time is determined to be 2.4 x 10^{-2}m/s. What is the rate of formation of O2 at the same time?

A. 1.6 x 10^{-2}m/s B. 2.4 x 10^{-2}m/s C. 3.6 x 10^{-2}m/s D. 7.2 x 10^{-2}M/s

_____60. Which of the following species can act as an amphiprotic substance?

A. H_2S B. HS- C. CS D. HCl

_____61. The reaction between NO and I_2 is second order with respect to NO and first order in I_2. What change occurs in the rate of the reaction if the concentration of each reactant is tripled?

A. 3 times increases
B. 6 times increases
C. 18 times increase
D. 27 times increases

_____62. Oxygen gas in the laboratory is prepared by heating $KClO_3$
$2KClO_3(s) \rightarrow 2KClO_3(s) + 3O_2(g)$ ΔH= -89KJ
What is the enthalpy change for the formation of 0.8mol of O_2?

A. -71.2KJ B. -24KJ C. -44.5KJ D. 44.5KJ

_____63. For which of the following processes would the change in entropy, ΔS be positive?

A. Spreading of perfume in a room
B. The reaction of sodium metal with chlorine gas to from sodium chloride
C. Repairing a broken radio
D. Combination of N_2 and O_2 to form nitric oxide.

_____64. Assume that the industrial process for making sulfuric acid has three steps. Given the overall reaction and data below.

$S(s) + O_2(g) \rightarrow SO_2(g)$ ΔHrxn =-296.83KJ
$2SO_3(g) \rightarrow O_2(g) + 2SO_3(g)$ ΔHrxn =-196.2KJ
$SO_3(g) + H_2O(g) \rightarrow H_2SO_4(L)$ ΔHrxn = -227.72KJ
What is the enthalpy change for the over all reaction?

A. -850.9KJ B. -722.8KJ C. -1247.3KJ D. -326.6KJ

_____65. If the equilibrium constant for the reaction: $2NO(g)$ $N_2(g)+O_2$ is Kc=3.6x10^3 at 275k, Then, what will be the value of Kc for the reaction: $N_2(g) + O_2(g)$ $2NO(g)$

A. 2.70 x 10^{-4} B. 2.70 x 10^4 C. 12.96 x 10^4 D. 3.60 x 10^3

_____66. The value of Keq changes when

A. a catalyst is added
B. the temperature changes
C. the surface area changes
D. the concentration of reactants changes

_____67. A chemical equilibrium is described as 'dynamic' because _____

A. maximum randomness has been achieved
B. the pressure and temperature do not changes
C. both reactants and products continue to form
D. the concentration of chemical species remain constant.

_____68. The reaction NO_2 with CO is believed to occur according to the following mechanism, what would be the rate expression if the mechanism is correct?

$NO_2 + NO_2 \rightarrow NO_3 + NO$(slow)

$NO_3 + CO \rightarrow NO_2 + CO_2$(Fast)

A. Rate = $K[NO_2]^2$ C. Rate = $K[NO_2][CO]$
B. Rate = $K[NO_2]^2[CO]$ D. Rate = $K[NO_2]$

_____69. For the reaction $2A+B \rightarrow 2C$ The following rate data were obtained

Experiment	Initial [A]mol/L	Initial [B]mol/L	Initial Rate
1	0.5	0.5	10
2	0.5	1.0	20
3	0.5	1.5	30
4	1.0	0.5	40

Which of the following states the rate law for the reaction above?

A. $r=k[A]^2$ B. $r=l[A][B]$ C. $r=k[A]^2[B]$ D. $r=k[A]^2[B][C]$

_____70. Which one of the following is the electron geometry of H_2O^+?

A. Tetrahedral B. V-shape C. linear D. square planner

_____71. What is the hybridization of sulfur atom in SO_2?

A. SP^2 B. SP^3 C. SP^3d D. SP^3d^2

_____72. At a certain temperature for the reaction: $2NO(g) + O_2(g)$ $2NO_2(g)$ The equilibrium concentrations are $[NO]=0.5M$, $[O_2]=0.24M$ $[NO_2]=0.18M$. What is the value of Kc at this temperature?

A. 0.063 B. 0.50 C. 1.4 D. 2.0

_____73. For the reaction: $2Ag+(aq) + Zn(s) \rightarrow 2Ag(s) + Zn+2(aq)$. E^0_{cell} is 1.56V. What is the corresponding value of ΔG°?

A. 301KJ B. 301KJ C. -301KJ D. -301KJ

_____74. How many moles of copper metal is produced at the cathode during the electrolysis of aqueous $CuSO_4$ solution if a current of 0.10A passes through the solution for 20min?

A. 2.0×10^{-5} B. 1.2×10^{-3} C. 6.2×10^{-4} D. 1.0×10^{-5}

_____75. Which statement is incorrect about an electrolytic cell?

A. The cell reaction is spontaneous.
B. Reduction occurs at the cathode.
C. Oxidation occurs at the anode.
D. Convert electrical energy to chemical energy.

Use the following information to answer questions from 76-78

Ag^+/Ag Ered = 0.80V

Cu^{+2}/Cu Ered=0.34V

_____76. What is the anode reaction if the above cell is an electrolytic cell?

A. $Cu(s) \rightarrow Cu^{+2}(aq) + 2e^-$ C. $Cu^{+2} + 2e^- \rightarrow Cu(s)$

B. $2Ag^+ + 2e^- \rightarrow 2Ag(s)$ D. $2Ag(s) \rightarrow 2Ag^+(aq) + 2e^-$

_____77. In the above electrolytic cell, electrons flow in the external circuit from _____ electrodes to _____ respectively.

A. Cu, Cu B. Cu, Ag C. Ag, Cu D. Ag, Ag

_____78. In the above electrolytic cell, how much is the standard cell voltage.

A. 1.14V B. -0.46V C. 0.46V D. 1.26V

_____79. Which of the following is true for an operating galvanic cell?

A. $\Delta G>0$; $E_{cell}=0$ B. $\Delta G<0$; $E_{cell}>0$ C. $\Delta G<0$; $E_{cell}<0$ D. $\Delta G=0$;$E_{cell}=0$

_____80. What kind of hybrid orbitals are expected to be used by the central atom in PCl3?

A. SP B. SP^2 C. SP^3 D. SP^3d