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OROMIA EDUCATION BUREAU

CHEMISTRY MODEL EXAM FOR GRADE 12 STUDENTS, 2018/2026.

TIME ALLOWED: $2\frac{1}{2}$

GENERAL DIRECTIONS

THIS BOOKLET CONTAINS ***CHEMISTRY*** **MODEL EXAM** FOR **GRADE 12.** IN THIS BOOKLET, THERE ARE TOTAL OF **80** MULTIPLE CHOICE QUESTIONS.

THERE IS ONLY ONE BEST ANSWER FOR EACH QUESTION. CHOOSE THE BEST ANSWER FROM THE GIVEN ALTERNATIVES AND WRITE THE LETTER OF YOUR CHOICE ON THE ANSWER SHEET PROVIDED.

YOU ARE ALLOWED TO WORK ON THE EXAM QUESTIONS FOR $2\frac{1}{2}$ hours **ONLY.** WHEN TIME IS CALLED, YOU MUST IMMEDIATELY STOP WORKING ON THE QUESTIONS AND PUT DOWN YOUR PEN/PENCIL AND WAIT FOR WHAT YOU MIGHT BE TOLD TO DO.

ANY FORM OF CHEATING OR AN ATTEMPT TO CHEAT IN THE EXAM WILL RESULT IN AN AUTOMATIC DISMISSAL FROM THE EXAM HALL AND CANCELLATION OF YOUR SCORE.

PLEASE MAKE SURE THAT YOU HAVE WRITTEN ALL THE REQUIRED INFORMATION ON THE ANSWER SHEET BEFORE YOU START TO WORK ON THE EXAM.

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➢ PHYSICAL CONSTANTS

- ✓ Gas constant R= 0.0821 Latmmol^{-1}K^{-1}
- ✓ Avogadro"s number = 6.023 x10^{23} mol^{-}
- ✓ Plank"s constant h=6.626 x10^{-34} Js^{-},
- ✓ Rydberg constant= -2.18 *10^{-18} J
- ✓ Log 2.7=0.43, log 1.8=0.255
- ✓ √6.6 = 2.57, log (2.57)= 0.4
- ✓ Kb (NH_3)=Ka (CH_3COOH)=1.8 ×10^{-5}
- ✓ Ka of HF= 6.6 ×10^{-4}
- ✓ Speed of light, C = 3x10^{8}m/s
- ✓ Faradays constant, F = 96500 C/mol
- ✓ Mass of an electron = 9.11x10^{-31} Kg
- ✓ Charge of electron= 1.6.x10^{-19} C

➢ Atomic Number (Z) and Atomic Weight (A)

Element	H	He	Li	Be	B	C	N	O	F
Z	1	2	3	4	5	6	7	8	9
A	1.0	4.0	6.9	9.01	10.8	12.0	14.0	16.0	19.0
Element	Ne	Na	Mg	Al	P	S	Cl	Ar	K
Z	10	11	12	13	15	16	17	18	19
A	20.2	23.0	24.3	26.98	31.0	32.1	35.5	39.95	39.0
Element	Ca	Mn	Cr	Cu	Zn	Br	Ag	I	pb
Z	20	25	24	29	30	35	47	80	82
A	40.08	54.9	52	63.55	65.38	79.90	108	200.6	207

➢ Standard *reduction potential values of selective species*

- ✓ $E^0(Zn^{2+}/Zn)$_____-0.76v
- ✓ $E^0(Cr^{3+}/Cr)$ _____-0.74v
- ✓ $E^0(Pb^{2+}/Pb)$ _____0.13v
- ✓ $E^0(Ni^{2+}/Ni)$ _____-0.25v
- ✓ $E^0(Al^{3+}/Al)$ _____-1.66v
- ✓ $E^0(Mg^{2+}/Mg)$ ____-2.37v
- ✓ $E^0(Fe^{2+}/Fe)$ _____-0.44V
- ✓ $E^0(Ag^{+}/Ag)$ _____0.8v
- ✓ $E^0(Mn^{2+}/Mn)$ ___-1.18v
- ✓ $E^0(Cu^{2+}/Cu)$ ____0.34v
- ✓ $E^0(Ca^{2+}/Ca)$ ____-2.87
- ✓ $E^0(Au^{3+}/Au)$ ___1.5v
- ✓ $E^0(Cd^{2+}/Cd)$ ____-0.4V

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1. Which of the following sub atomic particle is used to determine chemical properties of elements?
   A. proton
   B. electron
   C. Nucleus
   D. Neutron
2. An element has two isotopes with masses of 62.93 amu (69.17%) and 64.93 amu (30.83%). What is the average atomic mass?
   A. 64.54 amu
   B. 63.54 amu
   C. 63.93 amu
   D. 64.93 amu
3. What is the effect of increasing atomic size on electronegativity down a group of periodic table ?
   A. The electronegativity increases because the atomic energy level increases.
   B. The electronegativity increases because the atomic number increases.
   C. The electronegativity decreases because the atomic size increases.
   D. The electronegativity decreases because the atomic size decreases.
4. The periodic table contains two separate rows of inner transition elements located below the main table. These raws contains 14 elements each and belongs to the 6th and 7th periods. Based on their position and electron configurations, which pair of elements series correctly corresponds to 6^{th} and 7^{th} periods ?
   A. Halogenes, Nobel gas
   B. lanthanoids, actinoids
   C. chalcogens, halogens
   D. actinoids, halogens
5. Aluminum reacts with a certain nonmetallic element, X to form a compound with the general formula AlX. Element X is a diatomic gas at room temperature. Element X must be
   A. sulfur
   B. fluorine
   C. Bromine
   D. Nitrogen
6. Ammonium ion (NH_4^+) is formed when ammonia (NH_3) reacts with a hydrogen ion (H^+). Which statement correctly analyzes the bond formed in the ammonium ion (NH_4^+)?
   A. All N–H bonds are ionic because the ion carries an overall positive charge.
   B. N–H bond is formed when nitrogen donates a lone pair of electrons to a hydrogen ion.
   C. N–H bonds are formed by transfer of electrons from hydrogen to nitrogen atom
   D. The positive charge causes all bonds in the ion to become nonpolar covalent bonds.
7. A student miss understood that London dispersion forces are insignificant and can be ignored when predicting physical properties. Which of the following is the best to evaluate this claim?
   A. London forces exist only in gaseous molecules and not in liquids or solids.
   B. London forces are the strongest type of interaction found in all substances.
   C. London forces exist in all molecules and become significant in large atoms.
   D. London forces only occur in ionic compounds and have no effect on molecules.
8. Someone conducts an experiment by using test tube with unknown compounds. If he/she touches the outer surface of the test tube during the reaction progress, he/she feels hot. This indicates the reaction that takes place in the test tube is _____.
   A. absorbed heat from the surroundings.
   B. released heat energy to the surroundings.
   C. the unknown compound evaporated to atmosphere
   D. heat is neither absorbed nor released during the reaction.

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9. If a student uses 2 grams of copper (II) oxide and obtains 1.60 grams of copper after reduction, Which of the following statement is correctly describe its law of definite proportion?
   A. The ratio of copper to oxygen remains constant in the compound.
   B. The compound contains more amount of oxygen than before.
   C. The mass of copper depends on the volume of hydrogen gas used.
   D. The changes temperature changes the composition of the compound.
10. Why does the electron configuration of chromium (Cr) deviate from the expected [Ar] $4s^2 3d^4$?
   A. Half-filled d -orbitals are more stable than incomplete field.
   B. d-orbital of Chromium is more stable than s- orbital
   C. 4s orbital is in the higher energy than 3d orbital.
   D. Electron fills the lower energy before higher energy.
11. Many classic experiments have given indirect evidence about the nature of the atom. Which statement below is **NOT** correct about the results of these experiments?
   A. Rutherford Experiment confirmed that Plum Pudding Model of the atom was correct.
   B. Dalton's atomic model stated that atoms are not subdivided in to subatomic particles.
   C. Oil Droplet Experiment showed that electric charge occurs in multi-electron charge.
   D. Cathode Ray Tube Experiment demonstrated that electrons carry a negative electric charge.
12. On the gold foil experiment, most alpha particles passed straight through the foil while a few were strongly deflected. What conclusion can be drawn from this observation?
   A. Atoms are completely solid spheres and destructible.
   B. Most of the mass of an atom is evenly distributed.
   C. Electrons are embedded in a positive sphere of an atom.
   D. Atoms contain a small, dense, positively charged nucleus.
13. Which of the following statements correctly relates wavelength, frequency, and speed of EMR in vacume?
   A. Wavelength increases, frequency increases, speed decreases
   B. Wavelength decreases, frequency increases, speed constant
   C. Wavelength increases, frequency decreases, speed decreases
   D. Wavelength decreases, frequency decreases, speed constant
14. Which combination represents all possible sets of quantum numbers for the 3d electrons?

Choices	n	L	ml	ms
A	3	2	-2, -1, 0,1,2	±1/2
B	3	1	-1, 0,1	±1/2
C	3	2	-3, -2, -1, 0,1,2,3	+1/2
D	3	1	-2, -1, 0,1,2	±1/2

15. Which of the following sets shows the correct first four members of the alkane series?
   A. Methane, Ethene, Propane, Butane
   B. Methane, Methanol, Ethanol, Butanol
   C. Methane, Ethyne, Propane, Butene
   D. Methane, Ethane, Propane, Butane

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16. Given elements: O, Be, N, B, F: which is the correct increasing order of first ionization energy?
    A. Be < B < N < O < F
    B. F < B < Be < O < N
    C. N < B < O < Be < F
    D. B < Be < O < N < F
17. Which of the following statements is CORRECT regarding the formation of ionic compounds?
    A. Ionic compounds are formed when electrons are shared between atoms.
    B. Ionic compounds are formed between atoms with similar electronegativity.
    C. Ionic compounds form when electrons transferred from one atom to another.
    D. Ionic compounds formed by delocalization of electrons in metal.
18. Why is graphite a good conductor of electricity, while diamond (C) is not, even though both are forms of carbon allotropes?
    A. Graphite has delocalized electrons due to its hexagonal structure, while diamond does not
    B. Graphite is a metal having delocalized electron while diamond is a non-metal doesn't.
    C. Diamond has metallic bonding; while graphite forms ionic bond with each other.
    D. Both graphite and diamond have identical structures and conductivity randomly.
19. Which of the following lists correctly shows the strength of the intermolecular attractive forces in decreasing order?
    A. Hydrogen bond ⟶ dipole-dipole force ⟶ London force
    B. Dipole- dipole force ⟶ Hydrogen bond ⟶ London force
    C. London force ⟶ dipole − dipole force ⟶ Hydrogen bond
    D. London force ⟶ Hydrogen bond ⟶ dipole-dipole force
20. When two chlorine atoms combine to form a chlorine molecule (Cl_2), a covalent bond is formed due to the overlapping of atomic orbitals. Which orbital overlap is responsible for the formation of the bond in Cl_2?
    A. Side-by-side overlaps of two p orbitals to forms a π bond.
    B. End-to-end overlap of two p orbitals to forms a σ bond.
    C. End-to-end overlaps of two s orbitals to forms a σ bond.
    D. Side-by-side overlap of s orbital and p orbital forms a π bond.
21. You wants to design a set of molecules whose central atoms all exhibit sp^2 hybridization. Using concept of molecular geometry and hybridization, which of the following groups of molecules could best satisfy this requirement?
    A. SO_2, SO_4^{2-}, C_6H_6,
    B. $CHCl_3$, C_6H_6, C_2H_4
    C. SO_2, C_6H_6, C_2H_4
    D. $CHCl_3$, SO_2, C_6H_6
22. Given two molecules **X** and **Y** that satisfy the following conditions:
    - ✓ Molecule X contains 14 sigma (σ) bonds and no pi (π) bonds**.**
    - ✓ Molecule Y contains 5 sigma (σ) bonds and 1 pi (π) bonds**.**

    Which of the following molecules can be represented by X and Y respectively.
    A. diethyl ether, $(CH_3CH_2)_2O$) and hydrazine, (N_2H_4)
    B. diethyl ether, $(CH_3CH_2)_2O$) and carbon dioxide (CO_2)
    C. Ethyl alcohol (CH_3CH_2OH) and Benzene (C_6H_6)
    D. hydrazine, (N_2H_4) and Chloroform $(CHCl_3)$

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23. The molecule **BF_3** consists of a boron atom bonded to three fluorine atoms. Based on VSEPR theory what is the shape and bond angel of BF_3?

A. Tetrahedral 109.5° bond angles

B. Trigonal planar with 120° bond angles

C. Linear with 180° bond angles

D. Bent with bond angles less than 120°

24. Which of the following statement is correctly describes Boyle's law**?**

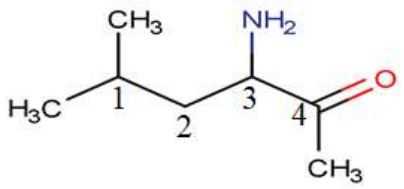
A. The volume of a gas is directly proportional to temperature at constant pressure.

B. The pressure of a gas is inversely proportional to its volume at constant temperature.

C. The pressure of a gas is directly proportional to the number of moles at constant temperature.

D. The volume of a gas is directly proportional to pressure at constant temperature.

25. Identify the hybridization of carbon atoms in the molecule labelled as 1,2,3,4 below in given figure?



	1	2	3	4
A	SP^3	SP^2	SP^2	SP^2
B	SP^2	SP^2	SP^2	SP
C	SP^3	SP^3	SP^3	SP^2
D	SP^2	SP^3	SP^2	SP^3

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26. Which of the following is **NOT** a pre-condition for a chemical reaction to occur?

A. Effective collision

B. Sufficient energy.

C. proper orientation

D. high activation energy

27. Two substances X and Y have melting points of 100 °C and 50 °C, respectively. Which substance is more thermally stabl as a solid**?**

A. Y, because it melts at lower temperature.

B. Both are equally stable at the given temperature.

C. X, because it requires more heat to melt

D. Impossible to guess.

28. Which of the following changes will generally increase the rate of a reaction?

A. Decreasing temperature of the reaction.

B. Decreasing concentration of reactants.

C. Using powdered solids instead of large size.

D. Removing a catalyst from the reaction.

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29. The phase change diagram below shows a different physical processes, labeled X, Y, Z, M:



Which of the following correctly identifies the processes represented by X, Y, Z, and M?

	X	Y	Z	M
A	sublimation	boiling	deposition	freezing
B	Melting	boiling	deposition	freezing
C	Melting	boiling	freezing	condensation
D	Melting	boiling	deposition	sublimation

30. If Kc_1 and kc_2 are the equilibrium constant for the two reaction:

- ❖ $XeF_6(g) + H_2O(g) \rightleftharpoons XeOF_4(g) + 2HF(g)$…….$Kc_1$
- ❖ $XeF_4(g) + XeF_6(g) \rightleftharpoons XeOF_4(g) + XeO_3F_2(g)$……$Kc_2$

What is the equilibrium constant for the reaction: $XeF_4\ (g) + 2HF\ (g) \rightleftharpoons XeO_3F_2\ (g) + H_2O(g)$?

A. $Kc_1 - K_{c2}$
B. B. $Kc_2 - K_{c1}$
C. Kc_2/Kc_1
D. Kc_1/Kc_2

31. How is the reaction quotient (Q_c) related to equilibrium constant (K_{eq})?

A. Qc < Kc after equilibrium
B. Qc = Kc before equilibrium
C. Qc = Kc at equilibrium
D. Qc and Kc are not related

32. Which statement best explains why alcohols generally have higher boiling points than alkanes with similar molecular mass?

A. Alcohols contain hydroxyl groups that form intermolecular hydrogen bonds.
B. Alcohols molecules contain carbon atoms that increase intermolecular attractions.
C. Alcohols molecules have shorter carbon chains than most similar alkane molecules.
D. Alcohols molecules are less polar than alkanes with similar molecular masses.

33. Given the following compounds, what would be the correct decreasing order of boiling point?:

I. $CH_3\ CH_2CH(CH_3)\ CH_2COOH$ II. $CH_3\,(CH_2)_4\,COOH$ III. $CH_3\ CH_2\ C(CH_3)_2COOH$

A. I > III > II
B. II > III > I
C. III > I > II
D. II > I > III

34. Which of the following describes a general method for synthesizing esters from carboxylic acids and alcohols, emphasizing reaction conditions and equilibrium?

A. Mixing alcohol and carboxylic acid without catalyst.
B. Carboxylic acids and alcohols are reacted under basic condition
C. Heating of carboxylic acid and alcohol with concentrated H_2SO_4
D. Esters formed only by oxidation of alcohols in the presence of Cu.

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35. Which evaluation correctly describe physical and chemical properties of oils?
    A. Oils are solids and remain unreactive under all conditions.
    B. Oils are polar solid and can't decompose when exposed to air.
    C. Oils are generally liquid undergo hydrogenation reaction
    D. Oils are nonpolar liquids but cannot react with acids and bases
36. Why tricarboxylic acids have higher boiling points than monocarboxylic acids?
    A. Monocarboxylic acids are branched, lowering the boiling point.
    B. Tricarboxylic acids are lighter, which increases boiling points.
    C. Monocarboxylic acids contain double bonds, reducing its boiling point
    D. The more –COOH in tricarboxylic acid, forming stronger hydrogen bonds
37. In a redox reaction: $MnO_2 + 4HCl \longrightarrow MnCl_2 + Cl_2 + 2H_2O$.
    Which of the following statements correctly identifies the roles of the reactants?
    A. MnO_2 is the reducing agent because the oxidation state of Mn increases.
    B. HCl is the oxidizing agent because the oxidation state of Cl increases.
    C. MnO_2 is the oxidizing agent because the oxidation state of Mn decreases
    D. HCl is the reducing agent because the oxidation state of H decreases.
38. When 5.0 g of magnesium reacts with 20.0 g of oxygen gas according to the reaction:
    $Mg(s)+O_2(g)\rightarrow MgO(s)$,What is the mass of MgO that can be formed?
    A. 8.3 g
    B. 10.0 g
    C. 16.7 g
    D. 20.0 g
39. A student crushes a large crystal of sugar into many small pieces before dissolving it in water. The sugar dissolves faster than the large crystal. Which of the following is correctly describing the observation?
    A. Increase in intermolecular force
    B. Increase the surface area of the molecule
    C. Increase in pressure of the system
    D. Decrease temperature
40. A technician prepares a solution by dissolving 40 g of NaOH, in enough water to make 500 mL of solution. What is the molarity (M) of this solution?
    A. 1.0 M
    B. 2.0 M
    C. 0.5 M
    D. 4.0 M
41. Which of the following oxides is classified as an amphoteric oxide?
    A. CaO
    B. SO_2
    C. Al_2O_3
    D. CO_2
42. Which of the following statements correctly applies to the formation and nature of salts?
    I. $NaHSO_4$ is a normal salt because all ionizable H^+ from the acid are replaced.
    II. $NaHSO_4$ is acidic salt formed when ionizable H^+ of the acid is **not** completely replaced by metal ions.
    III. Zn(OH)Cl is a basic salt because it contains one ionizable OH^- group in its formula.
    IV. Na_2CO_3 is a basic salt due to the presence of CO_3^{2-} that can be hydrolysis.
    A. Only IV
    B. Only II
    C. II, III & IV
    D. I,II & IV

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43. In a Galvanic cell consisting of Zinc and Copper electrodes, which of the following process occurs at the anode electrode?

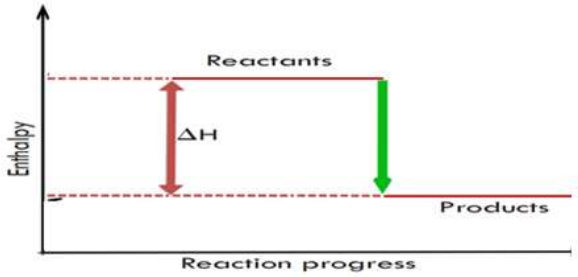
A. Reduction half-cell reaction is takes placed

B. Copper ions are reduced to Copper metal.

C. Electrons flow from Copper to Zinc.

D. Zinc metal is oxidized to Zinc ions.

44. Which of the following statement is correctly describing the reaction represented in the diagram below?



A. It is an endothermic reaction with a positive ΔH.

B. Energy is absorbed from the surroundings.

C. It is an exothermic reaction with a negative ΔH.

D. Heat is neither released nor absorbed in this reaction

45. In the extraction of Iron using a blast furnace, what is the primary purpose of adding Limestone ($CaCO_3$) to the furnace?

A. Act as a reducing agent for the iron ore.

B. Provide the heat necessary for the reaction.

C. Remove impurities like silica (SiO_2)

D. Prevent the iron from re-oxidizing.

46. Non -metals usually have poor electrical conductivity and are often brittle. However, they are widely used in electrical insulation and chemical industries. Which evaluation best explain how these properties affect their real –world uses?

A. Non-metals are unsuitable for all industrial applications because they are brittle.

B. Non-metals are useful as electrical insulators but their brittleness limited their use

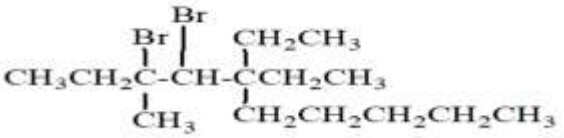
C. Non-metals are mainly used for construction because they are strong and malleable

D. Non-metals are good electrical and heat conductors like metal

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47. What is the correct IUPAC name for this molecule?



A. 4,4-diethyl-3,4-dibromo-5-methyl decane
C. 4,4-diethyl-3,4-dibromo-3-methyl decane
B. 7,8-dibromo-6,6-diethyl-8-methyl decane
D. 3,4-dibromo-5,5-diethyl-3-methyl decane

48. Abel is a grade 10 student. He took three different test tubes and added 5.00ml of toluene to each test tube. Then he added 2 drops of Br_2 water in the first test tube, equal drops of cold $KMnO_4$ in the second test tube and again equal drops of concentrated H_2SO_4 in the third test tube. In which test tube does a reaction occur?

A. The 1st and the 3rd test tube
C. The 3rd test tube
B. The 2nd test tube and the 3rd test tube
D. The 1st ,2nd and3rd test tube

49. Which of the following is the major limitation of the Arrhenius concept of acids and bases?

A. It is limited to aqueous solutions
C. It includes Lewis acid-base reactions
B. It explains proton transfer
D. It applies to non-aqueous solvents

50. A grade 12 students prepares 0.20 M aqueous solution of Acetic acid in the laboratory, according to the ionization equation given: $CH_3COOH(aq) \rightleftharpoons H^+(aq) + CH_3COO^-(aq)$: $Ka = 1.8 \times 10^{-5}$
Which of the following is the closest approximation of the hydrogen ion concentration? $\sqrt{3.6} = 1.9$

A. 1.9×10^{-3} M
C. 1.9×10^{-5} M
B. 1.9×10^{-8} M
D. 1.9×10^{-4} M

51. Consider a solution that is 0.10 M acetic acid (CH_3COOH) and 0.20 M sodium acetate ($NaCH_3COO$). Which of the following statements is correct?

A. Adding a small amount of NaOH causes the pH to decrease slightly.
B. When NaOH is added, the OH^- ions react with CH_3COO^- ions.
C. Adding a small amount of HCl causes the pH to decrease slightly.
D. When HCl is added, the H^+ ions react with CH_3COOH molecules.

52. Which of the following procedure can NOT produce buffer solution?

A. Equal volume of 0.5M NaOH and 1M HCl solution are mixed.
B. Equal volume of 0.5M NaOH and 1M CH_3COOH solution are mixed.
C. Equal volume of 1M CH_3COONa and 1M CH_3COOH solution are mixed.
D. Equal volume of 1M NH_3 and 0.5 M HCl solution are mixed.

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53. A buffer solution is prepared using Acetic acid (CH_3COOH) and its conjugate base Sodium acetate **(CH_3COONa)**. Under which condition will this buffer solution have maximum buffering capacity?

A. pH = pKa
B. $[A^-] = 10[HA]$
C. $[HA] = 10[A^-]$
D. pH=pOH

54. Which of the following salts will produce an acidic solution when dissolved in water?

A. NH_4Cl
B. CH_3COONa
C. NaCl
D. KNO_3

55. The dye bromothymol blue (HBb) is a weak acid whose ionization can be represented as follows $HBb(aq) \rightleftharpoons H^+(aq) + Bb^-(aq)$. Which may will the equilibrium shift when NaOH is added?

A. Initially to the left, finally to right
B. Initially to the right finally to left
C. To the left
D. to the right

56. During laboratory class, a student placed clean water in a beaker and added pieces of calcium metal using tongs. Which of the following is observed color after the reaction has completed?

A. The litmus paper turns to blue.
B. The litmus paper turns to red.
C. The litmus paper maintains its color.
D. The litmus paper turns to colorless

57. Which of the following statement is NOT correctly describe about oxidation and reduction ?

A. oxidizing agent is a species being reduced and causes oxidation
B. Reducing agent is a species being oxidized and causes reduction.
C. Oxidation is gain of electron while reduction is loss of electrons
D. Oxidation and reduction reactions are occurs simultaneously

58. A chemist compares electrolysis of dilute NaCl solution and concentrated NaCl solution using inert electrodes. The substance produced at anode electrode of dilute NaCl solution and concentrated NaCl solution are_____and____respectively.

A. Oxygen and chlorine.
B. chlorine and chlorine
C. hydrogen and chlorine
D. Hydrogen and sodium

59. An aqueous solution contains $Ag^+(aq)$ and $Cu^{2+}(aq)$ ions. Electrolysis is carried out using inert platinum electrodes. A constant current of 9.65 A is passed through the solution for 1000 seconds. Which metal will be deposited at the cathode and what mass will be deposited?

A. Copper, 10.8 g
B. Silver, 10.8 g
C. Silver, 5.4 g
D. Copper, 21.6 g

60. A Galvanic cell constructed from a strip of magnesium metal dipped in a solution of magnesium sulfate and a strip of silver metal immersed in a solution of silver nitrate.
Which of the following correctly represents the cell notation for this galvanic cell?

A. $Ag / Ag^+ // Mg^{2+} / Mg$
B. $Mg / Mg^{2+} // Ag^+ / Ag$
C. $Mg / Mg^{2+} / Ag^+ / Ag$
D. $Ag / Ag^+ // Mg / Mg^{2+}$

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61. Aluminum metal reacts spontaneously with iron (II) ions according to the reaction: $Al(s)+Fe^{2+}(aq)\rightarrow Al^{3+}(aq)+Fe(s)$ .what is the value of **ΔG°** for the reaction?
    A. −1216 kJ
    B. −608 kJ
    C. −706 kJ
    D. −203 kJ

62. A metal pipeline buried underground is protected from corrosion by attaching a more reactive metal such as magnesium. Why does magnesium protect the iron pipe?
    A. Magnesium decreases oxygen concentration around iron.
    B. Magnesium acts as a sacrificial anode and oxidizes first.
    C. Magnesium increases the potential of iron.
    D. Magnesium prevents electron movement.

63. Which of the following is considered a renewable resource?
    A. Petroleum B. Natural gas C. Solar energy D. Coal

64. At which stage of industrial manufacturing process of sulphuric acid, vanadium (V) oxide specifically required to ensure efficient industrial production?
    A. During the oxidation of sulfur dioxide to sulfur trioxide
    B. During the combustion of sulfur to produce sulfur dioxide
    C. During the dilution of oleum with water to form sulfuric acid
    D. During the reaction of sulfur trioxide with sulfuric acid to form oleum

65. Which one of the following fertilizers supplies the highest percentage of nitrogen to plants? und
    A. Urea ($CO(NH_2)_2$)
    B. Urea Ammonium Nitrate ($CO(NH_2)_2$) +NH_4NO_3
    C. Diammonium Phosphate $(NH_4)_2HPO_4$
    D. Monoammonium Phosphate ($NH_4H_2PO_4$)

66. Which of the following describes the process of manufacturing valuable products in industries?
    A. Designing to produce a desired output from raw materials using energy
    B. Discharging of a solid, liquid or gaseous substance into an environment
    C. Unwanted reaction of a material those results in the dissolution of material.
    D. Uses of only inorganic chemicals in the production of valuable products.

67. Which type of glass is made by heating a mixture of silica, sodium carbonate and limestone?
    A. Quartz
    B. Pyrex
    C. Borosilicate
    D. Soda-lime

68. Which of the following chemicals is commonly known as washing soda?
    A. $NaHCO_3$
    B. $Na_2CO_3 \cdot 10H_2O$
    C. NaOH
    D. Na_2SO_4

69. Which of the following chemicals is mainly used to kill unwanted plants in agricultural fields?
    A. Pesticides
    B. Herbicide
    C. Insecticide
    D. Fungicide

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70. Which of the following is NOT the Methods of reducing water pollution.

A. Treatment of water before discharge into rivers and lakes.

B. Recycling and replacing of industrial and agricultural wastes.

C. Industries shouldn't discharge heat-ladened water into water body.

D. Using high amount of agricultural chemicals and organic fertilizers.

71. Consider the following steps involved in the preparation of local alcohol (Araki).

I: Fermentation of the mixture for which converts sugars into ethanol.

II: Preparation of the raw materials by crushing cereals and mixing them with water.

III: Distillation of the fermented mixture to separate ethanol from water

IV: Heating the fermented mixture to produce alcohol, later condenses to liquid alcohol.

Which of the following shows the correct sequence of steps in the preparation of local alcohol (Araki)?

A. II → I → IV → III

B. I → II → III → IV

C. II → IV → I → III

D. I → III → II → IV

72. What is the molar mass of a polyethylene sample, [— CH_2 —CH_2 —]n , when n = 4600?

A. 1.288×10^3 g/mol

B. 1.288×10^5 g/mol

C. 1.196×10^3g/mol

D. 1.196×10^4g/mol

73. Which one of the following polymer-monomer pairs is INCORRECTLY matched?

A. Teflon….Propylene

B. PVC…..Chloroethene

C. Plexiglass….methyl methacrylate

D. Bakelite….phenol and formaldehyde

74. A student compared thermoplastic polymers and thermosetting polymers.

Which of the following pairs is NOT correct about their difference? Any

	Thermoplastic polymers	Thermosetting polymers
A	soften and reshaped when heated	permanently hard after heating
B	consist mainly of linear chains	highly cross-linked three-dimensional structures
C	Can't repeatedly melted and remolded	soften when heated and can be reshaped again
D	are generally recyclable	Can't be recyclable

75. For the electrolysis of aqueous copper (II) sulfate solution using graphite electrode, what substances produced at anode and cathode electrode respectively and their ratio?

A. Cu and O_2 are produced in a mol ratio of 2:1

B. H_2 and O_2 are produced in a mol ratio of 1:1

C. H_2 and O_2 are produced in a mol ratio of 2:1

D. O_2 and Cu are produced in a mol ratio of 1:2

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76. Which one of the following reactions creates energy in our bodies during respiration?

A. $C_6H_{12}O_6(s)+6O_2(g) \rightarrow 6CO_2(g)+6H_2O(l)$

B. $CO_2(g)+6H_2O(l) \rightarrow C_6H_{12}O6(s)+6O_2(g)$

C. $C_6H_{12}O_6\ (s) \rightarrow 2C_2H_5OH(l)+2CO_2(g)$

D. $NH_2CONH_2\ (g)+H_2O(g) \rightarrow 2NH_3\ (l)+CO_2\ (g)$

77. The following gases are contributed to the greenhouse effect on Earth. Which is the correct order of their importance from greatest to smallest?

A. CO_2, H_2O, CH_4

B. H_2O, CO_2, CH_4

C. CH_4, CO_2 , H_2O

D. H_2O, CH_4 , CO_2

78. Which of the following sample routine correctly indicate the extraction of copper from is principal-ore?

A. Concentration of ores ⇨ Reduction ⇨ Roasting ⇨ Purification

B. Concentration of ores ⇨ Purification ⇨ Roasting ⇨ Reduction

C. Purification ⇨ Concentration of ores ⇨ Reduction ⇨ Roasting

D. Concentration of ores ⇨ Roasting ⇨ Reduction ⇨ Purification

79. Which of the following is TRUE about a homologous series? REM

A. A group of compounds with different functional group

B. A group of isomers with the same boiling point

C. Compounds with different molecular masses but the same formula

D. hydrocarbons where each member differs from the next by a repeating unit $-CH_2$

80. The following reaction can be used for the synthesis of $CH_3CH=CHCH_3$ as a desired product

$CH_3CH_2CHBrCH_3 + CH_3S^- \rightarrow CH_3CH=CHCH_3 + CH_3SH + Br^-$

What is the atom economy for the above reaction?

A. 80%

B. 48%

C. 56%

D. 30.4%

THE END

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