Chapter 1
Fundamental Concepts in Chemistry

Q. 1.   The soul of chemistry is its dealing with

    a.   Internal structural changes in matter
    b.   Composition of matter
    c.   Properties of matter
    d.   Composition and properties of matter

    (d)

Q. 2.   All of the following statements are incorrect for 20 mol of hydrogen peroxide except

    a.   it has 20 mol of hydrogen atoms
    b.   it has 30 mol of oxygen atoms
    c.   it has 80 mol of atoms
    d.   30 mol of hydrogen atoms

    (c)

Q. 3.   If proton number of two atoms is same then it can be concluded that

    a.   they are isotopes
    b.   compounds of both with Cl_2 will be similar in reactivity towards other compounds
    c.   both have same colors
    d.   both have same melting points

    (b)

Q. 4.   A chemist poured lemon juice on soil, the idea that he may have in his mind is that

    a.   there may be a possibility of a chemical reaction
    b.   lemon juice is dangerous to health
    c.   lemon juice is dangerous to health
    d.   water should be preferred over lemon juice for drinking

    (a)

Q. 5.   Dr. Khan has discovered two isotopes of an element with atomic number 119. The relative abundance of isotopes $_{119}Uue^{300}$ and $_{119}Uue^{305}$ is 70% and 30% respectively. The average atomic weight of Uue is

    a.   301.5 a.m.u
    b.   302.5 a.m.u
    c.   303.5 a.m.u
    d.   304.5 a.m.u

    (a)

Q. 6. Which of the following is not related to a.m.u

a. gram
b. kilogram
c. microgram
d. gram/lit

(d)

Q. 7. The number of significant figures in 0.00200 is

a. two
b. three
c. five
d. one

(b)

Q. 8. All of the following statements are incorrect except

a. precision and accuracy should go side by side in a scientific work
b. scientific work must be precise, accuracy is not essential
c. scientific work must be accurate, precision is not essential
d. +calculations must be made before any experiment

(a)

Q. 9. Empirical formula and formula unit of an ionic compound

a. are always similar
b. are always different
c. may be similar or different
d. ionic compounds don't' have any empirical formula
(c)

Q. 10. Copper (II) oxide is mixed with organic compound during combustion analysis. The purpose is

a. to carry out complete combustion
b. to reduce the economy of the process
c. to reduce the time for completion of the reaction
d. all of the above

(a)

Q. 11. Bismark brown is a dye. Its molar mass is 228.3 g/mol. When the dye was analyzed by a scientist, it was found that it contains 30.68% nitrogen. How many nitrogen atoms are there in each Bismark brown molecule?

a. 6
b. 5

c. 4
d. 3

(b)

Q.12. The mass of 2 mole of sodium hydroxide will be

a. 2 g
b. 20 g
c. 40 g
d. 80 g

(d)

Q. 13. "A" compound is always consists of the same elements combined in the same fixed ratio". The statement is

a. a hypothesis
b. a fact
c. a law
d. an observation

(c)

Q. 14. Compound having highest boiling point among the following is

a. $HF_{(l)}$
b. $HCl_{(l)}$
c. $HBR_{(l)}$
d. $HI_{(l)}$

(d)

Q. 15. Islamian genius investigated that the amount of heat required to raise the temperature of 11 gram of water form $30^{\circ}C$ to $31^{\circ}C$ is

a. one calorie
b. little bit greater than on calorie
c. little bit less than one calorie
d. never equal to one calorie

(c)

Q. 16. An atom is

a. smallest indivisible particle in an element
b. smallest particle of an element which can undergo a chemical reaction
c. building block of an element
d. always smaller than molecule

(b)

Q. 17. 10 moles of H_2O contains

a.   100 moles of bonds
b.   100 moles of electrons
c.   30 atoms
d.   25 moles of hydrogen bonds
(b)

Q. 18. The volume of one kilogram of water at $4^{\circ}C$ is equal to one litre. The temperature of water is kept at $4^{\circ}C$ because water

    a.   has no dissolved gasses at this temperature
    b.   has maximum density at this temperature
    c.   polarity of water molecule is least at this temperature
    d.   dipole moment has maximum value at this temperature

    (b)

Q. 19. A compound contains two elements X and Y percentage of X is 20% (At.wt = 40) and that of Y is 80% (At.wt =80). The empirical formula of the compound is

    a. XY_2
    b. X_2Y
    c. X_3Y
    d.   XY

    (A)

Q. 20. A piece of paper is burnt in air, the gas produced is passed through distilled water. The PH of water solution will be

    a.   1
    b.   7
    c.   2.1
    d.   6.8

    (d)

Q. 21. Which of the following is a substance?

    a.   sea water
    b.   brass
    c.   tape water
    d.   graphite

    (d)

Q. 22. Freezing point of a substance is a temperature at which a liquid substance is converted to solid, it is

    a.   always lower than its melting point
    b.   usually a little lower than its melting point
    c.   always higher than its melting point
    d.   exactly the same as its melting point

    (d)

Q. 23. Number of covalent bonds in 10 mol of carbon tetrachloride is

    a. 2.4×10^{25}
    b.   40
    c. 4×10^{24}
    d. 6.4×10^{21}

    (a)

Q. 24. A student subtracted 0.00055 from 10.2345678 and reported the result as 10.23401. But his friend told him that the result was wrong. What is the correct result?

    a.   10.234017
    b.   10.2340178
    c.   10.234
    d.   10.23

    (d)

Q. 25. The following statement contained in a student's laboratory report is a conclusion.

    a.   a gas is liberated
    b.   colour of the gas is greenish yellow
    c.   oxide of the gas is strongly acidic
    d.   the gas is chlorine

    (d)

Q. 26. If 10g each of uranium and hydrogen are converted into energy according to equation $E = mc^2$

    a.   energy obtained from uranium will be too much greater than that of hydrogen
    b.   energy obtained from hydrogen will be a little bit less than that of uranium
    c.   energy obtained from hydrogen and uranium will always be exactly equal
    d.   diamond

    (c)

Q. 27. A student analyzed a sample of sea water and found that it contained 2.3g of NaCi, 0.005g of $MgSo_4$, 0.234g of $CaCl_2$ and 60.12g of H_2O. Total mass of the sample is

    a.   62.659
    b.   62.65
    c.   62.70
    d.   65.7

    (d)

Q. 28. A 50.00 mL sample of a cough mixture prepared by a pharmacist was found to have a mass of 46.0g. what is the density (in g/mL) of this mixture. Stated to the correct number of significant figures?

    a.   0.92
    b.   0.920
    c.   0.9200
    d.   1.087

(b)

Q. 29. Ozone (O_3) filters the cosmic rays of sunlight. How many oxygen atoms are there in 0.2 mole of ozone (O_3, molar mass 48.0 g/mol)?

    a. 6.02×10^{22}
    b. 6.02×10^{23}
    c. 3.61×10^{23}
    d. 6×10^{23}

(c)

Q. 30. On heating, the hydrated salt $CaSO_4$, xH_2O loses its water of crystallization. In an experiment it was found that when 0.2 mol of the hydrated salt was heated 0.10 mol of water was lost. What is the molecular formula of the hydrated compound?

    a. $CaSO_4$
    b. $CaSO_3 . \frac{1}{2} H_2O$
    c. $CaSO_4 . H_2O$
    d. $CaSO_4 . 2H_2O$

(b)

Q. 31. Zirconium chloride reacts with magnesium to produce Zirconium. The process is called Knoll process.

ZrCl4 + 2Mg $\longrightarrow$ Zr + 2MgCl$_2$
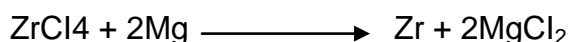
How many moles Zr would be produced if 0.2 mol of Mg metal is used in the reaction?

    a.   0.1
    b.   0.01
    c.   0.20
    d.   0.05

(a)

Q. 32. Tobacco contains a poisonous alkaloid called Nicotine. The molecular formula of nicotine is $C_{10}H_{14}N_2$ (molar mass = 162.23g). The mass percentage of nitrogen in nicotine, is?

    a.   4.32%
    b.   8.23%

c.   12.4%
d.   17.3%

(d)

Q. 33. A sample of an ionic compound contains 2.82 g Na, 4.35 g Cl, and 7.83 g O. The empirical formula of this compound is:

a. $NaClO_2$
b. $NaClO_3$
c. $NaClO$
d. $NaClO_4$
(d)

CHAPTER 2
GASES

Q. 1. Professor Qawwi told his students that air is a mixture because: suddenly a student raised his hand and said

a.   it is colourless
b.   oxygen can be removed from it
c.   its composition is different at different altitudes
d.   it has different properties from its constituents

(c)

Q. 2. Imagine Dr. Khan is sitting in a room. The room is closed from all sides, no entry, no exit of any gas. If the room expands suddenly then

a.   he will be frightened
b.   his blood pressure will decrease
c.   he will feel cool
d.   he will feel warmth

(c)

Q. 3. which of the following elements will have strongest Van Der Waal force of attraction between its molecules

a.   hydrogen
b.   oxygen
c.   chlorine
d.   nitrogen

(c)

Q. 4.   The beaker shown in the figure contains slurry of ice and water, the three thermometers Fahrenheit, Kelvin and Centigrade placed in it. The thermometers are represented by A, B and C respectively. The lowest reading will be on thermometer.

   a.   A
   b.   B
   c.   C
   d.   Both A and C

   (c)

Q. 5.   Which thermometer will have its reading 273 degrees greater than that of thermometer C?

   a.   A
   b.   B
   c.   C has greater reading than all other thermometer
   d.   B has 273 degrees greater reading than A

   (b)

Q. 6.   The temperature recorded by Kelvin scale is

   a.   0K
   b.   273K
   c.   373K
   d.   Absolute scale is unable to record this temperature

   (b)

Q. 7.   If three birds called O_2, Cl_2 and H_2 were flying in the garden of Islamia College Peshawar then,

   I.   Fastest birds are O_2 and Cl_2
   II.   Slowest bird is Cl_2
   III.   Bird called O_2 is in the middle.

   a.   I only
   b.   II and III only
   c.   I and III only
   d.   III only

   (b)

Q. 8.   One liter of an unknown gas weighs 1.25 grams at S.T.P, one possible formula for the gas is

   a. CO_2
   b.   CO

c. O_2

d. SO_2

(b)

Q. 9. If pressure on a gas is increased from 2 atm to 4 atm than its volume will decrease from

        a.   6L to 4L
        b.   8L to 2L
        c.   3L to 1L
        d.   4L to 2L

(d)

Q. 10. An unknown gas has a density of 2.45 g/L at 1.5 atmospheric pressure and 25 $^\circ$C. The gas is

        a.   Kr
        b. Cl_2
        c. SO_2
        d.   Ar

(d)

Q. 11. This is a known fact that the molar volumes of different gases at S.T.P are

        a.   little bit greater than the molar volumes of liquids
        b.   little bit less than the molar volumes of solids
        c.   about the same as the molar volumes of liquids
        d.   much larger than the molar volumes of liquids and solids

(d)

Q. 12. The behavior of a gas is non-ideal at

        a.   lo2w temperature and low pressure
        b.   high temperature and high pressure
        c.   high temperature and low pressure
        d.   low temperature and high pressure

(d)

Q. 13. Ammonium Perchlorate is used as solid fuel in rockets. During the process it decomposes according to the reaction given below

$4NH_4ClO_{4(g)} \longrightarrow 2Cl_{2(g)} + 8H_2O_{(g)} + 2N_2O_{(g)} + 3O_{2(g)}$
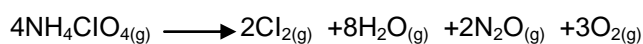
The total volume of all the gases produced at S.T.P by the decomposition of 8 moles of Ammonium Perchlorate will be

        a.   30 L
        b.   672 L
        c.   179.0 L
        d.   60 L

(b)

Q. 14. Compressed natural gas (CNG) contains mainly methane CH_4. Methane gas burns in air according to the following reaction.

$$CH_{4(g)} + 2O_{2(g)} \longrightarrow CO_{2(g)} + 2H_2O_{(g)}$$

If 8 g of methane is burnt, what volume of CO_2 measured at S.T.P. will be produced?

a. 0.5 L
b. 22 L
c. 22.4 L
d. 11.2 L

(d)

Q. 15. A kid has a helium filled balloon which deflates at the rate of 1.00 liter/day by He gas leaking through the relatively porous skin of the balloon. How fast would carbon dioxide (CO_2) leak from a balloon made of the same material?

a.   3.0 L/day
b.   0.3 L/day
c.   1.33 L/day
d.   3.33 L/day

(b)

Q. 16. All of the following statements are false except

a.   gas molecules do not attract each other at very low temperature
b.   all of the gases cannot be liquefied
c.   increase in pressure will not decrease the intermolecular distance in a gas
d.   actual volume of a gas is not negligible at very high pressure

(d)

Q. 17. At the same temperature and pressure helium is more ideal than hydrogen due to

a.   greater molar mass
b.   less molar mass
c.   greater molecular size
d.   less molecular size

(d)

Q. 18. A container with a porous wall has a mixture of H_2, He, N_2 and O_2. Which of these gases will take maximum time in getting out of the container?

a. H_2
b.   He
c. N_2
d. O_2

(d)

Q. 19. The value of $\dfrac{PV}{nT}$ for an unknown gas is equal to

a.   0.082 L.atm.mol^{-1}.K
b.   0.082 L.atm.mol^{-1}.K^{-1}
c.   0.82 L.atm.mol.K^{-1}
d.   0.82 L.atm.mol.K

(b)

Q. 20. If the temperature of the atmosphere is 30°C then which of the following will have highest average speed

a. O_2
b. H_2
c.   Ne
d. N_2

(b)

CHAPTER 3
LIQUIDS AND SOLIDS

Q.1.   I heard Islamian genius saying that glass must be a super cooled liquid. The reason that he might have in his mind is that glass has

a.   definite volume
b.   definite shape
c.   crystalline structure
d.   no crystalline structure

(d)

Q. 2.   Some substances are good conductor of electricity in both the solid and liquid states. These substances are generally

a.   ionic substances
b.   metallic substances
c.   molecular solids
d.   covalent network solids

(b)

Q. 3.   Air can be distilled fractionally because the constituents of the air

a.   can be liquefied
b.   have different boiling points
c.   are gases at room temperature
d.   have different densities

(b)

Q. 4.   There are three different substances, Argon, Hydrochloric acid and Hydroiodic acid. The correct sequence in which the boiling point increases is

a.   Ar < HCl < HI
b.   HI > HCl > Ar
c.   HCl < HI < Ar
d.   HI > Ar > HCl

(a)

Q. 5.   A student put two eggs A and B in HCl solution. After 5 minutes he took them out for weighing but egg dropped in water accidentally. The student was able to take it out after 30 minutes. He weighed it. Its weight was 40.33 grams. Weight of egg "B" was also 40.33 grams. Islamian genius told him that if both eggs have been dropped in water, the weight of egg "B" would have been

a.   greater than that of egg "A"
b.   less than that of egg "A"
c.   equal to that of egg "A"
d.   unaffected instead

(a)

Q. 6. Keeping in mind different factors which affect the melting point of a substance, the compound having highest melting point among the following is

a. NaCl
b. RbCl
c. LiCl
d. CsCl

(a)

Q. 7. Islamian genius told his follows that in a crystal the atoms are located at the position of

a. zero potential energy
b. infinite potential energy
c. maximum potential energy
d. minimum potential energy

(A)

Q. 8. Keeping in mind the concept of charge density, compound having highest lattice energy is

a. KCl
b. MgO
c. LiBr
d. NaF

(b)

Q. 9. Meniscus is the shape of the surface of a liquid in a cylindrical container. It may be concave, convex or plane. For molten metals

a. meniscus is concave
b. meniscus is convex
c. meniscus is plane
d. meniscus may be concave or convex depending on the nature of the metal

(b)

Q. 10. All of the following substances are crystalline except

a. Ice
b. Carbon (diamond)
c. Sucrose
d. Plastic

(d)

Q. 11. All of the following have cleavage planes except

a. ionic crystals
b. covalent crystals

c.   molecular crystals
d.   metallic crystals

(d)

Q. 12. Coordination number of Na^+ in NaCl is

a.   1
b.   4
c.   2
d.   6

(d)

Q. 13. For a crystal system a b c and   the example for this crystal system is

a. $CuSO_4. 5H_2O$
b. $Na_2B_4O7. 10H_2O$
c. $ZnSO_4. 7H_2O$
d. $BaSO_4. 4H_2O$

(a)

Q. 14. A student said I will preserve my father dead body in a time capsule for 1000 years. Islamian genius told him that the atmosphere of the capsule must contain

a. O_2
b. SO_2
c. CO_2
d.   Ar

(d)

Q. 15. All of the following have crystals except

a.   diamond
b.   NaCl
c.   KBr
d.   CdS

(d)

Q. 16. Kerosene is liquid at room temperature due to

a.   hydrogen bonding
b.   organic nature
c.   dipole-dipole forces
d.   molecular size

(d)

Q. 17. All of the following are network solids except

a. SiO_2
b. Graphite
c. S_8
d. Diamond

(c)

Q. 18. Honey contain glucose and fructose along with some other ingredients, it has greater viscosity due to

a. hydrogen bonding
b. irregular shape of the molecules
c. irregular shape of the molecules and strong intermolecular forces
d. greater molecular size   (c)

Q. 19. Boiling point of phosphine (PH_3) is -87.8 $^{\circ}C$ while that of silane (SiH4) is -111 $^{\circ}C$. Phosphine has greater boiling point because

a. dipole moment of PH_3 is greater than that of SiH_4
b. PH_3 has greater molecular size
c. Molecular weight of SiH_4 is less than that of PH_3
d. Actually the boiling of SiH_4 is greater than that of PH_3

(a)

Q. 20. Rate of evaporation of petrol is greater than that of water at room temperature because

a. petrol molecules do not have any hydrogen bond
b. petrol is an organic compound
c. water molecules have small size
d. petrol molecules have greater size

(a)

Q. 21. Substance having highest boiling point among the following is

a. HF
b. HCl
c. Br_2
d. HBr

(c)

Q. 22. Boiling points of different substances are given below

CH^4 = - 161 $^{\circ}C$
C_2H_6 = -89 $^{\circ}C$
Cl_2 = -34.6 $^{\circ}C$
F_2 = -188 $^{\circ}C$

The data shows that vapour pressure of

a. $Cl_2 > C_2H_6 > CH_4 > F_2$

b. $Cl_2 > F_2 > CH_4 > C_2H_6$
c. $C_2H_6 > CH_4 > F_2 > Cl_2$
d. $F_2 > CH_4 > C_2H_6 > Cl_2$

(d)

Q. 23. Which of the following statements is correct for the statement

"Vapour pressure of water at 0 °C is 5 mmHg"

a. boiling point of water will be 0 °C at 5 mmHg
b. boiling point of water will be 0 °C
c. if external pressure is 5 mmHg then water will boil at 0 °C
d. boiling point of water is 100 °C at 760 mmHg pressure

(c)

Q. 24. What is the typical range of the hydrogen bond

a. 5 – 25 kJ per mole of bonds
b. 5 – 25 kJ per molecule
c. 500 kJ per mole of bonds
d. 1 – 2 kJ per mole of bonds

(a)

Q. 25. Hydrogen bond is unimportant in

a. DNA structure
b. The liquid properties of water
c. Liquid HF
d. Liquid CH_4

(d)

Q. 26. All of the following acids have hydrogen bond in liquid state except

a. sulfuric acid
b. nitric acid
c. hydrofluoric acid
d. hydrochloric acid

(d)

Q. 27. Which of the following statements is incorrect?

a. dispersion force is the weakest type of intermolecular interactions
b. the strong intermolecular attractions in H_2O result from hydrogen bonding
c. boiling point of H_2S is less than H_2O
d. boiling point of non-polar substances tends to decrease with increasing molecular weight

(d)

Q. 28. A white substance melts with some decomposition at 730 ^{o}C. As a solid, it is non conductor of electricity but it dissolves in water to from a conducting solution. The white substance is

a. a covalent network solid
b. an ionic solid
c. a molecular solid
d. a metallic solid

(b)

Q. 29. Keeping in mind different factors which affect the boiling point of a substance, element having highest boiling among the following is

a. He
b. F2
c. Ne
d. Br_2

(d)

Q. 30. The increasing vapor pressure caused by heating a liquid is due to

a. increase intermolecular interactions
b. increasing potential energy of molecules
c. increasing kinetic energy of molecules
d. decreasing surface tension

(c)

Q. 31. Covalent network crystals have

a. higher melting point then molecular crystals
b. lower melting point then molecular crystals
c. discrete molecules linked by Van der waals forces
d. hydrogen bonding

(a)

Q. 32. Keeping in mind different factors which affect the boiling point of a liquid, element having lowest boiling point among the following is

a. F_2
b. Cl_2
c. Br_2
d. I_2

(a)

Q. 33. A chemist was able to measure the value of lattice energy of KCl to be 690 kJ/mol. From this experiment he concluded that

a. lattice energy of KBr is 630 kJ/mol and that of KI is 665 kJ/mol

b.   lattice energy of KBr is 665 kJ/mol and that of KI is 630 kJ/mol
c.   lattice energy of KBr is 765 kJ/mol and that of KI is 730 kJ/mol
d.   lattice energy of KBr is 730 kJ/mol and that of KI is 765 kJ/mol

(b)

CHAPTER 4
ATOMIC STRUCTURE

Q.1.   Color of the glow produced in the discharge tube

   a.   depends on the pressure in the discharge tube
   b.   depends on the metal used as cathode
   c.   depends on the gas used in the discharge tube
   d.   does not depend on the nature of the gas used in the discharge tube

   (c)

Q. 2.   Dr. Khan told his students that if charge on electrons in a chamber is 3.50×10^{11} coulomb than mass of electrons must be

   a. 9.1×10^{-31} kg
   b.   8 kg
   c.   4 kg
   d.   2 kg

   (d)

Q. 3.   e/m ratio of the canal rays is less than that of cathode rays. The reason is

   a.   greater mass of canal ray particles
   b.   greater charge of the canal ray particles
   c.   greater mass and charge of the canal ray particles
   d.   actually e/m ratio of canal rays is greater than that of the cathode rays

   (a)

Q. 4.   Nuclear radiation is emitted by those elements whose

   a.   molecules are stable
   b.   molecules are unstable
   c.   nuclei are stable
   d.   nuclei are unstable
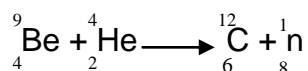
   (d)

Q. 5.   -rays are good ionizers of gases because they

   a.   have greater mass
   b.   have positive charge
   c.   have greater mass and positive charge
   d.   are helium nuclei

   (c)

Q. 6. Consider the following reaction

$$^{9}_{4}\text{Be} + ^{4}_{2}\text{He} \longrightarrow ^{12}_{6}\text{C} + ^{1}_{8}\text{n}$$

This reaction is

a. a chemical reaction
b. a nuclear reaction
c. an example of artificial radioactivity
d. an exothermic reaction

(c)

Q. 7. Roentgen discovered X-rays and Mosley found that the frequency of the X-rays emitted from anode increases with the

a. increase in the mass number of the metal used as anode
b. decrease in the mass number of the metal used as anode
c. decrease in the proton number of the metal used as anode
d. increase in the proton number of the metal used as anode

(d)

Q. 8. Radiation emitted by exited atoms is

a. in the form of continuous waves
b. in the form of quanta
c. nuclear radiations
d. ultraviolet radiation

(b)

Q. 9. If the electron of hydrogen atom jumps of "M" shell then the radius of this excited hydrogen atom will be

a. 8.464 A°
b. 4.761 A°
c. 2.116 A°
d. 0.529 A°

(b)

Q. 10. If a particle of mass 0.1gram moves with a velocity of 10,000 m/s then the wavelength of the wave associated with this particle is

a. 6.626×10^{-34} m
b. 2.145×10^{-39} m
c. 3.313×10^{-21} m
d. 1.325×10^{-18} m

(a)

Q. 11. Second ionization energy

    a.   is always less than first ionization energy
    b.   is always greater than first ionization energy
    c.   is equal to the first ionization energy
    d.   may be greater or less than the first ionization energy depending on the nature of the element

    (b)

Q. 12. "Ionization energies of the elements of the 5th group are greater than those of 6th group". It is because

    a. 5th group elements have less electronegativity
    b. 6th group of elements have greater shielding effect
    c. 5th group element have greater shielding effect
    d. 5th group elements have half filled atomic orbitals

    (d)

Q. 13. A sodium lamp emits yellow light with a wavelength of 589 nm. What is the energy of a single photon in this light?

    a. 3.37×10^{-19} Joules
    b. 1.12×10^{-25} Joules
    c. 1.17×10^{-33} Joules
    d. 5.09×10^{15} Joules

    (a)

Q. 14. The energy associated with the transition of an electron from the n=1 state to the n=3 state of H atoms is:

    a. $+1.74 \times 10^{-17}$ Joules
    b. $+1.94 \times 10^{-18}$ Joules
    c. $+1.94 \times 10^{-18}$ Joules
    d. -1.74×10^{-17} Joules

    (b)

Q. 15. All of the following are electromagnetic radiations except

    a.   red light
    b.   sound waves
    c.   x-rays
    d.   photon

    (b)

Q. 16. This shape of a 2s orbital resembles:

a. a hockey puck
b. an (American) football
c. an ellipse
d. a sphere

(d)

Q. 17. Which orbital of the following has a principal quantum number of 3 and an angular momentum quantum number of 27

a. 3s
b. 3d
c. 4f
d. 3f   (b)

Q. 18. Which of the following has the highest energy?

a. gamma rays
b. X-rays
c. Ultra-violet radiation
d. \radio waves

(a)

Q. 19. All of the following elements are correct for atomic orbitals except

a. p-sub energy level has 3 orbitals
b. s-orbital has spherical shape
c. energy of 4s is less than that of 4d
d. All d orbitals have 4 lobes

(d)

Q. 20. Various values of the quantum numbers (n, /, m, m_s) are listed below. Which is a possible set of values for one of the d electrons in an iron atom in its ground state?

a. (1, 1, 0, ½)
b. (4, 0, 1, ½)
c. (4, 1, 0, -1/2)
d. (3, 2, 1, -1/2)

(d)

Q. 21. How many orbitals are allowed for principal quantum number (n) of 3?

a. 9
b. 8
c. 6
d. 4

(a)

Q. 22. Which of the following orbitals are degenerate in a multielectron atom?

a.   3d orbitals
b.   3s, 3p, 3d orbitals
c.   1s, 2s orbitals
d.   2d orbitals
       (a)

Q. 23. The quantum number that specifies the way the orbital is oriented in space is:

a.   the electron spin quantum number
b.   the magnetic quantum number
c.   the angular momentum quantum number
d.   the principal quantum number

(b)

Q. 24. Which of the following has the largest wavelength?

a.   visible light
b.   x-rays
c.   infrared light
d.   ultraviolet radiation

(c)

Q. 25. Select the arrangement of electromagnetic radiation which starts with the lowest energy and increases to greatest energy.

a.   radio, visible, infrared, visible, ultraviolet
b.   microwave, infrared, visible, ultraviolet
c.   visible, ultraviolet, infrared, gamma rays
d.   X-radiation, visible, infrared, microwave

(b)

Q. 26. A radio station broadcasts music at 99.1 MHz. The wavelength of these waves is

a. 1.88×10^{-2} m
b.   0.330 m
c.   3.03 m
d. 5.33×10^{2} m

(c)

Q. 27. Green light has a wavelength of 5200A. Calculate the energy of one photon of green light.

a. 3.4×10^{-40} J
b. 3.4×10^{-30} J
c. 3.8×10^{-26} J
d. 3.8×10^{-19} J   (d)

Q. 28. The size of an atomic orbital is associated with

a. principal quantum number (n)
b. angular momentum quantum number (l)
c. magnetic quantum number (m_l)
d. spin quantum number (m_s)

(a)

Q. 29. Which of the following is a correct set of quantum numbers for an electron in a 5*f* orbital?

a. $n = 5, l = 3, m_l = +1$
b. $n = 5, l = 2, m_l = +3$
c. $n = 4, l = 3, m_l = 0$
d. $n = 4, l = 2, m_l = +1$

(a)

Q. 30. In the quantum mechanical treatment of the hydrogen atom, which one of the following combinations of quantum numbers is not allowd?

a. 3, 1, -1
b. 3, 2, 2
c. 3, 2, -1
d. 3, 3, 2

(d)

Q. 31. "Each electron in an atom must have its own unique set of quantum numbers" is a statement of

a. Aufbau principle
b. Pauli exclusion principle
c. Hund's rule
d. Periodic law

(b)

Q. 32. The effective nuclear charge for an atom is less than the actual nuclear charge due to

a. Shielding
b. Penetration
c. Paramagnetism
d. Electron-pair repulsion

(a)

Q. 33. "Electrons added to atomic orbitals of the same energy will remain unpaired with parallel spins until the subshell is more than half-filled" is a statement of

a. Aufbau principle
b. Pauli exclusion principle

c.   Hund's rule
d.   Periodic law

(c)

Q. 34. All of the following statements are correct for atomic structure and quantum numbers except

a. In a given atom, the maximum number of electrons having principal quantum number n = 3, is 18
b. The number of orbitals in a given f subshell is 7
c. For $n=4$, the largest possible value of l is 3
d. For $n=4$, the largest possible value of m_l is 2

(d)

Q. 35. Select the correct electron configuration for Cu (Z=29)

a. $[Ar]\ 4s^2 3d^9$
b. $[Ar]4s^1 3d^{10}$
c. $[Ar]4s^2 4p^6 3d^3$
d. $[Ar]4s^1 4d^9$

(b)

Q. 36. Arrange potassium, rubidium, calcium and barium in order of increasing atomic size.

a.   K < Ca < Rb < Ba
b.   Ca < K < Rb < Ba
c.   Ca < K < Ba < Rb
d.   K < Ca < Ba < Rb

(b)

Q. 37. Element having smallest atomic radius among the following is

a.   Li
b.   Ne
c.   Rb
d.   Sr

(b)

Q. 38. The arrangement of sodium, oxygen, fluorine and strontium on the basis of increasing first ionization energy is

a. Na < Sr < O < F
b. Sr < Na < O < F
c. Sr < Na < F < O
d. Na < Sr < F < O

(b)

Q. 39. Elements with _____ first ionization energies and _____ electron affinities generally form cations.
a. low, very negative
b. high, positive or slightly negative
c. low, positive or slightly negative
d. high, very negative

(c)

Q. 40. In a Millikan oil-drop experiment, the charges on several different oil drops were as follows: -5.92; -4.44; -2.96; -8.88. The units are arbitrary. What is the likely value of the electronic charge in these arbitrary units?

    a.   -1.11
    b.   -1.48
    c.   -2.22
    d.   -2.96

    (b)

CHAPTER 5
CHEMICAL BONDING

Q. 1. Which of the following compounds has maximum ionic character?

    a.   NaCl
    b.   CsF
    c.   KBr
    d. $MgCl_2$

    (b)

Q. 2. Which of the following molecules or ions is nonplanar, i.e., has at least one atom that is not in the same plane as the others?

    a. BH_3
    b. NF_3
    c. SO_3
    d. CO_3^{2-}

    (b)

Q.3. Which of the following best describes the shape and polarity of the carbon disulfide, CS_2, molecule?

    a.   bent and polar
    b.   linear and non-polar
    c.   pyramidal and polar
    d.   bent and non-polar

    (b)

Q. 4. Which of the following molecules has the smallest angle between adjacent bonds?

    a. CO_2
    b. CH_4
    c. H_2O
    d. NH_3

(c)

Q.5. The shape of hydronium ion H_3O^+ is:

    a.   planar
    b.   see-saw
    c.   trigonal planar
    d.   trigonal pyramidal

(d)

Q. 6. Which of the following pairs of atoms are least likely to form an ionic compound?

    a.   Ni, O
    b.   Na, F
    c.   Cu, Cl
    d.   Li, Mg

(d)

Q. 7. Which of the following pairs of atoms are most likely to form a covalent compound?

    a.   Na, F
    b.   Cu, Cl
    c.   C, O
    d.   Li, F

(c)

Q. 8. Which molecule has one pair of nonbonding electrons on the central atom?

    a. PCl_3
    b. CO_2
    c. SO_3
    d. BF_3

(a)

Q. 9. Which of the following will have the largest dipole moment?

    a.   HF
    b.   HCl
    c.   HBr
    d. F_2 (a)

Q. 10. CO_2 is a nonpolar molecular ($\mu=0$) whereas SO_2 is polar ($\mu=1.62D$). This difference is due to the fact that:

    a. CO_2 has an even number of double bonds whereas SO_2 has an odd number of double bonds
    b.   C and O are in different groups whereas S and O are in the same group
    c.   The C-O bond is nonpolar while the S-O bond is polar
    d. CO_2 is linear whereas SO_2 is not linear

(d)

Q. 11. What is the state of hybridization of the carbon atoms in ethylene, C_2H_2?

    a. sp^2
    b. sp
    c. sp^3
    d. sp^3d^2

(a)

Q. 12. The type(s) of bonding present in a sample of sodium nitrated, $NaNO_3$, are:

    a.   covalent bonds only
    b.   ionic bonds only
    c.   covalent and ionic bonds
    d.   ionic and metallic bonds

(c)

Q. 13. The C=C double bond in ethane C_2H_4, is consist of:

    a.   two Π bonds
    b.   covalent bonds
    c.   two sigma bonds
    d.   one Π bond + one sigma bond

(d)

Q. 14. All of the following statements are false except

    a.   The number of MO's in a molecule equals twice the number of constituent atomic orbitals
    b.   As bonding MO's become equally less stable
    c.   In MO's, the number of bonding electrons equals the number of antibonding electrons
    d.   Each bonding MO can accommodate only one electron

(b)

Q. 15. All of the following statements are false except

    a.   The MO's in a molecule equals twice the number of constituent atomic orbitals.
    b.   As bonding MO's become more stable, antibonding MO's become equally less stable.
    c.   In MO's, the number of bonding electrons equals the number of antibonding electrons.
    d.   Each bonding MO can accommodate only one electron.

(b)

Q. 16. What is the hybridization of phosphorus in PCl_3?
    a. sp^2

b. sp^3
c. sp
d. sp^3d^2

(b)

Q. 17. Analysis of an unknown substance showed that it has a high boiling point and is brittle. It is an insulator as a solid but conducts electricity when melted. Which of the following substances would have those characteristics?

a. HCl
b. Al
c. KBr
d. SiF_4

(c)

Q. 18. Arrange the following bonds in order of increasing bond strength.
        C-F, C-Br, C-I, C-Cl

a. C-F < C-Cl < C-Br < C-I
b. C-I < C-Br < C-Cl < C-F
c. C-Br < C-I < C-Cl < C-F
d. C-I < C-Br < C-F < C-Cl

(b)

Q. 19. Based on electronegativity trends in the periodic table, predict which of the following compounds will have the greatest % ionic character in its bonds.

a. H_2O
b. LiI
c. RbF
d. HCl

(c)

Q. 20. According to VSEPR theory, a molecule with the general formula AX_3 will have a _____ molecular shape.

a. linear
b. bent
c. trigonal planar
d. tetrahedral

(c)

Q. 21. According to VSEPR theory, a molecule with the general formula AX_3E will have a _____ molecular shape.

a. bent
b. trigonal planar
c. trigonal pyramidal
d. tetrahedral

(c)

Q. 22. Predict the ideal bond angles around carbon in C_2I_2 using the molecular shape given by the VSEPR theory.

    a. 90°
    b. 109°
    c. 120°
    d. 180°

    (d)

Q. 23. Predict the actual bond angles in BrF_3 using the VSEPR theory.

    a.   more than 120°
    b.   between 109° and 120°
    c.   between 90° and 109°
    d.   less than 90°

    (d)

Q. 24. Which of the following has no net dipole moment?

    a. N_2O
    b. NF_3
    c. H_2Se
    d. TeO_3

    (d)

Q. 25. A molecule with the formula AX_2 uses ………. To form its bonds.

    a.   *sp* hybrid orbitals
    b.   *sp²* hybrid orbitals
    c.   *sp³* hybrid orbitals
    d.   *sp³d* hybrid orbitals

    (a)

Q. 26. Valence bond theory predicts that carbon will use -------- hybrid orbitals in the carbonate anion, CO_3^{2-}

    a.   sp
    b. sp^2
    c. sp^3
    d. sp^3d
    (b)

Q. 27. Valence bond theory predicts that sulfur will use -------- hybrid orbitals in sulfur dioxide, SO_2.

    a. sp
    b. sp^2
    c. sp^3
    d. sp^3d

(b)

Q. 28. Which one of the following statements about orbital hybridization is incorrect?

    a.   The carbon atom is CO2 is *sp* hybridized
    b.   The nitrogen atom in NH_3 is sp^3 hybridized.
    c. sp^2 hybrid orbitals are coplanar, and at $120°$ to each other.
    d.   *sp* hybrid orbitals lie at $180°$ to each other.

(b)

Q. 29. For which one of the following molecules is the indicated type of hybridization not appropriate for the central atom?

    a. $BeCl_2$ sp^2
    b. SiH_4 sp^3
    c. BF_3 sp^2
    d. C_2H_2 sp

(a)

Q. 30. According to molecular orbital (MO) theory, the twelve outermost electrons in the O2 molecule are distributed as follows:

    a.   12 in bonding MOS, O in antibonding MOs.
    b.   10 in bonding MOs, 2 in antibonding MOs.
    c.   9 in bonding MOs, 3 in antibonding MOs.
    d.   8 in bonding MOs, 4 in antibonding MOs.

(d)

Q. 31. According to molecular orbital theory, what is the bond order in the O_2^+ ion?

    a.   5.5
    b.   5
    c.   4
    d.   2.5

(d)

Q. 32. Which of the following statements relating to molecular orbital (MO) theory is incorrect?

    a.   A bonding MO is lower in energy than the two atomic orbitals from which it is formed.
    b.   Combination of two 2p orbitals may result in either Л MOs.
    c.   A species with a bond order of zero will be stable
    d.   In a stable molecule having an even number of electrons, all electrons must be paired.

(d)

Q. 33. One can safely assume that the 3s- and sp- orbitals will form molecular orbitals similar to those formed when 2s- and sp-orbitals interact. According to molecular orbital theory, what will be the bond order for the Cl_2^+ ion?

    a.   0.5
    b.   1
    c.   1.5
    d.   2

    (c)

CHAPTER 6
ELECTRICS OF CHEMICAL REACTIONS

Q.1.   All of the following are state functions except
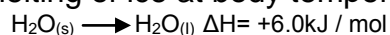
    a.   P
    b.   V
    c.   q
    d.   H

    (c)

Q. 2. Suppose you have a balloon of given volume, V1, containing a gas at temperature, T_1. When you place the balloon in a colder room at temperature, T_2, the balloon's temperature starts to drop. What are the signs of the system's q, w, and E for this process?

    a.   +q, +w, + E
    b.   -q, -w, + E
    c.   +q, -w, - E
    d.   −q, +w, - E

    (d)

Q. 3. The melting of ice at body temperature is an endothermic process:

    $H_2O_{(s)} \longrightarrow H_2O_{(l)}$ ΔH= +6.0kJ / mol

Thus eating ice counteracts the exothermic processes of metabolizing food. How much ice (in grams) would you have to eat to counteract the energy gained by eating 28.3g of peanuts (13 kJ/g)?

    a.   78 g
    b.   110 g
    c.   370 g
    d.   1100 g

    (d)

Q. 4. All of the following statements are false except

   a. $q = H$ at constant T; $q = E$ at constant V
   b. $q = H$ at constant V; $q = E$ at constant P
   c. $q = H$ at constant P; $q = E$ at constant V
   d. $q = H = E$ at constant P or at constant V
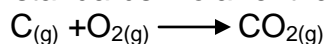
   (c)

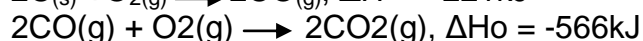Q. 5. H^o of which of the following reactions is equal to the standard enthalpy of formation of NH_3?

   a. $3H_{2(g)} + N_{2(g)} \longrightarrow 2NH_{3(g)}$
   b. $2NH_{3(g)} \longrightarrow 3H_{2(g)} + N_{2(g)}$

   c. $\dfrac{3}{2}H_{2(g)} + \dfrac{1}{2}N_{2(g)} \longrightarrow NH_{3(g)}$

   d. $NH_{3(g)} \longrightarrow \dfrac{3}{2}H_{2(g)} + \dfrac{1}{2}N_{2(g)}$

   (c)

Q. 6. Calculate the standards molar enthalpy of formation of CO2(g) in the reaction:
$$C_{(g)} + O_{2(g)} \longrightarrow CO_{2(g)}$$

   Given the following standard enthalpy changes:
   $2C_{(s)} + O_{2(g)} \longrightarrow 2CO_{(g)}, \Delta H^o = -221kJ$
   $2CO(g) + O2(g) \longrightarrow 2CO2(g), \Delta Ho = -566kJ$

   a. -393.5 kJ
   b. +393.5 kJ
   c. +787.0 kJ
   d. -787.0 kJ

   (a)

Q. 7. All of the following chemical reactions are endothermic except

   a. $H_2O_{(s)} \longrightarrow H_2O_{(l)}$
   b. $2H_2O_{(g)} \longrightarrow 2H_{2(g)} + O_{2(g)}$
   c. $H_2O_{(g)} \longrightarrow H_2O_{(l)}$
   d. $Al_2O_{3(l)} + 2Fe_{(l)} \longrightarrow 2Al_{(s)} + Fe_2O_{3(s)}$
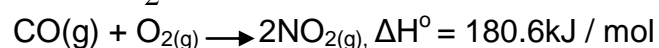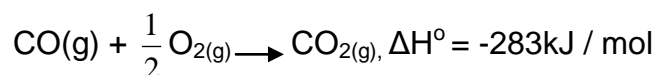
   (c)

Q. 8. All of the followings are incorrect except

   a. Hvaprizaiton < Hsublimation < Hfusion < Hcondensation
   b. Hfusion < Hcondensation < sublimation < Hvaporization
   c. Hcondensation < Hfusion < Hvaporization < Hsublimation
   d. Hcondensation < Hsublimation < Hfusion < Hvaporization

(c)

Q. 9. An environmental chemist got an idea that two serious pollutants (CO and NO) of the automobile exhaust can be converted to less harmful gases CO_2 and N_2. The reaction is

$$CO_{(g)} + NO_{(g)} \longrightarrow CO_{2(g)} + \frac{1}{2}N_{2(g)}, \Delta H° = ?$$
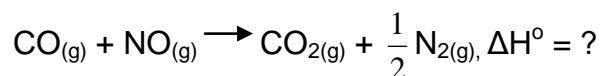
The enthalpy of this reaction as calculated from the following date is

$$CO(g) + \frac{1}{2}O_{2(g)} \longrightarrow CO_{2(g)}, \Delta H° = -283kJ / mol$$

$$CO(g) + O_{2(g)} \longrightarrow 2NO_{2(g)}, \Delta H° = 180.6kJ / mol$$

a. -102.4 kJ
b. -322.1 kJ
c. -373.3 kJ
d. -400.0 kJ

(c)

Q. 10. A chemist heated a balloon by supplying 600 J of heat. The balloon expands doing 200 J of work against the atmospheric pressure. The change in internal energy of

a. -800 J
b. -400 J
c. O J
d. +400 J

(d)

Q. 11. Spontaneous reactions are those which

a. continue to occur once started
b. require activation energy
c. are endothermic
d. are exothermic

(a)

Q. 12. All of the following processes are spontaneous except

a. reaction of H_2 with O2 to form H_2O
b. combustion of natural gas
c. neutralization of HCl by NaOH
d. synthesis of glucose by plants

(d)

Q. 13. Every one knows about the importance of water. Though it is abundant in nature, yet it can be produced in laboratory by the following reaction

$$2H_2 + O_2 \longrightarrow 2H_2O$$
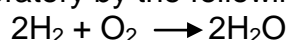
If H_f is the heat of formation of H_2O and H_r is the heat of this reaction, then

a. $H_f = H_r$

b. $H_r = \dfrac{H_r}{2}$

c. $H_r = \dfrac{H_r}{2}$

d. $H_f = 2H_r$

(b)

Q. 14. The following table provide different types of system and their examples but in irregular manner.

System	Example
I. Open	a. water in cork fitted titration flask
II. Closed	b. pigeon
III. isolated	c. ice in thermos bottle

Which of the following is a best match of both columns?

a. (I, a), (II, b), (III, c)
b. (I, b), (II, a), (III, c)
c. (I, c), (II, a), (III, b)
d. (I, b), (II, c), (III, a)

(b)

Q. 15. Sublimation, vaporization, melting and photosynthesis all are examples of

a.   chemical processes
b.   physical processes
c.   biochemical processes
d.   endothermic processes

(d)

Q. 16. A mixture of ice and water contains 60g of ice and 60g of water. If 60J of heat energy is removed from this mixture then some of the

a.   water will vaporize
b.   ice will sublime
c.   ice will melt
d.   water will freeze

(d)

Q. 17. Pieces of four different metals are present on a table. These metals are Na, AI, W and Ti. Their melting points are 98, 660, 3410 and 1660 ^{o}C respectively. Metal having maximum enthalpy of fusion is

a.   Ti
b.   AI
c.   W
d.   Na

(c)

Q. 18. If volume of a system is kept constant and heat is supplied to the system then

a.   internal energy of the system increases and no work is done on the surrounding
b.   internal energy of the system increases and work is done on the surrounding
c.   no change in internal energy occurs
d.   no work is done on the surrounding

(a)

Q. 19. Melting of ice at room temperature is

a.   spontaneous exothermic process
b.   spontaneous endothermic process
c.   non-spontaneous exothermic process
d.   non-spontaneous endothermic process

(b)

CHAPTER 7
CHEMICAL EQUILIBRIUM

Q. 1.   At 1000 C, the equilibrium constant for the reaction of carbon monoxide and oxygen to produce carbon dioxide is very large ($K_c = 1.2$ x 10_{22}). When the reaction is at equilibrium the:

a. concentration of carbon dioxide will be much larger than one or both reactants
b. concentration of carbon dioxide will be much smaller than concentrations of both reactants
c. concentration of carbon monoxide will be much larger than the concentration of carbon dioxide
d. concentrations of both reactants must be much smaller than the concentration of carbon dioxide

(a)

Q. 2.   A cylinder contains a unknown gas "X". When the cylinder is heated a reddish brown color develops. It means that the gas present in the cylinder was

a. NO_2
b. N_2O
c. N_2O_5
d. N_2O_4

(d)

Q. 3.   A beaker contains a saturated solution of potassium Perchlorate. When potassium chloride (KCI) is added to this solution, some of the potassium Perchlorate is precipitated. It means that

a. $KCIO_4$ is strong electrolyte that KCI
b.   Solubility of $KCIO_4$ is greater than that of KCI
c.   Both $KCIO_4$ and KCI are soluble in water to some extent
d.   KCI is a strong electrolyte as compared with $KCIO_4$

(d)

Q. 4.   In salt analysis 3rd group basic radicals (Al_{3+}, Fe^{3+} etc) are detected by adding NH_4CI to the salt solution and then NH_4OH. 3rd group radicals are precipitated as hydroxide. In this process

a. NH_4CI will ionize to a lesser extent in presence of NH_4CI
b. NH_4CI will precipitate
c. NH_4CI will react with NH_4CI
d. AL^{3+} will precipitate as $AICI_3$ (a)

CHAPTER 8
SOLUTIONS AND ELECTROLYTES

Q. 1. Islamian genius prepared a salt by the neutralization reaction of a weak acid and weak base. If Pk_a value for acid is greater than the Pk_b value for the base then salt prepared will be

    a.   soluble in water
    b.   insoluble in water
    c.   acidic
    d.   basic

    (d)

Q. 2. Equivalent weigh of sulfuric acid is 49, thus 1N solution of sulfuric acid will contain

    a.   98g of H_2SO_4 in 1lit of solution
    b.   49g of H_2SO_4 in 1kg of solvent
    c.   49g of H_2SO_4 in 1lit of solvent
    d.   49g of H_2SO_4 in 1lit of solution

    (d)

Q. 3. 0.5 Molar solution of NaOH contains

    a.   40g of NaOH in 1lit of solution
    b.   20g of NaOH in 1lit of solution
    c.   80g of NaOH in 1lit of solution
    d.   10g of NaOH in 1kg of solvent

    (b)

Q. 4. 05. molal solution

    a.   is less concentrated than 0.5 molar solution
    b.   has come concentration as that of 0.5 molar solution
    c.   is 0.5 times more concentrated than 0.5 molar solution
    d.   has concentration equal to 1 molar solution

    (a)

Q. 5. Mole fraction of water in tap water will be

    a.   equal to 1
    b.   less than 1
    c.   greater than 1
    d.   will be somewhat equal to 2

    (b)

Q. 6. Molality of pure water is
    a.   36
    b.   55.5
    c.   18

d.   1

(b)

Q. 7.   All of the following are postulates of Arrhenius theory of ionization except

   a.   electrolytes ionize in water to produce cations and anions
   b.   ionization is reversible processes
   c.   electrical conductivity of a solution of an electrolyte depends on the extent to which the electrolyte ionize in the solution
   d.   strong electrolyte ionize to a greater extent in water

(d)

Q. 8.   If "X" moles of $Ag_2Cr_2O_7$ are dissolved in water to produce a saturated solution then Ksp will be

   a. $2X^2$
   b. $2X^3$
   c. $4X^3$
   d. X^3

(c)

Q. 9.   A salt was dissolved in water. It was found that ionic product is greater than the solubility product. It means that the

   a.   solution is unsaturated
   b.   solution is saturated
   c.   solution is supersaturated
   d.   we cannot predict the saturation or unsaturation of the solution for this data

(c)

Q. 10. Enough lead chloride $PbCl_2$ was dissolved in water at 25° to produce a saturated solution. Concentration of Pb^{2+} in the solution will be

   a. $\sqrt[3]{\dfrac{Ksp}{4}}$

   b. $\sqrt{\dfrac{Ksp}{4}}$

   c. $\sqrt[3]{\dfrac{Ksp}{2}}$

   d. $\sqrt[3]{\dfrac{Ksp}{3}}$

(a)

Q. 11. Consider the following cell reaction
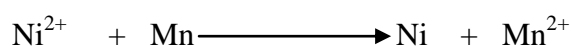
$$Pb + 2Ag^+ \longrightarrow Pb^{2+} + 2Ag$$
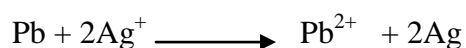
If a cell is made based on this equation then

a.   lead will act as anode and silver as cathode
b.   lead will act as cathode and silver as anode
c.   silver will act as cathode because it has greater reduction potential
d.   lead will act as anode because it has lesser reduction potential

(a)

Q. 12. Consider the following spontaneous reaction

$$Ni^{2+} + Mn \longrightarrow Ni + Mn^{2+}$$

If a voltaic cell is made based on this reaction then conventional representation of the cell will be

a. Ni , Ni^{2+} $\parallel$ Mn^{2+} , Mn

b. Mn , Mn^{2+} $\parallel$ Ni^{2+} , Ni

c. Mn^{2+} , Ni $\parallel$ Ni , Ni^{2+}

d. Ni , Ni $\parallel$ Mn , Mn^{2+}

(b)

Q. 13. 0.05 molar H_2SO_4 solution was present in the laboratory of Islamia College. Islamian genius told his friends that PH of this solution must be

a. 0.05
b. 0.5
c. 1
d. 2

(c)

Q. 14. Buffer is a solution

a.   whose PH is constant
b.   which resists change in its PH
c.   which is strong enough to maintain its PH
d.   whose PH may or may not change during a chemical reaction

(b)

Consider the following list of indicators of the next two questions

    I.   Ferroin   II.   Methyl red
    III.   Diphenyl amine
    IV.   Allizarian yellow
    V.   Bromthymol blue

Q. 15. In this list acid base indicators are

    a.   I and II
    b.   II, III and V
    c.   III, IV and V
    d.   II, IV and V

(d)

Q. 16. In this list redox indicators are

    a.   I and II
    b.   II and III
    c.   I and V
    d.   III and IV

(a)

Q. 17. Consider the following four acids.
$H2SO_4$, HNO_3, $HCIO_4$ and HCI
The correct order in which the strength of these acids increases

    a. $H_2SO_4 < HNO_3 < HCI < HCIO_4$
    b. $HCIO_4 < HCI < HNO_3 < H_2SO_4$
    c. $HNO_3 < H_2SO_4 < HCI < HCIO_4$
    d. $HCIO_4 < HCI < H_2SO_4 < HNO_3$

(c)

Q. 18. An unknown acid is present in a container. If the acid is weak then

    a.   it will have low PH and low Pka value
    b.   it will have high Ph and high Pka value
    c.   it will have low PH but high Pka value
    d.   it will have high PH but low Pka value

(b)

Q. 19. Dr. Khan dissolved three salts $Cu(NO_3)_2$, $NaHCO_3$ and $(NH_4)_2SO_4$ in water to make a saturated solution. Islamian genius told him that the result solution

    a.   must be neutral
    b.   must be basic
    c.   must be acidic
    d.   may be acidic, basic or neutral depending on the temperature

(c)

Q. 20. Four statements are given below. The correct statement is

a. oxidation state of N in NO and N_2O_5 is +5 and +2 respectively
b. oxidation state of N in NO and N_2O_5 is +1 and +5 respectively
c. oxidation state of N in NO and N_2O_5 is +2 and +5 respectively
d. oxidation state of N in NO and N_2O_5 is +2 and +4 respectively

(c)

Q. 21. Islamian genius told his roommate that for pure water at room temperature

a. molarity is slightly greater then Molality
b. molarity is slightly less then Molality
c. molarity is equal to its Molality
d. concept of Molality and molarity does not applies

(b)

Q. 22. One of the following ways of expressing the concentration of a solution does not depend on temperature. It is

a. molarity
b. Molality
c. Normality
d. Formality

(b)

Q. 23. Mole fraction of pure water is

a. slightly less then one
b. slightly greater then one
c. exactly equal to one
d. may be any one of the above depending on the temperature of water

(c)

Q. 24. A solution contains 3 moles of ethyl alcohol and 7 moles of water. The mole fraction of ethyl alcohol and water will be

a. 0.7 and 0.3 respectively
b. 0.3 and 0.7 respectively
c. 0.6 and 0.4 respectively
d. 0.2 and 0.8 respectively

(b)

Q. 25. Which of the following statements is correct for the life period of a galvanic cell

a. it increases with increase in concentration of cathodic solution

b.	it increases with increase in concentration of anodic solution
c.	it increases with increase in the size of the cathode
d.	it increases with decrease in the size of the anode

(a)

Q. 26.	Consider the following spontaneous reaction

$$A + 2B^+ \longrightarrow A^{2+} + 2B$$
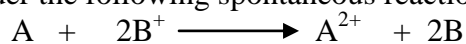
The standard reduction potentials are

A^{2+}/A -0.13V

B^+/B +0.80V

The voltage of this cell will be

a.	0.26V
b.	1.6V
c.	0.67V
d.	0.93V

(d)

Q. 27.	A spontaneous reaction is for a galvanic cell as a non spontaneous reaction is for

a.	Nelson's cell
b.	Down's cell
c.	Electrolytic cell
d.	Daniel cell

(c)

Q. 28.	Acetic acid is a weak electrolyte. Its concentrated aqueous solution will contain

a.	CH_3COOH and H_3O^+
b.	CH_3COO-, OH^- and H^+
c.	CH_3COOH, CH_3COO^- and H^+
d.	CH_3COOH, CH_3COO- and H_3O^+

(d)

Q. 29.	The strongest base among the following is

a.	RbOH
b.	KOH
c.	NaOH
d.	LiOH

(a)

Q. 30.	Consider the following buffers

a.	$AI(OH)_3 + AI_2(SO_4)_3$
b.	$Fe(OH)_3 + FeCI_3$
c.	$NH_4CI + Na_2SO_4$
d.	$NaOH + Na_2SO_4$

(b)

Q. 31. A solution contains two compounds $AI(OH)_3$ and $Zn(OH)_2$. Solubility products for these compounds are 8.5×10^{-23} and 1.8×10^{-4} respectively. If NH_4OH is added to this solution then

    a.   both will precipitate at the same time
    b. $Zn(OH)_2$ will precipitate first
    c. $AI(OH)_3$ will precipitate first
    d. $Zn(OH)_2$ or $AI(OH)_3$ will precipitate first depending on the temperature of the solution

(c)

CHAPTER 9
INTRODUCTION TO CHEMICAL KINETICS

Q. 1. The number of atoms or molecules whose concentration determines the rate of a chemical reaction is called the

    a.   molecularity of the reaction
    b.   order of the reaction
    c.   specific activity of the reaction
    d.   rate constant of the reaction

(b)

Q. 2. A scientist prepared a compound in laboratory. He found that it has two forms, one amorphous form and another crystalline form C. Both A and C reacts with sulfuric acid. One possible predication is that

    a.   increases with increase in concentration of the reactants
    b.   decreases with increase in concentration of the reactants
    c.   increases with increase in concentration of the products
    d.   decreases with increase in concentration of the products

(a)

Q. 3. The rate of an irreversible reaction

    a.   increase with increase in concentration of the reactants
    b.   decreases with increase in concentration of the reactants
    c.   increases with increase in concentration of the products
    d.   decreases with increase in concentration of the products
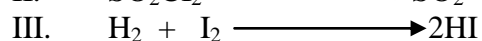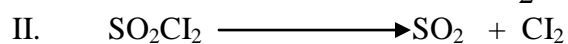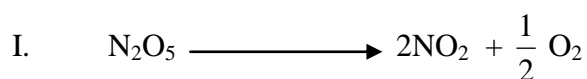
(a)

Q. 4.   Consider the following equation

$$K = A\, e^{-\frac{Ea}{RT}}$$

In this equation

a.   A is a molecule of the reactant
b.   A is a molecule of the product
c.   A is proportionality constant
d.   A is Arrhenius constant

(d)

Q. 5.   Consider the following reactions

I. $N_2O_5 \longrightarrow 2NO_2 + \frac{1}{2} O_2$

II. $SO_2Cl_2 \longrightarrow SO_2 + Cl_2$
III. $H_2 + I_2 \longrightarrow 2HI$

The correct statement about these reactions is

a.   I is a second order reaction
b.   II and III are first order reactions
c.   III is a first order reaction
d.   I and II are first order reactions

(d)

Q. 6.   A substance which increases the efficiency of a catalyst is termed as

a.   Promoter
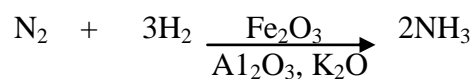b.   Activator
c.   Retarder
d.   Super catalyst

(a)

Q. 7.   "Rancidity produced in butter can be decreased by adding quinoline to the butter". This statements shows that

a.   nothing is impossible
b.   quinoline is an inhibitor
c.   quinoline is a catalyst
d.   quinoline is an activator

(b)

Q. 8. Ammonia can be produce according to the following reaction

$$N_2 \ + \ 3H_2 \xrightarrow[\text{A1}_2O_3, \ K_2O]{Fe_2O_3} 2NH_3$$

In this reaction

a. Fe_2O_3 and AI_2O_3 are catalysts while K_2O is a promoter
b.   Fe2O3 is catalyst while AL2O3 and K_2O are promoters
c. AI_2O_3 and K_2O are catalysts while AI_2O_3 is a promoter
d. Fe_2O_3 and K_2O are catalysts while AI_2O_3 is a promoter
     (b)

Q. 9. In specified conditions the rate of consumption of N2O5 in the reaction
$$2N_2O_5 \longrightarrow 4NO_2 \ + \ O_2$$
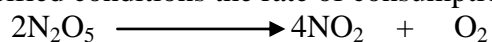
is 0.5 mol $N_2O_5 \ L^{-1}.S^{-1}$. The rate of formation of NO_2 is

a.   0.5
b.   4
c.   2
d.   1

(d)