DELHI PUBLIC SCHOOL, FARIDABAD

Chemistry Assignment 2016-17 Semester-I Unit-I

Class - XI

Subject : Atomic Structure

Q.1 What do you mean by 'Einstein of Energy'?

Q.2 What is the total number of orbitals associated with the principal quantumber n = 3

Q.3 Calculate the energy associated with the first orbit of He^{+}. What is the radius fo the orbit?

E= -8.72×10^{-18} J r = 0.2645 A

Q.4 Iodine molecule dissociates into atom after absorbing light of 4500 A°. If one quantum of radiation is absorbed by each molecule, calculate the kinetic energy of iodine atoms.

K.E/atoms = 0.216×10^{-19}J

Q.5 Give any two evidences for the wave nature of electron.

Q.6 Derive Bohr's postulate of quantisation of angular momentum from de-Broglie relation.

Q.7 An electron in certain Bohr orbit has velocity 1/275 of the velocity of the light. Calculate the orbit in which the electron is revolving? **n= 2**

Q.8 What are Balmer series? Calculate the wave number of the longest and shortest wavelength.

Q.9 What is the wavelength for the proton accelerated by potential of 35 volts? **4.8×10^{-12} m**

Q.10 Calculate the number of waves made by a Bohr electron in one complete revolution in its thrid orbit.

Q.11 A proton is accelerated to one tenth of velocity of light. If the velocity can be measured with a precision of ±0.5%. What must be the uncentainty in its position? **2.11×10^{-13}m**

Q.12 The ejection of the photoelectron from the silver metal in the photoelectric effect experiment can be stopped by applying the voltage of 0.35 V when the radiation 256.7 nm is used. Calculate the work function for silver metal. **4.48 eV.**

Q.13 An electron beam can undergo diffraction by crystals. Through what potential should a beam of electrons be accelerated so that its wavelength becomes equal to 1.54A°? **63.3 V**

Q.14 An electron in a H-atom in its ground state absorbs 1.50 times as much energy as the minimum energy required for it to escape from the atom. What is the wavelength of the emitted electron? **4.70×10^{-10}**

Q.15 Calculate the ratio between the wavelength of an electron and a proton if the proton is moving with half the velocity of electron. **916.6**

Q.16 A compound of vanadium has a magnetic moment of 1.73 BM. Work out the electronic configuration of vanadium ion in the compound. **V^{+4}**

Q.17 Given below are the sets of quantum numbers for given orbitals. Name these orbitals.

a. n=2, l=1, m=–1
b. n=4, l=2, m=0
c. n=4, l=0, m=0
d. n=3, l=2, m=±2
e. n=3, l=1, m=±1

Q.18 Write down all the four quantum nos. for

a. 19th electron of $_{24}Cr$
b. 21st electron of $_{21}Sc$

Q.19 Give the configuration & the magnetic nature for -

i) Cr^{3+}
ii) Mn^{2+}
iii) Cu^{2+}
iv) Fe^{2+}
v) Fe^{3+}
vi) N^{-} & N^{2-}
vii) Zn^{2+}
viii) Ag^{+}

Q.20 Write the values of the quantum numbers n,l,m and s for electron filling 21st place in the atom of element with atomic number 24.

Q.21 When would the wavelength associated with an electron become equal to the wavelength associated with proton? **$1836v_p$**

Q.22 Calculate the de-Broglie wavelength of an electron which has been accelerated from rest through a potential difference of 1 kV. **3.88×10^{-11} m**

DELHI PUBLIC SCHOOL, FARIDABAD

Chemistry Assignment 2016-17 Semester-I Unit-I

Class - XI

Subject : Mole Concept and Stoichiometry

Q.1 Calculate the total number of protons in 10 g of calcium carbonate . **3.0115×10^{24}**

Q.2 If 0.50 mole of $BaCl_2$ is mixed with 0.20 mole of Na_3PO_4,what will be the maximum number of moles of $Ba_3(PO_4)_2$ that can be formed **0.10**

Q.3 30 mL of an acid is neutralized by 15 mL of 0.2 N alkali.What wii be the strength of the acid. **0.1N**

Q.4 To neutralise 100 ml 0.1 M H_2SO_4 ,What amount of NaOH will be required. **0.8g**

Q.5 0.16 g of a dibasic acid required 25 ml of decinormal NaOH solution for complete neutralisation. What will be the molecular weight of the acid. **128**

Q.6 5.3 g of Na_2CO_3 have been disolved to make 250ml of the solution. What wii bethe normality of the resulting solution. **0.4N**

Q.7 The reaction $2C + O_2 \longrightarrow 2CO$ is carried out by taking 24 g of carbon and 96 g of O_2. Find out :

a. Which reactant is left in excess?

b. How much of it is left?

c. How many mole of CO are formed?

d. How many gram of other reactant should be taken so that nothing is left at the end of reaction?

O_2, 64g,2mole,72g carbon

Q.8 Butyric acid contains only C, H and O. A 4.24 mg sample of butyric acid is completely burnt. It gives 8.45 mg of CO_2 & 3.46 mg of H_2O. The molecular mass of butyric acid is 88 amu. What is the molecular formula of the acid? **$C_4H_8O_2$**

Q.9 How many millilitre of 0.5 M H_2SO_4 are needed to dissolve 0.5 g of copper II carbonate? **V=8.097ml**

Q.10 What is the strength in g per litre of a solution of H_2SO_4, 12 mL of which neutralized 15 mL of N/10 NaOH solution? **6.125g/litre**

Q.11 The formula weight of an acid is 82.0. 100 cm^3 of a solution of this acid containing 39.0 g of the acid per litre were completely neutralised by 95.0 cm^3 of aqueous NaOH containing 40.0 g of NaOH per litre. What is the basicity of the acid? **n=2**

Q.12 What weight of Na_2CO_3 of 95% purity would be required to neutralize 45.6 ml of 0.235N acid?

W = 0.5978 g

Q.13 Calculate the Normality of the resulting solution made by adding 2 drops (0.1ml) of 0.1N H_2SO_4 in 1 litre of distilled waster. **$N = 10^{-5}$**

Q.14 What weight of AgCl will be precipitated when a solution containing 4.77 g NaCl is added to a solution of 5.77 g of $AgNO_3$? **W = 4.87 g**

Q.15 How much AgCl will be formed by adding 200 ml of 5N HCl to a solution containing 1.7 g $AgNO_3$?

W = 1.435 g

Q.16 What is the Normality and nature of a mixture obtained by mixing 0.62 g of $Na_2CO_3 \cdot H_2O$ to 100 ml of 0.1N H_2SO_4? **0.1 N, Neutral**

Q.17 0.5g of fuming H_2SO_4 is diluted with water. the solution requires 26.7 ml of 0.4 N NaOH for its neutralization.Find the % of free SO_3 in the sample of oleum? **% of SO_3 = 20.78%**

Q.18 How many ml of 0.1 N HCl are required to react completely with 1 g mixture of Na_2CO_3 & $NaHCO_3$ containing equimolar amounts of the two? **V=157.8 ml**

Q.19 Arsenic forms two oxides, one of which contains 65.2% and the other 75.7% of the element. Determine the equivalent weight of As in both (14.98, 24.92)

Q.20 0.5 g mixture of K_2CO_3 and Li_2CO_3 required 30 ml of 0.25 N HCl for neutralization. What is % composition of mixture. (K=39, Li=7) **K_2CO_3=96%, Li_2CO_3 = 4%**

Q.21 8.0575×10^{-2} Kg of Glauber's salt ($Na_2SO_4.10H_2O$) is dissolved in water to obtain 1 dm^3 of a solution of density 1077.2 Kg m^{-3}. Calculate the molarity, molality and mole fraction of Na_2SO_4 in solution. **M= 0.2502M, m = 0.24m, Mole fraction = 4.3×10^{-3}**

Q.22 A solid mixture 5 g consists of lead nitrate and sodium nitrate was heated below 600°C until weight of residue was constant. If the loss in weight is 28%, find the amount of lead nitrate and sodium nitrate in mixture. **sodium nitrate=1.68g, lead nitrate = 3.32g**

Q.23 Equal weights of Zn and I_2 are mixed together and the product is ZnI_2. What is the limiting reagant. What fraction of the other reagant is left unreacted? **0.74**

Q.24 1.575 g of oxalic acid $(COOH)_2\ xH_2O$ crystal were dissolved in water and the solution made upto 250ml. 20.85 ml of this solution required 25ml of N/12 NaOH for complete neutralization. Calculate the value of x? **X = 2**

Q.25 0.7324 g of Zinc dust, containing Zn and ZnO were dissolved in dil H_2SO_4 liberated 224 ml of H_2 at STP. Calculate the % of Zn metal present in the sample. (Zn = 65.4). **89.3%**

DELHI PUBLIC SCHOOL, FARIDABAD

Chemistry Assignment — 2016-2017 Semester-I Unit-II
Class - XI

Topic : Chemical Families : Periodic Properties

Q.1 Select in each pair, the one having lower ionisation energy and explain the reason.

a. I and I^-
b. Br and K
c. Li and Li^+
d. Ba and Sr
e. O and S
f. Be and B
g. N and O

Q. 2 Which group members possess 2nd EA to be zero and why?

Q. 3 Arrange the following in order of increasing ionic radius.

a. Cl^-, P^{3-}, S^{2-}, F^-
b. Al^{3+}, Mg^{2+}, Na^+, O^{2-}, F^-
c. Na^+, Mg^{2+}, K^+

Q. 4 What do you mean by?

a. Diagonal relationship

b. Representative elements

Q. 5 Distinguish between electron affinity and electronegativity.

Q. 6 Write the order of increasing solubility of -

a. Sulphates of alkaline earth metals.

b. Hydroxide of alkaline earth metals.

Q. 7 Predict the period, block and group to which each of the following element belong?

A(10); B(27); C(35); D(42)

Q. 8 Write the atomic number of element of fourth period having maximum number of unpaired electrons.

Q. 9 Lanthanides and Actinides are placed in separate rows at the bottom of the periodic table. Explain.

Q. 10 a) Name two typical elements.

b) Name any two bridge elements.

c) Name any two rare earths.

d) Name any two transuranic elements.

Q. 11 The element Z = 107 and Y = 109 have been prepared artificially recently, however element X with at. no. 108 has not yet been discovered. Indicate the group of these elements if placed in periodic table. Give their IUPAC names also.

Q. 12 Why are 'f' block elements known as inner transition element?

Q. 13 An element 'x' is in the third group of the periodic table. What is the formula of its oxide?

Q. 14 Point out the soluble and insoluble sulphates of alkaline earth metals.

Q. 15 An element shows that its III electron affinity is zero and if this element belong to III period, why element is this?

Q. 16 A student reported the radius of Cu, Cu^+ and Cu^{2+} as 96 pm, 122 pm and 72 pm respectively. Do you agree with the trend in reported values? Justify with reasons.

Q. 17 Arrange in given order :

a. Increasing E.A. : O, S and Se

b. Increasing IE : Na, K and Rb
c. Increasing radius : I^-, I^+ and I
d. Increasing electronegativity : F, Cl, Br, I
e. Increasing EA : F, CI, Br, I
f. Increasing radius : Fe, Fe^{2+}, Fe^{3+}

Q. 18 Name some pairs of isoelectronic ions.

Q. 19 Arrange the following in the increasing order :
a. melting point of alkali metals.
b. boiling point of halogens
c. melting point of sodium halides
d. solubility of alkali metal fluorides in water

Q. 20 Give the formula of a species which will be isoelectronic with the following atoms or ions.
a. Ne
b. Cl^-
c. Ca^{2+}
d. Rb^+

Q. 21 Which has larger size. Explain your answer :
a. K or K^+
b. Br or Br^-
c. O^{2-} or F^-
d. Li^+ or Na^+
e. P or As
f. Na^+ or Mg^{2+}

Q. 22 The first (IE_1) and second (IE_2) ionisation energies (in KJ mol^{-1}) of a few elements designated by the Roman numerals are shown below :

	IE_1	IE_2
I	2372	5251
II	520	7300
III	900	1760
IV	1680	3380

Which of these is -
a. a reactive metal
b. a reactive non-metal
c. a noble gas
d. a metal that forms a stable binary halide of the formula AX_2

Q. 23 How many elements are yet to be discovered to complete the last period of the periodic table? What shall be the atomic number of the last member of the last period and to which group it shall belong?

Q. 24 Why IE_1 of Be > IE_1 of B?

Q. 25 IE_1 of O < IE_1 of N but IE_2 of O>IE_2 of N. Explain.

Q. 26 IE_2 for alkali metals shows a jump where as IE_3 for alkaline earth metals shows in jump. Explain.

Q. 27 Formation of Cl^- is exothermic but formation of O^{2-} is endothermic. Explain.

Q. 28 Lithium is more powerful reductant than sodium in aqueous medium. Why?

Q. 29 Na^+ has higher ionisation energy that Ne, though both have same electronic configuration. Why?

Q. 30 Mg^{2+} is smaller than O^{2-} in size though both have same electronic configuration. Why?

Q. 31 Electron affinity of chlorine is more than fluorine. Why?

Q. 38 Beryllium and magnesium atoms do not impart colour to flame where as other alkaline earth metals do so. Explain.

DELHI PUBLIC SCHOOL, FARIDABAD

Chemistry Assignment 2016-17 Semester-I Unit-II

Class - XI

Subject : Chemical Bonding

Q. 1 NaCl is a better conductor of electricity in a molten condition than in the solid state. Explain.

Q. 2 An element A combines with element B. An atom of A contains two electrons in its outermost shell whereas that of B has six electrons in its outermost shell. Two electrons are transferred from the atom A to the atom B.

a. What is the nature of bond between A and B?

b. What is the electronic structure of AB?

c. What is the electrovalency of A and that of B?

Q. 3 Define Lattice energy. On what factors does it depend? How does it help to predict the stability of the ionic compound formed?

Q. 4 How is the formal charge on an atom in a molecule/ion calculated? Explain taking the example of ozone molecule.

Q. 5 What are sigma and pi bonds? Explain the different ways of their formation diagrammatically. Which one of them is stronger and why?

Q. 6 Arrange the following according to bond length giving reasons :

a. H–F, H–Cl, H–Br, H–I

b. C–C, C=C, C≡C

c. C–H bond length in CH_4, C_2H_4 and C_2H_2

Q. 7 Arrange the following single bonds in order of bond energy giving reasons :

C–C, N–N, O–O, F–F

Q. 8 Define 'Electronegativity'. How is it calculated on

a. Pauling scale

b. Mulliken scale

How are the two values related to each other?

Q. 9 Explain : Each carbon-oxygen bond in CO_2 molecule is polar but the molecule itself is non-polar.

Q. 10 Explain giving reasons, which of the following molecules have electric dipoles.

a. CCl_4 b. $CHCl_3$ c. CH_2Cl_2 d. CH_3Cl e. CH_4

Q. 11 What type of hybridisation is associated with the central atom when the atoms attached to it form

a. an equilateral triangle

b. a regular tetrahedron?

Q. 12 Carbon has electronic configuration $1s^2\ 2s^2\ 2p^2$ and therefore, should be bivalent. How will you justify its tetravalency in methane?

Q. 13 Using the valency shell electron pair repulsion (VSEPR) model, predict the shapes of the following molecules

a. $BeCl_2$ b. BF_3

Q. 14 In terms of ionization energy and electron affinity, what type of atoms combine to form an ionic compound?

Q. 15 What orbitals can overlap to form a σ-bond and which orbitals can do so to form a π-bond?

Q. 16 Name the shapes of the following molecules :

CH_4, C_2H_2, CO_2

Q. 17 Name the two conditions which must be satisfied for hydrogen bonding to take place in a molecule.

Q. 18 Predict the dipole moment of a molecule of the type AX_4 with square planar arrangement of X atoms.

Q. 19 Arrange the following in order of increasing bond strengths :

F_2, N_2,O_2, Cl_2

Q. 20 Arrange the following in order of increasing strength of hydrogen bonding :

O, F, S, Cl, N

Q. 21 What are SI units of dipole moment?

Q. 22 Write two resonating structures of N_2O that satisfy the octet rule.

Q. 23 Give reasons for the following :

a. Covalent bonds are called directional bonds while ionic bonds are called non-directional.

b. Water molecules have bent structure whereas carbon dioxide molecules are linear.

c. Ethylene molecules are planar.

Q. 24 Explain the following :

a. AlF_3 is a high melting solid where as SiF_4 is a gas.

b. H_2S having high molecular weight is a gas whereas H_2O is a liquid.

Q. 25 Indicate whether the following statement is TRUE or FALSE. Justify your answer in not more than three lines :

The dipole moment of CH_3F is greater than that of CH_3Cl.

Q. 26 Account for the following : (Write the answer in four sentences only)

The experimentally determined N—F bond length in NF_3 is greater than the sum of the single covalent radii of N and F.

Q. 27 Give reason for the following :

The molecule of $MgCl_2$ is linear while that of stannous chloride ($SnCl_2$) is angular.

Q. 28 Explain why bond angle of NH_3 is greater than that of NF_3 while bond angle of PH_3 is less than that of PF_3.

Q. 29 Which of the following has maximum bond angle?

H_2O, CO_2, NH_3, CH_4

Q. 30 Which one of NF_3 and NH_3 is more polar and why?

Q. 31 Why does water have maximum density at 4°C?

Q. 32 O-nitro planet and p-nitro phenol can be seperated steans distillation. Explain.

Q. 33 Arrange in the increase order of boiling point (b) Bond angle.

i. HF, HCl, HBr, HI

ii. H_2O, H_2S, H_2Se, H_2Te

iii. NH_3, PH_3, AsH_3, SbH_3, BiH_3

Q. 34 KItF$_2$ exists while KHCI$_2$ does not. Explain.

Q. 35 HCI is predominantly covalent in gaseous state; but is ionic in aqueous solution.

Q. 36 Predict the shapes of the following molecules/ions. Also predict the hybridisation of the central atom.

i. XeO_3 b. $XeOF_2$ c. $XeOF_4$ d. SF_6

e. NO_3^- *f.* PO_4^{3-} *g.* NH_4^+

Q. 37 Mention the favourable conditions for orbital overlapping.

Q. 38 The observed dipole moment of HCI molecule is 1.03 D. Calculate the percentage of ionic character.

Q. 39 Construct Born-Itaber cycle to calculate the lattice energy of NaCl from the following data

$\Delta H_f NaCl_{(r)}$=-411 kJmol^{-1} $\Delta H_{sub}Na$=+108.4 kJmol^{-1}

$\Delta H(IE)Na_{(a)}$ =+495.8 kJmol^{-1} $\Delta H_D Cl_2$=242.0 kJmol^{-1}

$\Delta H(EA)Cl$=348 kJmol^{-1}

Q. 40 Out of H_2^+ and H_2^- which is more stable? Why?

Q. 41 He H$^-$ ion can not exist. Why?

Q. 42 O_2 molecule is paramagnetic, whereas N_2 molecule is diamagnetic. Why?

Q. 43 Arrange the following in the increasing order of stability :

O_2, O_2^-, O_2^{2-}, O_2^+

Q. 44 Explain why the bond order of N_2 is greater than N_2^+, but the bond order of O_2 is less than that of O_2^+. Why?

DELHI PUBLIC SCHOOL, FARIDABAD

Chemistry Assignment 2016-17 Semester-I Unit-III

Class - XI

Topic : States of Matter

Q.1 What is the dominant intermolecular force or bond that must be overcome in converting liquid CH_3OH to gas?

Q.2 What is the type of the graph between log (p) and log (1/v) at constant temperature?

Q.3 Why do real gases show deviation from ideal behaviour? Write van der Waal's equation for n moles of a gas.

Q.4 What is 'compressibility factor'? What is its value for 'an ideal gas'? How does it help to understand the extent of deviation of a gas from ideal behaviour?

Q.5 What are the units of 'a' & 'b' van der waal's constant? What is its physical significance?

Q.6 When 3.2 g S is vaporized at 450°C and 723 mm pressure, the vapours occupy a volume of 780 ml. What is the molecular formula of S vapours?

Q.7 Relate u_{rms}, u_{av}, and u_{mp} to each other.

Q.8 Starting from kinetic gas equation, prove that the average kinetic energy of a gas is directly proportional to its absolute temperature.

Q.9 Pure hydrogen sulphide is stored in a tank of 100 litre capacity at 20°C and 2 atm pressure. What will be the mass of the gas . 282.4 g

Q.10 a. Out of N_2 and NH_3, which gas has

i. larger value of a

ii. larger value of b

Q.11 A mixture of CO and CO_2 is found to have a density of 1.50 g/litre at 30°C and 730 mm. What is composition of mixture? Mole % of CO_2 = 67.81 Mole % of CO = 32.19

Q.12 An open flask contains air at 27°C. Calculate the temperature at which it should be heated so that

a. 1/3rd of air measured at 27°C escapes out. 177degree C

b. 1/3rd of air measured at final temperature escapes out 127 degree C

Q.13 The average velocity of gas molecules is 400 m/sec. Calculate its rms velocity at the same temperature. 434 ms^{-1}

Q.14 An evacuated glass vessel weighs 50.0 g when empty 148.0 g when filled with a liquid of density 0.98 g mL^{-1} and 50.5 g when filled with an ideal gas at 760 mm Hg at 300 K. Determine the molar mass of the gas. 123 g mol^{-1}

Q.15 A balloon of diameter 20 meter weighs 1000 kg. Calculate its pay - load, if it is filled with He at 1.0 atm and 27°C. Density of air is 1.2 kg m^{-3} (R=0.082 dm^3 atm K^{-1} mol^{-1}). 424.67 X 10^4g

Q.16 a. Calculate the pressure exerted by 5 mole of CO_2 in one litre vessel at 47°C using van der Waals's equation. Also report the pressure of gas if it behaves ideally in nature. Given that a=3.592 atm $litre^2$ mol^{-2}, b=0.0427 litre mol^{-1}. 77.218 atm.

b. If volume occupied by NO_2 molecules is negligible, then calculate the pressure exerted by one mole of CO_2 gas at 273 K. 0.9922 atm

Q.17 Calculate the pressure exerted by 10^{23} gas molecules, each of mass 10^{-22}g in a container of volume one litre. The R.M.S. speed is 10^5 cm sec^{-1}. p =3.3 X 10^7dyne cm^{-2}

Q.18 Compressibility factor (Z) for N_2 at –50°C and 800 atm pressure is 1.95. Calculate mole of N_2 gas required to fill a gas cylinder of 100 L capacity under the given conditions.

Mole of N_2 gas = 2240.8

Q.19 Using van der Waals equation, calculate the constant 'a', when two moles of a gas confined in a four litre flask exerts a pressure of 11.0 atmosphere at a temperature of 300 K. The value of 'b' is 0.05 litre mol^{-1}.

a = 6.46 $litre^2$ atm $mole^{-2}$

DELHI PUBLIC SCHOOL, FARIDABAD

Chemistry Assignment 2016-17 Semester-I Unit-III

Class - XI

Redox Reactions

Q.1 Balance the following equations :

a. $KMnO_4 + KCI + H_2SO_4 \rightarrow MnSO_4 + K_2SO_4 + H_2SO_4 + H_2O + CI_2$ (acidic)

b. $Cr_2O_7^{-2} + I^- + H^+ \rightarrow Cr^{+3} + I_2 + H_2O$ (acidic)

c. $Cu + NO_3^- + ... \rightarrow Cu^{+2} + NO_2 + ...$ (acidic)

d. $CI_2 + IO_3^- + OH^- \rightarrow IO_4^- + ... + H_2O$ (basic)

e. $KMnO_4 + H_2SO_4 + H_2O_2 \rightarrow K_2SO_4 + MnSO_4 + H_2O + ...$ (acidic)

f. $KCIO_3 + H_2SO_4 \rightarrow KHSO_4 + HCIO_4 + CIO_2 + H_2O$ (acidic)

g. $Br^- + BrO_3^- + H^+ \rightarrow Br_2 + H_2O$ (acidic)

h. $H_2S + Cr_2O_7^{-2} + H^+ \rightarrow Cr_2O_3 + S_8 + H_2O$ (acidic)

i. $Au + NO_3^- + CI^- + H^+ \rightarrow AuCI_4^- + NO_2 + H_2O$ (acidic)

j. $I_2 + Cr_2O_7^{-2} + H^+ \rightarrow Cr^{+3} + IO_3^- + H_2O$ (acidic)

k. $Cu_2O + H^+ + NO_3^- \rightarrow Cu^{+2} + NO + H_2O$ (acidic)

l. $MnO_4^{-2} \rightarrow MnO_4^{-1} + MnO_2$ (acidic)

m. $CI_2 + I_2 \rightarrow IO_3^- + CI^-$ (acidic)

n. $Cu_3P + Cr_2O_7^{-2} \rightarrow Cu^{+2} + H_3PO_4 + Cr^{+3}$ (acidic)

o. $Zn + NO_3^{-1} \rightarrow ZnO_2^{-2} + NH_3$ (basic)

p. $AsO_3^{-3} + MnO_4^{-1} \rightarrow AsO_4^{-3} + MnO_2$ (basic)

q. $Fe_3O_4 + MnO_4^{-1} \rightarrow Fe_2O_3 + MnO_2$ (basic)

r. $C_2H_5OH + MnO_4^- \rightarrow C_2H_3O^- + MnO_2(s) + H_2O$ (basic)

s. $CrI_3 + H_2O_2 + OH^- \rightarrow CrO_4^{2-} + IO_4^- + H_2O$ (basic)

t. $SbCI_3 + KIO_3 + HCI \rightarrow SbCI_5 + ICI + H_2O + KCI$ (acidic)

u. $IO_3^- + HSO_3^- \rightarrow SO_4^{-2} + HSO_4^- + I_2$ (acidic)

v. $As_2S_5 + HNO_3 \rightarrow H_3SO_4 + HCI$ (acidic)

w. $FeC_2O_4 + KMnO_4 + H_2SO_4 \rightarrow Fe_2(SO_4)_3 + CO_2 + MnSO_4 + K_2SO_4 + H_2O$ (acidic)

Q. 2 a. A solution one molar in each of NaCl, $CdCl_2$, $ZnCl_2$ and $PbCl_2$. To this tin metal is added which of the following is true? Given

$E°\ Pb^{2+}/Pb = -0.126$ V

$E°\ Sn^{2+}/Sn = -0.136$ V

$E°\ Cd^{2+}/Cd = -0.40$ V

$E°\ Zn^{2+}/Zn = -0.763$ I

$E°\ Na^{+}/Na = -2.71$ I

i. Sn can reduce Na^+ to Na　　ii. Sn can reduce Zn^{2+} to Zn

iii. Sn can reduce Pb^{2+} to Pb　　iv. Sn can reduce Cd^{2+} to Cd.

b. Which of the following is true for a galvanic cell

i. reduction occurs at cathode

ii. oxidation occurs at anode

iii. electrons flow from anode to cathode

iv. all statements are correct

c. Which one of the following is not a function of a salt bridge?

i. To allow the flow of cations from one solution to the other

ii. To allow the flow of anions from one solution to the other

iii. To allow electrons to flow from one solution to the other

iv. To maintain electrical centrality of solution

d. For the electro chemical cell

$M/M^+//X/X$, $E°\ (M^+/M) = 0.44$ V and $E°\ (X/X^-)$ is 0.33 V from this data one can deduce that

i. $M^+ + X \rightarrow M^+ + X^-$ is spontaneous

ii. $M^+ + X^- \rightarrow M + X$ is spontaneous

iii. $E°$ cell = 0.77 V

iv. $E°$ cell = –0.77 V

e. $E°$ of some oxidising agents are given below

a.	$I_2 + 2e \rightarrow 2I^-$	$E° = +0.54$ V
b.	$MnO_4^- + 8H^+ + 5e^- \rightarrow Mn^{2+}$	$E° = 1.52$ V
c.	$Fe^{+3} + e \rightarrow Fe^{+2}$	$E° = 0.77$ V
d.	$Sn^{+4} + 2e \rightarrow Sn^{+2}$	$E° = 0.1$ V

Select

i. Strongest oxidant　　ii. weakest oxidant

iii. Strongest reductant　　iv. weakest reductant

Select the spontaneous change from

i. $Sn^{+4} + 2Fe^{2+} \rightarrow Sn^{2+} + 2Fe^{3+}$　　ii. $2Fe^{2+} + I_2 \rightarrow 2Fe^{3+} + 2I^-$

iii. $Sn^{+4} + 2I^- \rightarrow Sn^{2+} + I_2$　　iv. $Sn^{+2} + I_2 \rightarrow Sn^{+4} + 2I^-$

Q.3 Four metallic elements A, B, C and D have $E°_{RP}$ as – 0.40, +0.40, + 0.54 – 0.14 and +1.36 V respectively. Arrange in order of decreasing activity of metals.

Q. 4 Arrange Mg, Zn, Cu and Ag in order of decreasing R.P.

$Cu + 2Ag^+ \rightarrow Cu^{+2} + 2Ag$, $Mg + Zn^{+2} \rightarrow Mg^{+2} + Zn$, $Zn + Cu^{+2} \rightarrow Zn^{+2} + Cu$

Q. 5 Two metals A and B has $E°_{RP} = 0.76$ V and + 0.80 V respectively, which liberate H_2 from H_2SO_4.

Q.6 I_2 and Br_2 are added in a solution containing I^- and Br^-. What reaction would occur, if $I_2 + 2e^- \rightarrow 2I^-$ E° = 0.54 V; $Br_2 + 2e^- \rightarrow 2Br^-$ E° = 1.09 V.

Q.7 Define Std Red potential, E° cell, Std H electrode, Reducing agent.

Q.8 Predict whether the following redox feasible under sold condition or not

Sn^{2+} (ag) + Cu(s) $\rightarrow$ Sn(s) + Cu^{2+} (ag)

E° Sn^{2+}/Sn = –0.136 V   E° Cu^{2+}/Cu = 0.34 V

Q.9 Calculate pot of the cell

Zn | Zn^{2+} || Pb^{2+} | Pb

1M) (1M)

E° Pb^{2+} / Pb = –0.12 V

E° Zn^{2+}/Zn = –0.76 V

Q.10 Cell is prepared by dipping Cu in $CuSO_4$ 1M and in 1 M $NiSO_4$.

E° red pot for Cu^{+2}/Cu = +0.34 V, F° Ni^{2+} | Ni = –0.25

a. Which is anode, which is cathode?
b. Cell reaction
c. Cell representation
d. EMF?