Chemistry exam (general secondary certificate in Sudan 2011

Answer five questions only:

First Question:

A) Choose the correct answer:
1. On electric discharge of gases, ………… deflects towards anode.
   (Alpha particle – cathode ray – gamma ray – X-ray)
2. On dissolving 5 moles of NaCl in 10 of water , the concentration of solution equals to ……… mole/liter
   (0.05   -   5 - 0.5 - 50)
3. The type of bond formed between water molecules is …………… bond
   (hydrogen – ionic – coordinate – metallic)
4. Cesium salts change the non-luminous Bunsen flame into …………… colour
   (purple – red   – golden yellow –   bluish violet)
5. The chemical name of siderite is ……………
   (hydrated iron oxide – anhydrous iron oxide – iron II carbonate – black iron oxide)

B) Write down the balanced chemical equation that represent how to obtain:
1. Benzamide from toluene.
2. Ethylene from sodium ethoxide.

Second Question:

A) write down the scientific reasons for:

1. Atomic radius of chloride ion Cl^- is bigger than that in chlorine atom.
2. The colour of ammonium chloride changes into red on adding drops of methyl orange.
3. Cementite is an intermetallic alloy.
4. The reaction between ethyl alcohol and ethanoic acid is reversible reaction.

B) Compare between:
1. Electron affinity – electronegativity.
2. Auf-bau principle - Hund's rule.
3. Organic compounds - inorganic compounds (according to melting points – solubility)

Thrid Question:

A) Write down the scientific term for the following statements:
1. A pure simple matter can not be analyzed by known chemical methods.
2. Number of positive or negative charges on an atom would have in a compound, be it ionic or covalent.
3. Type of bond formed in which the source of the electrons of the chemical bond from one atom.
4. Quantity of electricity required to ppt. or dissolving the equivalent weight of any element by electrolysis.

B) Write the scientific name and the structural formula for the chemical substance which be used in:
1. Preventing the growth of bacteria on food.   2- Treatment of burns

C) Calculate the solubility product K_{sp} for calcium phosphate $Ca_3(PO_4)_2$ which is sparingly soluble in water, if the concentration of calcium ions equals to (1×10^{-8}) mole/liter and the concentration of phosphate ions equals to (0.5×10^{-3}) mole/liter.
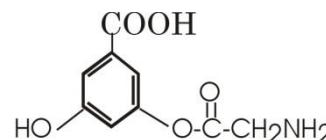
Fourth Question:

A) If you are provided with: iron fillings – diluted hydrochloric acid – ammonium hydroxide – distilled water, how can you get (with the help of balanced chemical equation): iron (II) hydroxide.

B) What is the role of the following scientists for the progress of chemistry:
   Wohler –Avogadro – Heisenberg

C) Study the functional groups in the following compound , then answer the questions:
Which function group is responsible for:

1- Produce effervance on adding the compound to sodium bicarbonate.
2- Production of violet colour on adding iron III chloride.
3- Forming ester with alcohol.

D) Explain the oxidation and reduction for zinc and copper in the following reaction:
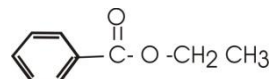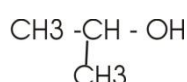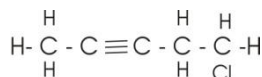
$$Zn + CuSO_4 \longrightarrow ZnSO_4 + Cu$$
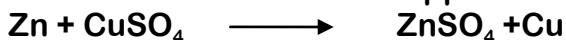
Fifth Question:

A) What is meant by:

1- Faraday's first law   2-Gay and Lussac law

B) Write the IUPAC name for these compounds:

C) Choose from column (A) what suit for columns (B) and (c), then write correct statement:

(A)	(B)	(C)
1- Nitric acid 2- Potassium super oxide 3- Washing soda	a- Hydrated sodium carbonate b- Exists as appetite c- Used in nitrogenous oxides d- Reacts with CO_2 and produces O_2	i- Used in purifying closed atmosphere. ii- Is prepared by heating nitrate salt with conc. H_2SO_4 iii- Used for removing water hardness iv- Used in manufacture of dyes

D) Calculate the equilibrium constant Kp in the following reaction:

$$N_2 + 3H_2 \longrightarrow 2NH_3 \ , \ \Delta H = 92kg$$
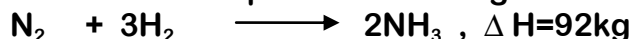
If the pressure of nitrogen gas equals to 2 atm. P., and the pressure of hydrogen gas equals to 6.8 atm. P.,
the pressure of ammonia gas equals to 0.4 atm. P.write the comment on the value of Kp , how to increase the products.

Sixth Question:

A) What is the type of hybridization ,and the value of angle between hybridized orbitals in : methane – acetylene

B) Draw a labeled diagram for the apparatus used in preparation of ammonia gas in lab., and write the equation.

C) What is the scientific reason for:

1- 2gm of hydrogen occupies the same volume that be occupied by 32 gm of oxygen in S.T.P.
2- There is no free hydrogen ion in acid solution.

D) In electrolysis of sodium chloride solution, the electric current intensity passed equals to 2 ampere for 0.5 hours. Calculate the volume of chlorine gas evolved in STP (Cl = 35.45).

E) What is the function of :

1- Natural gas in midrex furnace.   2- Lime stone in high furnace.