2016
MATRICULATION EXAMINATION
DEPARTMENT OF MYANMAR EXAMINATION

CHEMISTRY   Time Allowed: 3 Hours
WRITE YOUR ANSWERS IN THE ANSWER BOOKLET
The symbols in this paper have their usual significance

SECTION (A)
(Answer ALL questions)

1. Write **TRUE** or **FALSE** for each of the following statements.   **(7 marks)**
    (a) The alkaline earth metals always exhibit an oxidation number of +1 in their compounds.
    (b) Reactions proceed faster at higher temperatures than at lower ones.
    (c) Equal volumes of all gases contain the same number of molecules at all conditions.
    (d) In the neutralization reaction, the heat change is due to the reaction between one mole of acid and one mole of base.
    (e) All elements in the same period have the same number of electron shells.
    (f) Silver has the highest conductance among the metals.
    (g) The preparation of a standard solution of sulphuric acid can be done directly.

2. Fill in the blanks with the correct word(s), phrase(s), term(s), unit(s), etc.,   **(7 marks)**
   as necessary.
    (a) All alkyl groups have a bond order or valence of _____.
    (b) At −10°C, nitrogen dioxide exists as a _____.
    (c) The main source of aluminium is the naturally occurring oxide known as _____.
    (d) A mixture of chlorine and _____ will explode when merely exposed to sunlight.
    (e) Some car bumpers are electroplated with chromium to prevent _____.
    (f) Sulphur trioxide is easily dissolved in 98% concentrated sulphuric acid to form _____.
    (g) Na_2CO_3 has an acidity of _____.

3. Select the correct word(s), notation(s), term(s), unit(s), etc., given   **(7 marks)**
   in the brackets.
    (a) Faraday's laws express the [qualitative; volumetric; quantitative] results of electrolysis.
    (b) In a titration, a solution of known concentration is added gradually from a [pipette; burette; conical flask].
    (c) Reduction is the removal of [hydrogen; oxygen; nitrogen] from a substance.
    (d) The undissolved substance in sea water is [KCl; $CaSO_4$; $MgSO_4$].
    (e) A negative catalyst is a (an) [biocatalyst; inhibitor; intermediate].
    (f) 0.1 mole of hydrogen gas contains [0.0602×10^{23} molecules; 6.02×10^{23} molecules; 0.602×10^{23} molecules].
    (g) Ionic compounds are usually soluble in [benzene; water; ether].

[P.T.O.

4. Match each of the items in **List A** with the appropriate items **(7 marks)**
   given in **List B**.

List A	List B
(a) Glucose dissolved in water	(i) has a replaceable hydrogen
(b) Gold and silver	(ii) bleaches colouring matter by reduction
(c) Dinitrogen oxide	(iii) cannot bleach
(d) Sulphur dioxide	(iv) used for ripening fruit
(e) Iodine	(v) are very unreactive
(f) Hydrogensulphate ion	(vi) cold to touch
(g) Ethene	(vii) used as an anaesthetic

5. Define the following: **(8 marks)**
   - (a) Conductor
   - (b) Heat of formation
   - (c) Redox reaction
   - (d) Graham's law of gaseous diffusion
   - (e) A weak acid
   - (f) Essential electronic structure
   - (g) Photochemical reaction
   - (h) Primary standard

SECTION (B)

6. Answer **ALL** questions. **(12 marks)**

   (a) Select and give reasons which one has the larger radius from the following pair.
   Na and Na^+

   (b) What is the mass of oxygen gas enclosed in 11.2 dm^3 at STP? (O = 16)

   (c) Write down the electrode reactions for the electrolysis of aqueous sodium hydroxide solution using platinum electrodes.

   (d) Calculate the oxidation number of phosphorus in PCl_5 and P_2O_5.

   (e) Write full structural formulae for the two isomers of butane and name them.

   (f) Write an equation for the reaction of urea in the soil. What is the reason for the application of urea to the soil?

7. Answer any **FIVE** questions. **(20 marks)**

(a) An atom A has an atomic number of 6, whereas an atom B has an atomic number of 9.

    (i) Write down their complete electronic structures.

    (ii) Give their positions in the periodic table.

    (iii) What type of bond can be formed between A and B?

    (iv) Draw the electron dot-cross structure of the compound formed.

(b) The volume of a certain mass of gas collected over water is 230 cm^3 at 12°C and 760.5 mmHg. Vapour pressure of water at 12°C is 10.5 mmHg. What would be the volume of dry gas at 17°C and 770 mmHg?

(c) An electric current is passed in turn through solutions of silver nitrate and copper (II) sulphate in series. If 4.5 g of silver were deposited at the cathode of the first cell, calculate the mass of copper deposited in the second cell.
(Ag = 108, Cu = 63, 1F = 96500 C)

(d) Balance the following redox reactions using either oxidation number method or ion-electron (half-reaction) method.

    (i) $H_2SO_3 + HNO_3 \longrightarrow H_2SO_4 + H_2O + NO$

    (ii) $MnO_4^- + NO_2^- + H_2O \longrightarrow NO_3^- + MnO_2 + OH^-$

(e) (i) Why is chemical equilibrium referred to as a "dynamic equilibrium" ?

    (ii) Using Le Chatelier's principle, predict the effect of increasing the pressure on the following equilibrium. Give reason for your answer.

      $4NH_3(g) + 5O_2(g) \rightleftharpoons 4NO(g) + 6H_2O(l)$

(f) (i) Explain the meaning of the term alloy as applied to steel.

    (ii) Complete the following equations in **symbols** only.

      $Fe_2O_3(s) + Al(s) \longrightarrow$?

      $Cu_2S(s) + O_2(g) \longrightarrow$?

(g) Write equations in **words** and **symbols** for the following reactions.

    (i) Heating calcium carbide with nitrogen at 1000°C

    (ii) Action of cold dilute nitric acid on tin

(h) (i) What monomer will polymerize to produce PVC? Write the equation.

    (ii) Explain the term "thermoplastic polymers" with an example.

8. Answer any **FOUR** questions. **(32 marks)**

   (a) (i) Define "Lewis base" by given a suitable example. Write an appropriate acid-base reaction by using the example you provided.

     (ii) Calculate the pH of a buffer solution which is made by dissolving 0.05 mole of methanoic acid ($K_a = 1.8 \times 10^{-4}$) and 0.025 mole of sodium methanoate in 500 cm^3 of solution.

   (b) (i) Explain an exothermic reaction with an example.

     (ii) Calculate the heat of formation of gasoline, $C_8H_{18}(l)$ if its heat of combustion is -5434 kJmol^{-1}. The heats of formation of $CO_2(g)$ and $H_2O(l)$ are -393 kJmol^{-1} and -283 kJmol^{-1}, respectively.

   (c) (i) Outline an example to illustrate the fermentation of glucose.

     (ii) What happens when ethene ozonide is decomposed with water?

     (iii) What product would you expect when ethyne is passed into dilute sulphuric acid containing mercury (II) sulphate at 60°C?

     (iv) How would you obtain popane from propylene?

   (d) (i) Distinguish between propane and propyne. Give the relevant equations.

     (ii) Compound "A" is formed by the reaction of ethanol with HCl in the presence of anhydrous zinc chloride. What is compound "A" ? Write down the chemical equation.

     (iii) Describe the various crude oil fractions by fractional distillation of crude oil.

     (iv) What are the uses of LPG and CNG in Myanmar?

   (e) Describe the Manufacturing of chlorine by electrolytic process.

   (f) Write the balanced equations (**words and symbols**) for the laboratory preparations of nitrogen dioxide and ammonia gases. (Any **one method** for each gas)
State the collection methods and their respective reasons.

   (g) Calculate the molarity of sodium carbonate solution prepared by adding 100g of pure sodium carbonate to sufficient water to make 1.5 dm^3 of solution. 25 cm^3 of this solution was required to neutralize 24 cm^3 of sulphuric acid solution. What is the concentration of sulphuric acid solution?
(H = 1, C = 12, O = 16, Na = 23, S = 32)

   (h) Write a process for the extraction of magnesium from sea water.

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