THE OPEN UNIVERSITY OF SRI LANKA
B.Sc DEGREE PROGRAMME-2006/2007
CHU 1221 – BASIC PRINCIPLES OF CHEMISTRY
ASSIGNMENT TEST I1I (NBT)

DATE: 29 th January 2007 **TIME- 3.30 p.m TO 5.00 p.m**

This test paper consists of 10 short answer questions and 15 multiple choice questions.

Answers to the short answer questions should be written in the spaces given. Additional sheets w not be graded.

1. **By writing relevant chemical equations** identify species which can act as an **Arrhenius acid** (in water).

   (i) HCl (ii) NaCl (iii) KOH (iv) HCO_3^- (v) H_2SO_3

   (07 marks)

2. Gastric juice, the digestive fluid produced in the stomach, contains hydrochloric acid. A suspensi solid $Mg(OH)_2$ in aqueous medium is sometimes used to neutralize excess of stomach acid. W complete **balanced chemical equation** for the neutralization reaction and **identify the acid – conjugate base and base – conjugate acid pairs.**

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   acid ---------- conjugate base ---------- ; base ---------- conjugate acid ---------

   (06 marks)

3. The concentration of hydrochloric acid secreted by the stomach after a meal is about 1.2×10^{-3} m dm^{-3}. What is the pH of stomach acid?

   (05 marks)

4. Identify the Lewis acid and the Lewis base in each of the following reactions. State the basis of yo selection.

(i) $(CH_3)_3N(g) + BF_3(g) \longrightarrow (CH_3)_3NBF_3(s)$ (ii) $Zn^{2+}(aq) + 4NH_3(aq) \longrightarrow [Zn(NH_3)_4]^{2+}(aq)$

(i) Lewis acid ---------- Lewis base ----------

(ii) Lewis acid ---------- Lewis base ----------

(08 marks)

5. What are the characteristic hybrid orbitals employed by

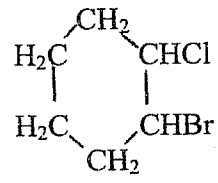
(i) carbon in an alkane (ii) carbon in a double bond in an alkene

(iii) carbon in the benzene ring (iv) carbon in a triple bond in an alkyne

(i) ---------- (ii) ---------- (iii) ---------- (iv) ----------

(08 marks)

6. Does the following molecule exist (i) in geometrical isomers?(ii) in optical isomers? Give reasons



Geometrical------ Optical ----------

Reasons (i) ----------

(ii) ----------

(06 marks)

7(a) Draw the Newman projections of (i) the **most stable** staggered conformation (ii) **least stable** eclipsed conformation of ICH_2CH_2Br.

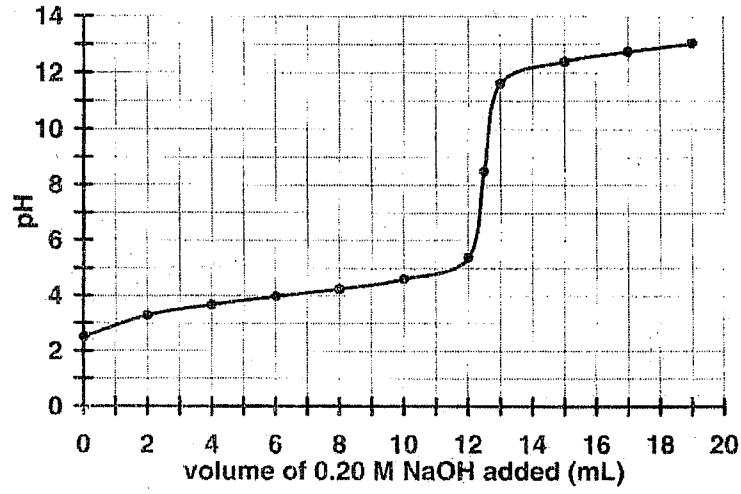
(i) the most stable staggered conformation

(ii) least stable eclipsed conformation

(b) Give reasons as to why the conformational isomers of propane cannot be separated at room temperature.

(10 marks)

Use the titration curve below for a weak monoprotic acid to answer questions 8and 9.



8. If the titration curve was obtained by titrating a 25.00 mL sample of the weak acid, what is the concentration of the weak acid?

(10 marks)

9. Out of the given indicator/s which is/are the most suitable one/s for the titration? Give reasons.

Indicator	**pH range**
Bromocresol green	3.8- 5.8
Methyl red	4.1- 6.0
Methyl orange	3.1- 4.4
Phenol red	6.8- 8.9

Suitable indicator ----------

Reasons ----------

(05 marks)

10. Consider the reaction in which solid Ag_2O decomposes to Ag(s) and $O_2(g)$.

$Ag_2O(s) \longrightarrow 2Ag(s) + \frac{1}{2} O_2(g)$ $\quad \Delta H^0 = 31 \text{ kJ mol}^{-1}$; $\Delta S^0 = 67 \text{ J K}^{-1}$

Over what temperature range is this reaction spontaneous?

(05marks)