ICSE-2000

Section A (40 Marks)   (Attempt all questions from this section)

Question 1

(a) From the following list of substances, choose the one substance in each [6]
     case which matches the description (i) to (vi) given below. (write down the
     names exactly as they are given in the list.)

     (Do not write formulae)

     Ammonium nitrate, calcium hydrogen carbonate, copper carbonate, lead
     carbonate, lead nitrate, potassium nitrate, sodium carbonate, sodium
     hydrogen carbonate, zinc carbonate

(i)   A hydrogen carbonate which exists in the solid state. _____.

(ii) A carbonate not decomposed by heat. _____.

(iii) A green coloured carbonate which turns black on _____.
      heating.

(iv) A nitrate which gives off only oxygen when heated. _____.

(v)   A nitrate which on heating decomposes into _____.
      dinitrogen oxide (nitrous oxide) and steam.

(vi) A nitrate which gives off oxygen and nitrogen dioxide _____.
      when heated.

(b)

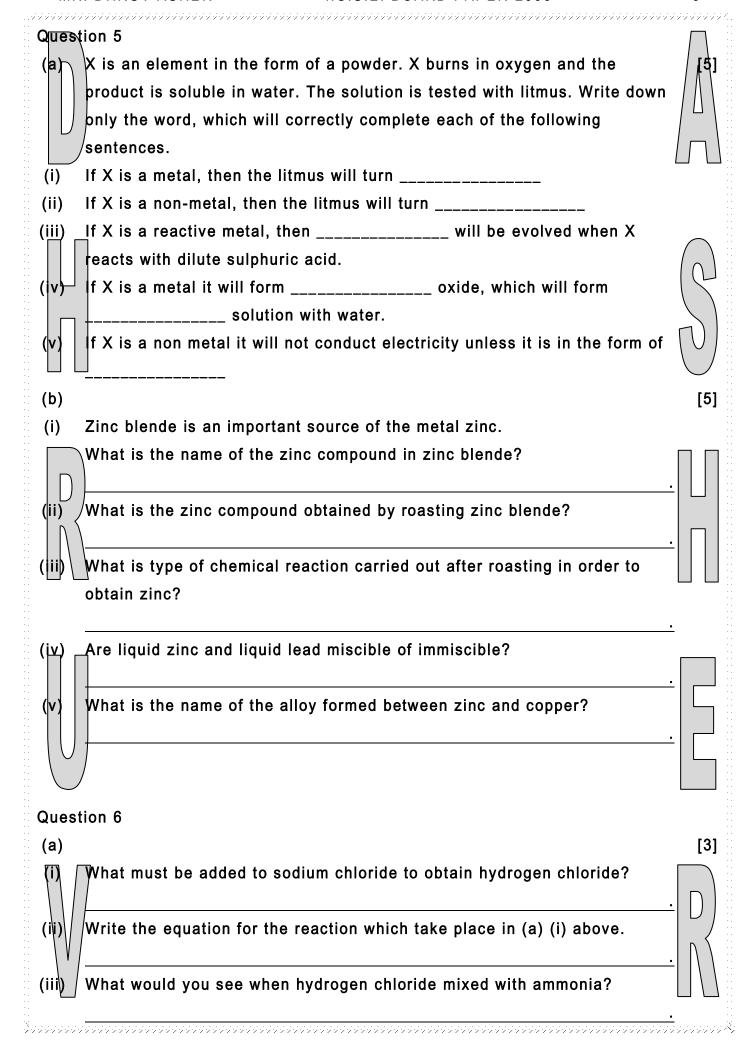(i)   What is the volume (measured in dm³ or litre) occupied by one mole of a
      gas at stp?

      _____.

(ii) 112 cm³ (at STP) of a gaseous fluoride of phosphorous has a mass of 0.63 [6]
      g. Calculate the relative molecular mass of fluoride. If the molecule of the
      fluoride contains only one atom of phosphorous, then determine the
      formula of the phosphorus fluoride. (F= 19, P=31)

(c)

(i) What is an electrolyte?

_____ .

_____ .

_____ .

(ii) Classify following substances as: [6]

Strong Electrolyte, Weak Electrolyte, Non Electrolyte.

Acetic acid, ammonium chloride, ammonium hydroxide, carbon tetrachloride, dilute hydrochloric acid, sodium acetate, dilute sulphuric acid.

Strong Electrolyte	_Weak Electrolyte_	_Non Electrolyte._
_____ .	_____ .	_____ .
_____ .	_____ .	_____ .
_____ .	_____ .	_____ .
_____ .	_____ .	_____ .

(d) Some methods used for the laboratory preparation of salts are: [6]

A : metal + acid

B : carbonate + acid

C : Precipitation (double decomposition)

D : Direct combination

E : Titration

Copy and complete the following table:

Salt	Method of preparation
Ammonium sulphate	
Calcium carbonate	
Iron (III) chloride	
Lead nitrate	
Zinc sulphate	

(e) Copy the complete the following table which summarizes the effect of   [5] adding a small amount of sodium hydroxide to various salt solutions followed by an excess of the reagent, and then adding ammonium hydroxide(ammonia solution) in a small amount followed by an excess to another sample of each of the salt solution.

Solution	Effect of adding Sodium hydroxide solution		Effect of adding ammonium hydroxide solution	
	Small amount	In excess	Small amount	In excess
Calcium nitrate			No precipitate	No change
Zinc nitrate				
Lead nitrate				

(f)   What do you see when: (you are not required to say what is happening,   [5]
nor is it necessary to name the products)

(i)   Concentrated nitric acid is added to copper.

_____ .

(ii)   Concentrated sulphuric acid is added to copper sulphate 5-water.

_____ .

(iii)   Concentrated hydrochloric acid is added to lead (IV) oxide with warming.

_____ .

(g)   Determine the empirical formula of the compound whose composition by   [2]
mass is 42% nitrogen, 48%oxygen, and 9% hydrogen. (N=14, O=16, H=1)

Ele	%	RAM	Atomic ratio	Simplest ratio

(h)   Write balanced equation for following reactions: [4]

(Give equation for formation of the normal salt)

(i)   Iron (III) chloride solution with sodium hydroxide solution.

_____ .

(ii)   _Chlorine and cold dilute sodium hydroxide solution._

(iii)   Zinc and sodium hydroxide solution.

_____ .

(iv)   Sulphur dioxide and sodium hydroxide solution.

_____ .

Section – B (40 marks)   (Attempt any four questions from this section)

Question 2

(a)   [7]

(i)   State the number of elements in period 1, period 2, and period 3 of the periodic table.

_____ .

(ii)   Name the elements in period 1. _____ .

(iii)   What happens to atomic size of element on moving from left to right in a period?

_____ .

(b)   [3]

(i)   What is the common feature of the electronic configurations of the elements at the end of period 2 and period 3?

_____ .

(ii)   If an element is in group 7 (group 7A) is it likely to be metallic or non metallic in character?

_____ .

(iii)   Supply the missing word from those in brackets.

If an element has one electron in its outermost energy level (shell) then it is likely to be _____ (metallic/non – metallic).

Question 3

(a)   *Explain what is meant by the term allotropy; using the allotropic forms of sulphur to illustrate your answer.*   [3]

(b)   State how you can obtain: [3]

(i)   Sulphur dioxide from sulphur

_____ .

(ii)   Hydrogen sulphide from iron (II) sulphide.

_____ .

(c)   The bacteria obtain their energy by oxidizing sulphur, producing Sulphuric   [4]
acid as by-product. In the laboratory, or industrially, the first step in the conversion of sulphur to sulphuric acid is to produce sulphur dioxide (see (b)(i) above). Then sulphur dioxide is converted to sulphur trioxide which reacts with water producing sulphuric acid.

(i) Name one catalyst used industrially which speeds up the conversion of sulphur dioxide to sulphur trioxide._____.

(ii) Write the equation for the conversion of sulphur dioxide to sulphur trioxide. Why does this reaction supply energy?

_____.

_____.

(iii) What is the name of the compound formed between sulphur trioxide and sulphuric acid?

_____.

Question 4

(a) Give the names and structural formulae of: [4]

(i) A saturated hydrocarbon.

_____.

(ii) An unsaturated hydrocarbon with double bond.

_____.

(b) Copy and complete the following sentence: [2]

A saturated hydrocarbon will undergo _____ reactions whereas the typical reaction of an unsaturated hydrocarbon is _____

(c)   [4]

(i) Write the equation for the laboratory preparation of Ethyne (acetylene) from calcium carbide

_____.

(ii) What is the special feature of the structure of Ethyne?

_____.

(iii) What would you see when Ethyne is bubbled through a solution of bromine in carbon tetrachloride?

_____.

(iv) Name the addition product formed between Ethene and water.

_____.

Question 5

(a)   X is an element in the form of a powder. X burns in oxygen and the   [5]
       product is soluble in water. The solution is tested with litmus. Write down
       only the word, which will correctly complete each of the following
       sentences.

(i)   If X is a metal, then the litmus will turn _____

(ii)   If X is a non-metal, then the litmus will turn _____

(iii) If X is a reactive metal, then _____ will be evolved when X
       reacts with dilute sulphuric acid.

(iv)   If X is a metal it will form _____ oxide, which will form
       _____ solution with water.

(v)   If X is a non metal it will not conduct electricity unless it is in the form of
       _____

(b)   [5]

(i)   Zinc blende is an important source of the metal zinc.
       What is the name of the zinc compound in zinc blende?
       _____ .

(ii)   What is the zinc compound obtained by roasting zinc blende?
       _____ .

(iii) What is type of chemical reaction carried out after roasting in order to
       obtain zinc?
       _____ .

(iv)   Are liquid zinc and liquid lead miscible of immiscible?
       _____ .

(v)   What is the name of the alloy formed between zinc and copper?
       _____ .

Question 6

(a)   [3]

(i)   What must be added to sodium chloride to obtain hydrogen chloride?
       _____ .

(ii)   Write the equation for the reaction which take place in (a) (i) above.
       _____ .

(iii) What would you see when hydrogen chloride mixed with ammonia?
       _____ .

(b) Hydrogen chloride dissolves in water forming an acidic solution.   [4]

(i) Name the experiment which demonstrates that hydrogen chloride is very soluble in water.

_____ .

(ii) Give three distinct tests(apart from using an indicator) you would carry out with this solution to illustrate the typical properties of an acid.

_____ .

_____ .

_____ .

(c) Write the equation for the reaction of hydrochloric acid with each of the following: [3]

(i) Bleaching powder.

_____ .

(ii) Lead nitrate solution.

_____ .

(iii) Manganese (IV) oxide.

_____ .

Question 7

(a) If 112 cm^3 of hydrogen sulphide is mixed with 120 cm^3 of chorine at STP what mass of sulphur is formed? $H_2S + Cl_2 \rightarrow 2HCl + S$ [2]

_____ .

_____ .

_____ .

_____ .

_____ .

(b) Washing soda has the formula $Na_2CO_3 \cdot 10H_2O$. What mass of anhydrous sodium carbonate is left when all the water of crystallization is expelled by heating 57.2g of washing soda?   [4]

_____ .

_____ .

_____ .

_____ .

_____ .

(c) When excess lead nitrate solution was added to a solution of sodium   [4]
sulphate, 15.15g of lead sulphate were precipitated. What mass of sodium
sulphate was present in the original solution?

(H=1; C= 12; O=16; Na=23; S=32; Pb=207):

Na_2SO_4 + $Pb(NO_3)_2$ → $PbSO_4$ + $2NaNO_3$

_____ .

_____ .

_____ .

_____ .

_____ .

_____ .

_____ .

_____ .

_____ .

_____ .