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SB-3510

M. Sc. (Part - II) Examination

March / April – 2011

Analytical Chemistry : Paper - III

(Applied Analysis)

Time : **3** Hours] [Total Marks :

Instructions :

(1)

નીચે દર્શાવેલ ☛ નિશાનીવાળી વિગતો ઉત્તરવહી પર અવશ્ય લખવી.
Fillup strictly the details of ☛ signs on your answer book.

Name of the Examination :

☛ **M. Sc. (Part - 2)**

Name of the Subject :

☛ **Analytical Chemistry : Paper - 3**

☛Subject Code No. : **3 5 1 0** ☛Section No. (1, 2,.....) : **Nil**

Seat No. :

Student's Signature

(2) All questions carry equal marks.

(3) All questions are compulsory.

(4) Give balance equations where necessary.

1 (a) (i) Describe electro gravimetric determination of copper and lead in Brass. Explain the function of nitric acid and urea in the process.

(ii) Give the composition of portland cement. How calcium content of cement can be determined ?

(b) (i) Describe the analysis of limestone for its calcium carbonate content.

(ii) How will you analyze magnesite ore for its major constituent ?

OR

(a) (i) Describe the determination of copper and nickel in a sample of German-Silver.

(ii) How can iron content of cement be determined using spectrophotometric method ?

(b) (i) Explain the simultaneous determination of chromium and manganese in steel using spectrophotometry.

(ii) Describe the determination of MnO_2 content in pyrolusite ore.

(c) A 0.8040 g sample of an iron ore is dissolved in acid. The iron is then reduced to Fe^{2+} and titrated with 47.22 ml of 0.02242 M $KMnO_4$ solution. Calculate % Fe (55.847 g/mol) in the sample

$$MnO_4^- + 5Fe^{2+} + 8H^+ \rightarrow Mn^{2+} + 5Fe^{3+} + 4H_2O$$

2 (a) (i) Describe the method to determine fluoride content of polluted water.

(ii) Describe the determination of COD using conventional method. Explain the interference in the determination. How is it eliminated ?

(b) Describe the chemiluminiscence method to determine NO_x in air sample.

OR

(a) (i) Describe the method to determine BOD in a polluted water. State its permissible limit.

(ii) Describe the methods of collecting sample of air from polluted area.

(b) How SO_2 and O_3 content in air sample can be determined using iodometric method.

(c) The CO in a 20.3 L sample of gas was converted to CO_2 by passing the gas over iodine pentoxide heated to 150°C. The iodine distilled at this temperature and was collected in an absorber containing 8.25 ml of 0.01101 M $Na_2S_2O_3$. The excess $Na_2S_2O_3$ was back titrated with 2.16 ml of 0.00947 mJ_2 solution. Calculate the number of milligrams of CO (28.01 g/mol) per liter of sample

$$I_2O_{5(s)} + 5CO_{(g)} \rightarrow 5CO_{2(g)} + I_{2(g)}$$

$$I_2 + 2S_2O_3^{2-} \rightarrow 2I^- + S_4O_6^{2-}.$$

3 (a) Explain the principle of UV spectrophotometric determination of aspirin.

(b) (i) Define saponification value and RM value of an oil.

(ii) How soft drink can be analyzed using HPLC?

OR

(a) Describe fluorimetric determination of quinine in an antimalarial tablet.

(b) (i) Describe Bendict's method for the determination of reducing sugar in a sample of urine.

(ii) Why sodium fluoride is often added to blood samples collected for glucose analysis ?

(c) The drug tolbutamine (F.W.270) has molar absorptivity of 703 at 262 nm. One tablet is dissolved in water and diluted to 2 litre. If the solution exhibits an absorbance in uv region at 262 nm equal to 0.687 in a 1.0 cm cell, how many grams of tolbutamine are contained in the tablet ?

4 (a) Give classification of detergent. Compare the cleansing action of detergent with soap.

(b) (i) How will you determine nitrite nitrogen content in a fertilizer sample ?

(ii) How GC is useful in determination of traces of pesticides ? Give one illustration.

OR

(a) How will you determine phosphates and borates in a sample of detergent ?

(b) (i) Describe the determination of moisture and biuret content in urea sample.

(ii) Explain HPLC method for separation and determination of phosphorous containing pesticide.

(c) 0.3516 g sample of a commercial phosphate detergent was ignited to destroy the organic matter. The residue was treated with hot HCl to convert the P to H_3PO_4. The phosphate was precipitated as $MgNH_4PO_4 \cdot 6H_2O$. After being filtered and washed, the precipitate was converted to $Mg_2P_2O_7$ (222.57 g/mol). This residue weighed 0.2161 g. Calculate percent P (30.974 g/mol) in the sample.

5 (a) Describe the determination of calorific value of gaseous fuel.

(b) (i) Describe light scattering method for the determination of molecular weight of polymer.

(ii) Define number average and mass average molecular weight of polymer.

OR

(a) Describe the ultimate analysis of coal. How it differs from proximate analysis ?

(b) (i) Define glass transition temperature.

(ii) Describe osmotic pressure method for the determination of molecular weight of polymer.

(c) A 4.476 g sample of petroleum product was burned in a tube furnace and the SO_2 produced was collected in 3% H_2O_2. A 25.00 ml portion of the SO_2 produced was collected in 3% H_2O_2. A 25.00 ml portion of 0.00923 m NaOH was introduced into the solution of H_2SO_4 and the excess base was back titrated with 13.33 ml of 0.01007 M HCl. Calculate the parts per million of sulfur in the sample.

$SO_{2(g)} + H_2O_2 \rightarrow H_2SO_4$