ESTIMATION OF IRON IN DIFFERENT IRON TABLETS

PROJECT DISSERTATION

Submitted to **University of Kerala** in the partial fulfilment of requirements for the award of Degree of Bachelor of Science in Chemistry.

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DEPARTMENT OF CHEMISTRY

CERTIFICATE

This is to certify that the project entitled "***Estimation of iron content in different iron tablets***" Is an authentic record of the dissertation work carried out by Gowri Gopan under my guidance in partial fulfillment of the requirement for the first degree program in chemistry under CBCSS of the university of Kerala and further that no part in this has been presented before for the award of any other degree.

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DECLARATION

We hereby declare that the dissertation entitled "***Estimation of iron content in different iron tablets*** " is an authentic record of the dissertation work carried out by us under the guidance of Dr Sree Remya T S,Assistant Professor,Department of Chemistry,Sree Narayana college Kollam in partial fulfilment of the requirements for the award of the first degree program in chemistry, university of Kerala and that no part of this work has previously been presented for the award of any other degree in any university.

Gowri Gopan

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CHAPTER -1

Introduction

1.1 Iron is the most abundant element in the earth crust. About 70 percentage of iron is found in the RBC of blood called hemoglobin, which plays a vital role in transportation of oxygen from lungs to various tissues in the body.

Iron is a chemical element with symbol (Fe) and atomic number 26. It is a metal in first transition series. In plants iron plays an important role in production of chlorophyll .It is the tenth most abundant element in universe.

1.2 Iron in biological System

Iron is essential in virtually all living organism, it is required for the functioning of proteins and enzyme involved in many key biological process, including oxygen transport and activation, electron transfer, and substrate hydroxylation ,oxidation.

In human body, the richest organs in iron are the liver and spleen. The function of iron in the body is limited almost exclusively to the oxygen transport in the blood, through the haemoglobin.

An adult man absorbs about 5 mg of iron a day, while women absorbs slightly more to compensate the losses during menstruation or pregnancy. The absorption of iron is larger in children, exceeding 10 to 15mg a day .There are several ferrous salts, as the ferrous sulphate that are effective in treatment of anaemia(due to deficiency of iron) .

1.3 Uses of iron

It is used to manufacture steel and is used in civil engineering .Iron is used to make alloy steels like carbon steel. Iron is used in Haber process for producing ammonia.

Health benefits of iron

Treats anaemia, boost haemoglobin ,reduce fatigue, boost immunity, improve concentration, restores sleep.

1.4 Functions of iron

About 25 % of iron in the body is stored as ferritin,found in cells and circulate in the blood .The average adult male have only about t 1000 mg of stored iron ,whereas women have only 300 mg.

1.5 Physical properties of Iron

It rust in damp air, but not in the dry air .It dissolves readily in dilute acids. At room temperature ,the metal is in the form of a ferrite or Alpha form .At 910 degree Celsius, it changes to gamma iron ,which is soft in nature. It melts at 1536 degree Celsius ,and boils at 2861 degree Celsius.

The purpose of iron is to help RBC's carry oxygen to all parts of the body .Almost two third of the iron in your body is found in the haemoglobin the protein in RBC that carries oxygen to your body's tissues .Smaller amount of iron are found in the myoglobin, a protein that helps to supply oxygen to muscles and it's enzymes that assist biochemical reaction in cells. Heme proteins like cytochromes and certain non heme proteins necessary for electron transport chain and oxidative phosphorylation. Heme iron containing peroxidises required for phagocytosis and maintains immune competence.

1.6 Source of Iron

The richest sources of heme iron in the diet include lean meat and seafood. Dietary sources of nonheme iron include nuts, beans, vegetables and grain products. Breast milk contains highly bio available iron but in amounts that are not sufficient to meet the needs of infants older than 4-6 months.

Heme iron has higher bioavailability than iron, and other dietary components have less effect on the bio availability of heme than nonheme iron. Diets that include substantial amount of meat , sea food and vitamin C enhances the bioavailability of nonheme iron.

Whereas phylate and certain polyphenols in some non animal foods are inhibitors of Iron absorption. The absorption of nonheme iron is greatly influence by meal composition i.e.; almost all cereals and seafoods contain large amount of iron, which is essential for our body.

Still, some populations may have inadequate iron intakes, impaired absorption, or increased iron needs. Thus, they may be at risk of iron deficiency, which may lead to fatigue, dizziness, and weakness, among other symptoms.

There are numerous iron supplements available, each containing varying amounts of iron. Although they are typically in tablet form, some are also available as a liquid.

Vitamin C helps the body absorb iron more efficiently, so some manufacturers of iron supplements will add vitamin C to the formulation. According to the National Institutes of Health (NIH), the types of iron in supplements include:

ferrous sulfate

ferrous gluconate

ferric citrate

ferric sulphate

1.7 Iron deficiency

Iron deficiency is a condition resulting from too little iron in the body. It is the most common nutritional deficiency and the leading cause of anemia in the world. Iron deficiency at critical time of growth and development can result in premature birth, low birth weight babies, delayed growth and development dekyed normal infant activity and movement. It results in poor memory or poor mental functions. Lower IQs have been linked to iron deficiency during critical periods of growth.

Anemia-iron deficiency causes many disorderers. The popular disease caused by iron deficiency is iron deficiency anemia. It is due to lack of the mineral iron in the body. Iron is used to produce red blood cells which help store and carry oxygen in the blood. If we have fewer RBC than in normal the organs does not get much oxygen. Anemia due to iron deficiency is the main cause for this. If iron deficiency anemia is left untreated, it can make more susceptible to illness and infection, as a lack of iron affects the body's natural defense system. Pregnant woman with severe anemia is also very risk.

1)Fatigue is one of the most common symptoms of iron deficiency. This is due to less oxygen reaching body tissues, depriving them of energy.

2)Paleness in areas such as the face, lower inner eyelids, or nails may be a sign of moderate or severe iron deficiency. This is caused by lower levels of hemoglobin, which gives blood its red color.

3) Shortness of breath is a symptom of iron deficiency, since low hemoglobin levels mean the body isn’t able to transport oxygen to muscles and tissues effectively.

4) Headaches and dizziness could be a sign of iron deficiency

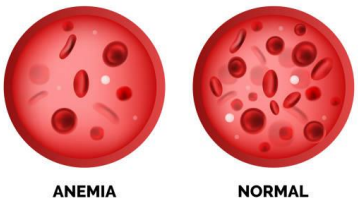
5) Noticeable heartbeats, also known as heart palpitations, can be another symptom of iron deficiency anemia.

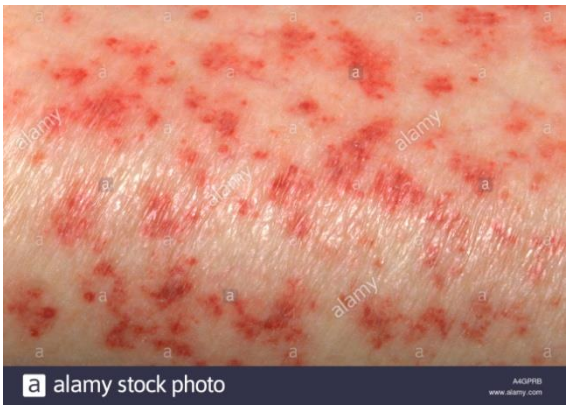
6) Skin and hair may receive less oxygen from the blood during iron deficiency, causing them to become dry and damaged. In more severe cases, this may lead to hair loss.

7) A sore, swollen, or strangely smooth tongue can be a sign of iron deficiency anemia. Cracks on the corners of the mouth can also be a sign.

8) Brittle or spoon-shaped nails can be an indicator of more severe iron deficiency anemia.

9) Other more generic signs of iron deficiency may include strange food cravings, feeling depressed, cold hands and feet, and an increased risk of infections.





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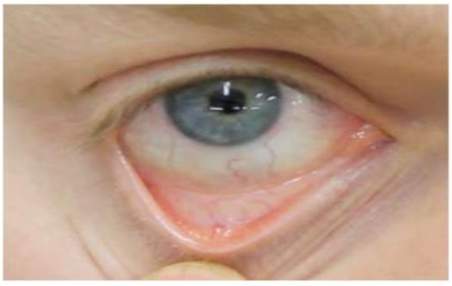

How iron deficiency is detected and diagnosed

The test used most often to detect iron deficiency includes haemoglobin, hematocrit which provides the percentage measures of RBC in the blood. Serumferritin, which indicates the amount of iron stored in the body and serum iron and iron binding capacity. The later measures are used to calculate transferrin-iron saturation percentage, a measure of iron transit in the serum. Serumferritin is a very important test because it helps distinguish between iron deficiency anemia and anemia of chronic disease. In case of iron deficiency anemia, iron supplements can be helpful, but in case of anemia of chronic disease, iron supplements could be harmful.A diagnosis of iron deficiency can be made when a person has both low haemoglobin and hematocrit and low serumferritin. Serum iron and transferrin iron saturation percentage will also below in as person has a normal haemoglobin, but below normal serum ferritin or transferrin saturation. Iron deficiency with anemia can occur when a person has low values of both serum ferritin and haemoglobin.

Iron overload disorders

Iron overload disorders are a group of medical conditions that cause the body to store excess iron. They include hereditary hemochromatosis, a genetic condition in which a person's body absorbs too much iron from foods and drinks.

Signs and symptoms may include:

Joint pain

Abdominal pain

Fatigue

Weakness

Diabetes

Loss of sex drive

Impotence

Heart failure

Liver failure

Bronze or gray skin color

Memory fog

Untreated, hereditary hemochromatosis can lead to a number of complications, especially in your joints and in organs where excess iron tends to be stored — your liver, pancreas and heart. Complications can include:

Liver problems. Cirrhosis — permanent scarring of the liver — is just one of the problems that may occur. Cirrhosis increases your risk of liver cancer and other life-threatening complications.Diabetes. Damage to the pancreas can lead to diabetes.

Heart problems. Excess iron in your heart affects the heart's ability to circulate enough blood for your body's needs. This is called congestive heart failure. Hemochromatosis can also cause abnormal heart rhythms (arrhythmias).

Reproductive problems. Excess iron can lead to erectile dysfunction (impotence), and loss of sex drive in men and absence of the menstrual cycle in women.Skin color changes. Deposits of iron in skin cells can make your skin appear bronze or gray in color.

Different methods for the estimation of iron

Redox titrations

The principle that governed the identification of iron (Fe^{2+}) in ion containing drugs, is the ability of iron(Fe^{2+}) to reduceStrong oxidising agents such as potassium permanganate ($KMnO_4$) to Mn^{2+} for which the iron itself is oxidised from Fe^{2+} to Fe^{3+}.At the end point of the reaction is associated to the formation of a persistent pale pink colour solution. As with acid-base titrations, a redox titration (also called an oxidation-reduction titration) can accurately determine the concentration of an unknown analyte by measuring it against a standardized titrant. use of $KMnO_4$ as a titrant is particularly useful, because it can act as its own indicator.

$$MnO^-_4 + 5Fe^{2+} + 8H^+ \longrightarrow Mn^{2+} + 5Fe^{3+} + 4H_2O$$

Dichrometry

Unlike permanganate, dichromate titrations require an indicator. The indicators used for the titrations are diphenylamine, diphenylbenzidine and diphenylamine sulfonate. The colour change for all three indicators is green to violet.

Prepare a standard dichromate solution by dissolving an accurately weighed sample of about 0.4 g in water and make up to 100 cm3 in a volumetric flask. Into flasks or beakers weigh out accurately duplicate portions of about 0.7 g of the iron(II) solid provided. Add 30 cm3 of dil. sulfuric acid, 100 cm3 of water, 7 cm3 of 85% phosphoric acid and 5 drops of diphenylamine sulfonate indicator. Titrate with dichromate to a purple colour. Calculate the percentage of iron in the solid.

$$Cr_2O_7^{2-} + 6Fe^{2+} + 14H^+ \longrightarrow 2Cr^{3+} + 6Fe^{3+} + 7H_2O$$

Determination of iron by thiocyanate colorimetry

A colorimeter is a device used in colorimetry. This device is most commonly used to determine the concentration of a known solute in a given solution by the application of the Beer Lambert law, which states that the concentration of a solute is proportional to the absorbance.

In this analysis the iron present in an iron tablet (dietary supplement) or a sample of food is extracted to form a solution containing Fe^{3+} (ferric) ions. To make the presence of these ions in solution visible, thiocyanate ions (SCN) are added. These react with the Fe^{3+} ions to form a blood-red coloured complex.

By comparing the intensity of the colour of this solution with the colours of a series of standard solutions, with known Fe^{3+} concentrations, the concentration of iron in the tablet or food samples may be determined.

$Fe^{3+} + SCN^{-} \longrightarrow (FeSCN)^{2+}$

Citrate Bicarbonate Dithionite (CBD procedure);The citrate bicarbonate dithionite (CBD) procedure is a widely acceptable extractive method for determination of total free iron.

Ferrozine method; The sample is digested with nitric acid and hydrochloric acid, and all forms of iron are converted to the ferric form. The ferrozine reagentforms a purple coloured complex with ferric ion, and the colour is proportional to the ironContent.

OBJECTIVE OF THE STUDY

1. Estimate the Iron content in different Iron Tablets

   In this work we have two different Iron tablets such as
   Livogen- Ferrous fumarate and folic acid Tablets BP
   Orofer XT- Ferrous Ascorbate and folic acid Tablets

2. Compare the amount of Iron content in these samples
3. To study the role of ligand in the complex on the accuracy of redox titration method.

ABSTRACT

Iron,the essential trace element and central metal of hemoglobin plays a vital role in the functioning of human body. In the present work, a comparative study of iron content in two different commercially available tablets is carried out by simple redox titration method. Tablets containing Ferrous ascorbate and ferrous fumarate were included in this study. The weight of elemental Fe^{2+} in (mg per g)of each tablet was also determined. $KMNO_4$ was used as the redox titrant. Based on the observations it is found that the tablet Livogen have the highest amount of iron (169 mg/g). Hence this tablet is most suitable for those groups lacking iron supplement mainly menstruating and pregnant women. The other tablet Orofer may be suitable for those who need low iron supplements just like infants. We suggest that the redox titration is a simple and convenient method for the estimation of iron in various samples (Fe should be in ferrous form)

Chapter – 2

3.2 Literature Review

1.Using Spectrophotometry to Determine the Iron Content in a Vitamin Tablet: The study of Iron Content in Vitamin Tablet using spectrophotometry was conducted by Timothy Lund on the month of April of 2019.The project mainly focused on determination of concentration of iron present in vitamin tablets as measured by spectrophotometer.The method used was the calculation of molar absorption power of Iron solution.For this by using O-phenanthroline solution, trisodium citrate solution, hydroquinone, Ethanol and deionised water, blank and standard iron solutions were prepared. A known standard solution of iron was also made up and experiment was conducted using spectrophotometer. Observations of absorbance of standard and blank solutions were noted and uncertainty was found. Using this findings, the content of Iron in vitamin tablet were determined.

2.Determination of iron by thiocyanate colorimetry : Researchers from University of Canterbury conducted a study of iron content in iron tablet using Thiocyanate colorimetry. For the purpose of study they used the method of colorimetry with ammonium thiocyanate. Standard ferric solution, Thiocyanate solution, iron tablet solution etc were prepared and colorimetrically analysed. Initially the ferric solution is analysed for various concentrations and graph is plotted against concentration and absorption. Then the sample of iron tablet is colorimetrically analysed for finding absorption and the respective concentration of iron in the sample is found from the graph.

3.Determination of Iron in Some Selected Iron Containing Tablets Using Redox Titration:

In September 2019,Nigerian scientists Muhammad Auwal Balarabeand Aliyu Zainab Folashade worked on determination of iron in certain iron tablet using the method of redox titration. For this, a comparative study of the determination of iron in iron tablets was carried out using Redox titration on five samples of capsule containing iron. The capsules were analyzed using Redox titration on five of the samples containing iron content in form of ferrous fumarate.The principle that governed the identification of iron (Fe^{2+}) in iron containing drugs, is the ability of iron (Fe^{2+}) to reduce strong oxidizing agents such as potassium permanganate [$KMnO_4$] to Mn^{2+}, for which the iron itself is oxidized from Fe^{2+} to Fe^{3+} and the end point of the reaction is associated to the formation of a persistent pale pink colour solution. Initial step was standardisation of $KmnO_4$ solution and there by determining the iron experiment was repeated for other tablets and results were compared.

4 **Ditermination of Iron in Natural and mineral waters by Flame atomic absorption spectrometry :** This work was conducted by Stasys Tautkus, Laura Steponeniene and Rolandas Kazlauskas Deparment of Analytical and Environmental Chemistry, Vilnius University , Simple methods for the determination of Fe in natural and mineral waters by flame atomic absorption spectrometry (AAS) are suggested. The results of the investigation of selectivity of the proposed AAS method proved that this procedure is not affected by high concentrations of other metals. The calibration graph for iron was linear at levels near the detection limit up to at least 0.10 g ml-1. For the determination of micro amounts of iron in mineral waters, an extraction AAS technique was developed. Iron was retained as Fe-8-oxyquinoline complex and extracted in tochloroform. The optimal conditions for the extraction of the iron complex were determined. The AAS method was applied to the determination of Fe in mineral waters and natural waters from different areas of Lithuania. The accuracy of the developed method was sufficient and evaluated in comparison with a photometric method. Theobtained results demonstrated that the procedure could be successfully applied for the analysis of water samples with satisfactory accuracy.

5. **Potentiometric sensor for iron (III) quantitative determination experimental and computational approaches:** This study was conducted by Somayeh Dadakhshan, Saeid Ahmadzadeh, Majidaghasi, Amirvasira.This work dealt with fabrication and validation of a new highly Fe^{3+} selective sensor based on benzo-18-crown-6 (b-18C6) using the potentiometric method. The proposed sensor revealed satisfactory performance for quantitative evaluation of Fe^{3+} trace amount in environmental samples. Also the sensor demonstrated an appropriate reproducibility with a rapid response time of 12 s and the suitable lifetime of 10 weeks. To validate the accurate response of the proposed sensor, AAS technique was applied for the determination of Fe^{3+} in real aqueous mediums such as drinking tap water and hospital wastewater sample after treatment by electrocoagulation process. Theoretical studies carried out using DFT/B3LYP computational level with 6-311G basis set to optimize the adsorption sites of Fe+3cationic species by b-18C6. The obtained adsorption energy with large negative value confirmed the formation of a stable complex.

6. There are various kinds of field tests for determining iron content. Several methods were studied by Healthbridge through this work and the major ones are;a) O-PHENANTHROLINE METHOD The principle of this method is, Ferrous ion (Fe^{2+}) in the salt reacts with 1,10 phenanthroline in an appropriate reaction mixture. Three molecules of phenanthroline chelate each atom of ferrous ion to form an orange-red complex. Ferric ion does not react. A pH between 2.9 and 3.5 insures rapid colour development in the presence of an excess of phenanthroline. There are no known interferences with salt or its common impurities.

b) **PHENANTHROLINE METHOD FOR FERROUS IRON-** In this method,to determine ferrous iron, acidify aqueous sample with 2 mL concentrated hydrochloric acid to prevent oxidation. Withdraw a 50 mL portion of the acidified sample into a 100 mL volumetric flask and add 20 mL phenanthroline solution and 10 mL ammonium acetate solution (buffer) with vigorous stirring. Dilute to volume and measure the colour intensity within 5 min.

c) **FERROZINE METHOD FOR TOTAL IRON** The procedure is based on a commercial portable kit including a spectrophotometer: Collect samples in acid washed glass or plastic bottles. To preserve samples, adjust the sample pH to 2.0 or less with nitric acid (about 2 mL per liter). Before testing digest samples in nitric/hydrochloric acid, then adjust the sample pH to 3 to 5 with ammonium hydroxide, ACS. Adjust wavelength of spectrophotometer to 562 nm. Fill a sample cell to the 25 mL mark with sample. Add the contents of one Ferrozine iron reagent pillow to the cell (the prepared sample). Swirl to mix. Let stand for five minutes. Read the display in mg/L Fe ferrozine.

Chapter - 3

3.1Materials and Methods

I. Different Iron Tablets
II. Distilled Water
III. H_2SO_4
IV. Mohr's Salt and KMnO4
V. Burette
VI. Standard Flask
VII. Funnel
VIII. Glass rod
IX. Beaker
X. Conical Flask
XI. Measuring Jar

3.2. Samples for Analysis

1. **Ferrous ascorbate and folic acid tablets-Orofer**
2. **Ferrous fumarate and folic acid tablets-Livogen**

3.3. Redox Titration Principle

Oxidation-reduction (redox) reactions are one of many chemical reactions. Redox usually involves the transfer of electrons. Titration is the volumetric measurements of a solution of know concentration when it reacts completely with a measured volume or mass of another substance. The analysis of present iron in a supplement tablet can be done by a redox titration reaction.Fe^{2+} ions can be ionized to ion Fe^{3+} ions by potassium permanganate in acidic solution. For the redox titration reaction one of the most commonly strong oxidizing agent is used, the potassium permanganate (KMnO4). Fe^{2+} will be oxidized to Fe^{3+} and the potassium permanganate will be reduced to Manganese.

$MnO4^{-}+8H^{+}+5Fe^{2+} \rightarrow Mn^{2+}4H_2O+5Fe^{3+}$

As the Potassium permanganate doesn't require an indicator to signal the end-point of the titration, it has a unique advantage among titrants. In an acidic condition the deep purple solution of manganite ions is reduced to a very pale pink solution of manganese ions.

This solution is so pale as to appear colorless when dilute and, in practice, the marked difference in color between these two oxidation states is useful as an end-point for this redox reaction.The manganite ion accepts electrons and is reduced to colorless Mn^{2+} ions according to the following half-equation: The potassium manganite solution is added from the burette to the solution of the reducing agent and is immediately decolorized. As soon as the reducing agent is used up, the next drop of potassium manganite solution is not decolorized therefore coloring the solution as a pale purple color. The end-point is the first appearance of this purple color. The acid used to provide H+ is dilute sulfuric acid.

3.4 Experimental Procedure

Standardization of ~0.005 M $KMnO_4$ Solution using Mohr salt

A standard solution of Mohr salt was prepared by weighing 9.8 g Mohr salt and quantitatively transferred to 100 ml standard flask using dil. H_2SO_4. The burette was then filled with the prepared 0.005m $KMnO_4$ solutions and titrated against 20 ml Mohr saltuntil a persisting pale pink colour was observed which indicates the end point of the reaction . The corresponding titre value was recorded and the procedure was repeated for two more times, each time noting the corresponding titrant values.

Determination of the amount of iron in the Iron Containing medications

Five livogen capsules were weighed and transferred into 250 ml standard flaskusing dil.H2SO4. 20 ml solution was buretted out into a conical flask, and was titrated against the standardized 0.005 m $KMnO_4$ until a persisting pale pink colour was observed which indicate the end point of the reaction. The corresponding titrant value was recorded . The procedure was repeated for each of the samples .The titrant value obtained was used to calculate the amount of iron in the samples.

Chapter-4

4.1RESULTS AND DISCUSSIONS

Fe content of the powdered tablets were quantitatively determined by means of redox titration employing $KMnO_4$. Chemistry of the reaction is presented in equation 1) Determination of Iron in Biological Material S .H Jackson 2) lron analysis by Redox Titration a general chemistry experiment .Samuel Kaufman and Howard devoe. As shown below.

as shown below.

$$MnO4^{-}+8H^{+}+5Fe^{2+} \longrightarrow Mn^{2+}{}_{+}\,4H_2O+5Fe^{3+} \qquad (1)$$

Volume of KMnO4 noted at the endpoint of the titration for various samples is tabulated below (Table 1).

Sample	Volume of $KMnO_4$
Livogen	15 ml
Orofer	39 ml

Calculation of the Fe content in livogen tablet is detailed below.

Volume of Fe - tablet solution = 20 ml

Molarity of $KMnO_4$ = 0.005 m

Volume of $KMnO_4$ = 15 ml

$V_1M_1n_2$ = $V_2M_2n_1$

$V_{Fe2+} \times M_{Fe2+} \times .1$ = $V_{KMnO4} \times M_{KMnO4} \times 5$

$20 \times M_{Fe2+} \times 1$ = $15 \times 0.005 \times 5$

Molarity of Fe-tablet solution = 0.0188 M

Volume of Fe^{2}+ solution on total = 250 ml

Mass of iron in this volume = 0.2617 g

Mass of iron/tablet = 52.34 mg

Mass of one tablet of livogen = 0.2951 g (preweighed 5 tablets before dissolution)

Mass of Fe/g of each tablet = 177 mg/g

As per the label of tablet, mass of Fe /g = 169 mg/g

Similarly the iron content of Orofer is also calculated. All the results are listed in Table 2. Table

2. Mass of Fe calculated for various samples

Sl No	Fe Tablet	Constituents	Fe (mg/g) calculated	Fe (mg/g) As per tablet label	Difference
1	Livogen	Ferrous fumarate and folic acid tablets BP	177	169	8
2	Orofer XT	Ferrous ascorbate and folic acid tablets	170	100.8	69.2
3	Orofer-calculation modified	Ferrous ascorbate and folic acid tablets	85.1	100.8	15.7

In the case of livogen tablet, the Fe content calculated differed only by 8 mg/g from the value specified on the label by the manufacturer. Whereas in the case of Orefer which is basically ferrous ascorbate, the result was not within proximity with the labelled value (difference of ~69 mg/g). Slight variation in the result can be attributed to the incomplete transfer or dissolution of the sample solution or improper mixing of the component. We infer that during the titration of Orofer with KMnO4, once the endpoint is reached (that is ferrous converted to ferric), the ascorbate anion may be reducing ferric to ferrous (Equation 2).

$$Fe^{3+} + \text{Ascorbate anion} \longrightarrow Fe^{2+} + \text{bye products} \qquad (2)$$

Ascorbic acid is well known as an antioxidant (1) Ibrahim, I. A. A. and Yusuf, A. J. “Quantitative Determination of Iron and Folic Acid in Lactucasativa (Lettuce)plant" (2) Chaka, G. T. (2010). “Determination of Iron in Dietary Supplements through Redox Titration” Collins College University, department of chemistry). Hence KMnO4 is again consumed to react with these ferrous ions. This may be the reason for the titre value of 39 ml we observed. Based on this assumption, we have calculated Fe content with a titre value of 19.5 ml(half of the original value), and found out that the value is in proximity with the labelled value(difference of ~15 mg/g).

Chapter -5

5.1 CONCLUSIONS

Based on the observations it is found that the tablet Livogen have the highest amount of iron (169 mg/g). Hence this tablet is most suitable for those groups lacking iron supplement mainly menstruating and pregnant women). The other tablet Orofer may be suitable for those who need low iron supplements just like infants. We suggest that the redox titration is a simple and convenient method for the estimation of iron in various samples (Fe should be in ferrous form).

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