

Abstract

Researchers have revealed the fact that all different compounds of ferrous acquire different light absorption capacities. The factors affecting this absorption capacity can be easily deduced using several techniques like stoichiometry, spectrometry and spectrophotometry. This paper will have its main emphasis on the contrast between the light absorption capacities of Ferrous Fumarate and Ferrous Gluconate using some specific Techniques like Mass Spectrophotometry. (Ref. 1)

Introduction

The main emphasis of this paper will be to have a clear and solid comparison between the light absorption capacities and curve traits of Ferrous Fumarate and Ferrous Gluconate using some specific methodologies and techniques like Mass spectrophotometry. The graphical results depict the dependency of the absorption capacities on the concentration of the solutions.

Observations and Calculations

Apparatus

1. Mortar and pistol
2. Hot plate
3. Stirring rod
4. 4 Beakers
5. Measuring cylinder
6. Glass stirring rod
7. Forceps
8. 4 Plastic bottles
9. Labels
10. Iron pills (Ferrous Gluconate)

Number of Iron Pills Volume of Water Wavelength Absorbency

1 100mL 326nm 2.134

2 200mL 334nm 2.276

2 100mL 340nm 2.630

4

200mL

338nm

2.673

Materials Used

A. Ferrous Fumarate

Ferrous Fumarate is the ferrous salt of fumaric acid. It has chemical formula $C_4H_2FeO_4$. It is a reddish-orange powder, used to supplement iron intake. Pure ferrous Fumarate has an iron content of 32.87%.

B. Iron Gluconate

Ferrous Gluconate is the ferrous salt of Gluconic acid. It is a black compound often used as an iron supplement. Ferrous Gluconate contains iron element of 11.6% (Ref. 2)

Experiment

I. Day 1

The mortar and pestle apparatus were used to grind an iron pill. Then, a 100mL of distilled water was taken using a measuring cylinder, and poured into a beaker. Then place the grinded pill was placed in there and stirred constantly. For further dissolution a stirring rod was placed in the beaker and hot plate was set on vibrating mode. Similarly, by repeating the same method for all the different combination of number of pills and water volume above four solutions were prepared.

Note: Due to the fact that the absorbency peak for the solution was not so accurate and flat, the experiment was repeated after further diluting the solutions.

II. Day 2

The solutions were diluted to the following concentration:

A. 0.005

B. 0.01

C. 0.015

D. 0.02

E. 0.025

Then these solutions were run through the spectrometer and the new readings were taken and plotted into a calibration curve. (Fig. 1)

Fig. 1 Absorption Curve for Ferrous Gluconate

This was the sample of Ferrous Gluconate

III. Day 3

A second sample of iron supplement was used to determine a second calibration curve. This contained iron in the form of Ferrous Fumarate:

Each pill from this sample contained 18mg Iron and therefore the preparation method for making the different concentrated solutions was different.

1 pill= 746mg and only 18mg of that is the Iron (Ferrous Fumarate)

So the measurements done were taken according to that and same concentrations used for the first sample were used for this one too. The Calibration curve for that one was more accurate. (Fig. 2)

Fig. 2 Absorption Curve for Ferrous Fumarate

These two calibration curves were compared to a known Iron II sample calibration curve. (Fig. 3)

Fig. 3 Ideal Absorption Curve for Ferrous

Results

The absorption curves reveal that the absorption capacity of Ferrous Fumarate solution is much more as compared to the Ferrous Gluconate Solution. It is due the fact that Ferrous Fumarate has higher elemental iron than that of Ferrous Gluconate as mentioned in the material properties. The higher the iron content, the better is the light absorption capacity of a compound. For Example; the absorption capacities (A) of Ferrous Fumarate and Ferrous Gluconate are 2.5 and 0.55 respectively relative to the same concentration of 0.025.

Conclusions

Using Mass spectrophotometry technique, the conclusion can be made that the accuracy, linearity and flatness in the absorption curve of a compound is dependant upon the diluteness of the solution. As Ferrous Fumarate solution was more dilute and hence it had better accuracy and flatness in its absorption curve as compared to the Ferrous Gluconate solution.

Future Recommendations

This study further can be utilized for a number of diversified applications like Mass Spectrophotometry technique is profoundly used to measure molar absorptivity, calibration curve and absorption spectrum of different compounds. It makes the fact more clear and certain that the dilution of ICG in different solvent media results in a shift of the absorption band of ICG toward wavelengths commonly used during surgery. (Ref. 3)