Aim 28

To Determine the Iodine Number of Fat Sample

Introduction

The amount of iodine absorbed by 100 g of fat is termed as iodine number. As unsaturation of fatty acids increases the amount of iodine absorbed by fat also increases and more rancidity of triacylglycerols can be observed with more unsaturation.

Coconut oil is saturated fat while plant oils like sunflower oil, soybean oil, mustard oil, corn oil etc. are unsaturated fats. Saturated fats have low iodine number. Coconut is saturated fat through its origin is from plant.

Iodine number of some oils

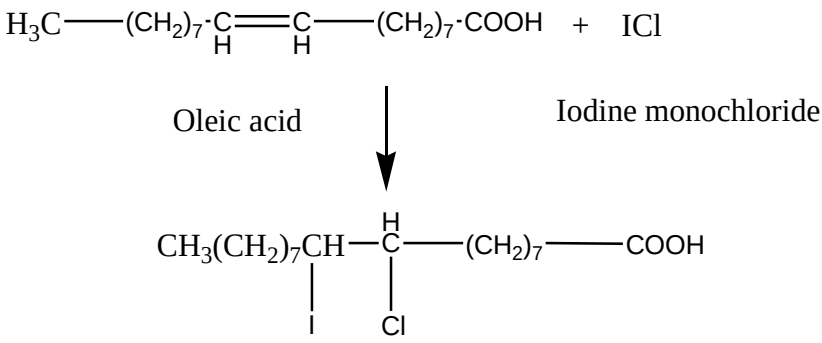
Oil	Iodine No.
Soybean oil	135-145
Corn oil	105-115
Peanut oil	85-100
Coconut oil	6-10
Butter oil	26-28

Unsaturated fats are good for health because they they are not atherogenic so they are helpful in reducing the blood cholesterol level. Degree of unsaturation is indicated by iodine number of fat sample.

The estimation of iodine number can be done by treating the known volume of standard solution of iodine monochloride with known amount of fat. The amount of

iodine liberated on the addition of excess of KI is used to determine the amount of unused iodine monochloride. Titrate the liberated iodine with 0.1 N sodium thiosulphate solution using starch as an indicator.

Reaction



$$ICl + KI \longrightarrow KCl + I_2$$

$$I_2 + 2Na_2S_2O_3 \longrightarrow 2NaI + Na_2S_4O_6$$

Requirements

1. Burette
2. Stopper bottle
3. KI solution - 10%
4. Sodium thiosulphate - 0.1N
5. Chloroform Fat sample (Olive oil, butter, coconut oil, corn oil)
6. Iodine monochloride - 0.2M
7. Starch indicator - 1%

Procedure

1. 2 % solution of fat is prepared in chloroform.
2. 20 ml of 0.5 N potassium dichromate is taken with 10 ml of 10 % KI, 5 ml of HCl to check the normality of sodium thiosulphate solution. Add 100 ml of distilled

water to dilute and titrate with thiosulphate solution till there is appearance of yellow colour. After this, few drops of starch indicator is added. The titration is continued till the blue colour disappears. Write down the volume of thiosulphate solution (Suppose - x).

3. Normality of sodium thiosulphate solution is calculated using formula:

   $N_1V_1 = N_2V_2$

   (Sodium thiosulphate) (Potassium dichromate)

   $N_1 \times X = 0.1 \times 20$

   $N_1 = (0.1 \times 20)/X$

4. 10 ml of fat solution is taken into stopper bottle and 25 ml of KI solutions also added.
5. Stir well and leave it to stand in dark for 1 hour (since halogens are oxidized in the light)
6. A blank is prepared in which the fat is omitted and only chloroform is taken.
7. After 1 hour, 50 ml of water and 10 ml of KI solution is added.
8. The liberated iodine is titrated with the standard sodium thiosulphate solution till pale yellow colour appears.
9. About 1 ml of starch solution is added and the titration is continued till the blue colour disappears.

Calculation

Volume of 0.1 N Sodium thiosulphate used for blank = x ml

Volume of 0.1 N Sodium thiosulphate used for sample = x ml

Amount of 0.1 N Sodium thiosulphate required to react with an equivalent volume of iodine = (x-y) ml.

1 L of 0.1 N iodine solutions contains 12.7 g of iodine.

$$\text{Iodine number} = \frac{(x-y) \times 12.7}{1000} \times \frac{100}{\text{Weight of sample (g)}}.$$

Precautions

1. To prevent the oxidation of halogen, carry the reaction of iodine monochloride with fat in the dark.
2. Shake properly during titration to remove the iodine.