

Study on adulteration of oil samples from various sources

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Abstract

Oils are simple lipids and glycerol esters of fatty acids. Edible oils from different sources have been collected for checking quality in terms of rancidity, degree of unsaturation of fatty acids. The present work is to analyze essential parameters of fatty acids by determination of the acid value, saponification value and iodine value of the oil samples taken.

Key Words

Acid number, Saponification number, Iodine number, titrimetry method.

Introduction

Oils constitute a broad group of naturally occurring molecules which include fats, waxes, sterols, fat soluble vitamins (such as vitamin A, D, E and K), monoglycerides, diglycerides, phospholipids including energy storage components, structural components of the cell membrane and as important signaling molecules. Lipids also encompass molecules such as fatty acids and their derivatives such as fatty acids and also its derivatives, sterol containing metabolites such as cholesterol. Although humans and other mammals use various biosynthetic pathways to both break down and synthesize lipids, some essential lipids cannot be obtained by this way and can only be supplied through diet (Michelle et al., 1993). A large number of studies have shown health benefits associated with consumption of omega – 3 fatty acids on cancer, cardiovascular diseases and various mental illness such as depression, dementia can be controlled. In contrast, it is now well established that consumption of trans fats such as those present in partially hydrogenated vegetable oils are risk factors for cardiovascular disease (Riediger N D, Othman 2009).

Materials and methods

Various oil samples were collected from different sources like local street vendor, retail shops and manufacturers. Acid number: the acid number is a sum parameter for all acidic components. Also it is the measure for the long term stability and corrosiveness of the oil. To 1gm of the oil sample

taken in a 100ml volumetric conical flask, 5ml of solvating agent, chloroform and phenolphthalein indicator are added and titrated with 0.1N KOH until pink color persisting for 20 – 30 seconds is obtained. A blank experiment is conducted using water instead of oil.

$$\text{Acid Value} = \frac{5.6(x)}{10}$$

Where x is sample amount used.

Saponification number

Saponification value represents the number of moles of KOH required to saponify 1gm of fat and also it is a measure of average fat.

$$\text{Sap Value} = \frac{\text{ml of HCl rundown for 1 gm of oil sample}}{56}$$

Iodine number

Iodine number is used to determine amount of unsaturation contained in fatty acid. This unsaturation is in the form of double bonds which react with iodine compounds. The higher the iodine value, the more is unsaturation of fatty acid in a fat (Firestone, 1994).

$$\text{Iodine Number} = \frac{\text{Volume rundown for oil samples}}{\text{Volume rundown for blank}} \times 6.35$$

The three parameters for three different oil samples, ground nut, sunflower oil, palm oil, were tested.

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Results and Discussion

Different samples brought from various sources were tested and compared. The values of the samples which differentiated from normal values of acid number, saponification number and iodine value. Saponification value and acid number is highest than normal standard value and low iodine value than standard was observed for oil sample from local street vendors. It depicts clearly that adulteration of oil was done. Samples obtained from (Manufacturers) direct suppliers (Table 1). Samples obtained from Retailer (Table 2). Samples obtained from Street vendors local (Table 3). Oil samples collected from various sources showed wide range of variation when tested their acid number, saponification number and iodine number. The samples when compared with actual standard values, rancidity is more to those samples obtained from street vendors (local). Some street vendors mix reused oils (adulteration of oils) or use cheap oils mixed in edible oils. Iodine value of oil samples obtained from different habitats showed a great variation between retailers, local street vendors and manufacturers (direct) suppliers. The value is very low indicating higher degree of saturation compared to iodine number of oil samples from (standard) saturated fatty acids directly related to LDL blood cholesterol. High saturated fatty acids are more prone to heart diseases and clogging the arteries.

Conclusion

Oils are used in dishes as part of normal diet. Oils play a significant role in individual health conditions. From the present study it is clear that adulterations of oils purchased from various sources vary and people taking adulterated oils are more prone to suffer from cardiac diseases. The higher the degree of saturated fatty acids, the more chances of heart diseases.

References

1. ASTM D-151088b Standard Test Method for Carbon Black-Iodine Adsorption Number, Approved 9/30/88, Published 2/198.
2. Coleman, R A, and Lee, D,P., "Enzymes of triglycerol synthesis and their regulation" *Prog. Lipid Res.* 43: 134-176(2004).
3. Firestone D (mayjune1994). Determination of the iodine value of oils and fats: summary of collaboration study *J AOAC Int* 77(3) 674 PMPD 8012219.
4. Michelle A, Hopkins J, Mc Langhlin CW, Johnsons, Warner MQ (1993) *Human Biology and Health*. England Cliff, USA: Prentice Hall ISBN 0-13-981176-1 OCLC 32308337.
5. Reidiger N D, Othman R A SubM, Moghadasian MH (2009) A systemic review of the roles of Fatty acids in health and disease " *Journal of the American Dietetic Association* 109(4)668-79.
6. Vance, Jean E., Vance, Dennis E. *Biochemistry of lipids, lipoproteins and membranes*. Amsterdam: Elsevier. ISBN 0444511393.

Table 1: Oil sample from Manufacturer.

Parameters taken	Blank	Groundnut oil	Sunflower oil	Palm oil
Acid value	20	6.10	3.24	5.18
Saponification value	24	12.1	6.22	12.5
Iodine value	1	78.8	96.25	77.12

Table 2: Oil sample from Retailer.

Parameters taken	Blank	Groundnut oil	Sunflower oil	Palm oil
Acid value	1.210	0.321	0.32	0.82
Saponification value	26.4	29.3	26	22.6
Iodine value	1	50.28	62.2	52.12

Table 3: Oil sample from Local street vendor.

Parameters taken	Blank	Groundnut oil	Sunflower oil	Palm oil
Acid value	1.1	1.34	16.12	16.3
Saponification value	28	39.4	35.6	28.2
Iodine value	1.6	40.05	41.91	46.49
