Introduction

Oils consist of wide group compounds that are soluble in organic solvent and insoluble in water. They have lower density than water and at normal room temperature range in consistency from liquid to solid, depending on their structure and composition. Chemically fats are generally triesters of glycerol and fatty acids. Although the words ‘oils’, ‘fats’ and ‘lipids’ are all used to refer fat, “oils” is usually used to refer to fats that are liquid at room temperature, while “fats” is usually used to refer to that are solids at normal room temperature. “Lipid” is used to refer to both liquid and solid fats.

Triacylglycerols are the predominant components of most food fats and oils. The minor components include mono and diacylglycerols, free fatty acids, phosphatides, sterols, fatty alcohols, fat-soluble vitamins and other substances.

Fats and oils are recognized as essential nutrients in both human and animal diet. They provide the most concentrated source of energy of any foodstuff, supply essential fatty acids, and contribute greatly to the feeling of satiety after eating, are carriers for fat soluble vitamins and serve to make foods more palatable. Fats and oils are present in varying amount in many foods. The principal sources of fat in the diet are vegetable fats and oils, meat, dairy products, poultry, fish and nuts. Most vegetables and fruits consumed as such contain only small amount of fat.

Fatty acids are building block of lipids and generally comprise 90% of fats in foods. These are compounds that are of interest when reporting lipid content labeling of fats and oils. Saturated fatty acid- hydrocarbon chain with single bonds between each of carbon atom – found primarily in products derived from animal sources (meat, dairy products) tend to raise the level of low density lipoprotein (LDL) cholesterol in the blood. Unsaturated fatty acids- characterized by one (monounsaturated) or more (polyunsaturated) double bonds in the carbon chain- are found mostly in plant and sea food. Since the carbon are double bonded to each other, there are fewer bonds available for hydrogen, so there are fewer hydrogen atom, hence unsaturated.

Typically, common vegetable oils, including soybean, sunflower, safflower, mustard, olive, rice bran, sesame are low in saturated fat and the double bond within unsaturated acids are in the cis configuration. To improve their oxidative stability and to increase their melting point, vegetable oils are hydrogenated.
The use of fat or oil for frying still remains one of the most popular processes in the preparation & manufacture of food in India. Deep – fat frying provides a fast & convenient approach to preparing foods with desirable flavor and crunchy texture, therefore is wildly used in commercial and household kitchens as well as various food industry for food preparation. The quality of the food product cooked using this method is depends not only on the frying condition, such as the temperature of the heating oil, frying time, food weight, and frying oil volume, but also on the type of oil and the kind of the food used. During the deep fat frying, the fat is continuously being exposed to elevated temperature (150 – 180°C) causing lipid degradation involving numerous reactions, such as lipid hydrolysis, lipid oxidation, isomerization, and polymerization. These reaction cause off-flavor and affect the shelf life of the fried food. These reactions may even produce toxic compound and also reduce its nutritional quality. Investigating and monitoring the degradation of oils during deep frying process is important to ensure the safety and quality of deep fried foods.

As deep fat frying is normally carried out at high temperature (between 160°C to 180°C) and in the presence of air and moisture, these frying oils and fats will undergo physical and chemical deterioration which will affect their frying performance and the storage stability of the fried products. The changes taking place in the oil due to repeated frying are often deteriorative and fatty acids undergo chemical changes and make the food that is fried an unsuitable product in terms of nutritional value. The over – use of frying oil causes adverse effect on flavor, stability, color and texture of fried product and may be harmful to human health. It is therefore necessary to examine some of the major changes which occur in the oils during deep frying. According to previous studies, the heat treatment causes the oxidative rancidity resulting in an increase in the free fatty acids. This is why heated and unheated fats and oils should be monitored by means of analysis.

The storing of large volume of oil for long period under diverse condition is not an easy task, since many of its characteristics such as color, flavor and clarity, which are necessary to be maintained, deteriorate. In order to maintain stability of oil for long period for consumption and individual usage, without loss of quality and quantity, a good storage method need to be developed.
Whether refined or not, all oils are sensitive to heat, light, and exposure to oxygen. Rancid oil has an unpleasant aroma and acrid taste, and its nutrient value is greatly diminished. To delay the development of rancid oil, a blanket of an inert gas, usually nitrogen, is applied to the vapor space in the storage container immediately after production. This is referred to as tank blanketing. Vitamin E oil is a natural antioxidant that can also be added to cooking oils to prevent rancidification.

All oils should be kept in a cool, dry place. Oils may thicken, but they will soon return to liquid if they stand at room temperature. To prevent negative effects of heat and light, oils should be removed from cold storage just long enough for use. Refined oils high in monounsaturated fats keep up to a year (olive oil will keep up to a few years), while those high in polyunsaturated fats keep about six months. Extra-virgin and virgin olive oils keep at least 9 months after opening. Other monounsaturated oils keep well up to eight months, while unrefined polyunsaturated oils will keep only about half as long.

In contrast, saturated oils, such as coconut oil and palm oil, have much longer shelf lives and can be safely stored at room temperature. Their lack of polyunsaturated content causes them to be more stable.

Production of fatty acid and glycerol from oils are important especially in oleochemical industries. Glycerol and fatty acids are widely used as raw material in food, cosmetics and pharmaceutical industries.

The fat and oil usually used in the frying processes are made of fatty acids which are either saturated or unsaturated. Such as steric acid, Oleic acid, linoleic acid, linolenic acid. The fatty acid composition of the frying oil is an important factor affecting fried food flavor and its stability; therefore, it should be low level of polyunsaturated fatty acid such as linoleic or linolenic acids and high level of oleic acid with moderate level of saturated fatty acid.

The characterization of untreated fresh oil samples kept for longer period & samples treated at high temperature can be analyzed with the help of this work.