Toxic Compounds Emerged in Brassica Juncea (L) Seed Oil Over Deep Heating are Identified Through Chromatographic Technique and Physio-Chemical Parameters

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**ABSTRACT**

Oil heating has been degraded by thermal, air and moisture penetration leading to the creation of volatile and non-volatile materials serving as active substrate and increasing temperature and mass transmission levels. In this study, Fresh mustard oil was characterized to assess chemical properties like saponification value (SV), iodine value (IV), peroxide value (PV), p-Anisidine value (p-AV), Totox value (TV), acid value (AV), density and viscosity. The oil was reused (thermal process) for three sets of periods at different heat levels 120, 140, 160, 180 and 200 degrees the impact of the thermal process was examined through physicochemical, nutritional and sensory properties and compared with fresh mustard oil. Chemical compounds were identified for selected oils using GC-MS and FT-IR spectroscopy. The effect of spectra reveals there was a significant change in the thermal refined oils band (180 to 200 ° C) and higher temperature changes the band’s exact positions and shifts when the fatty acid ratio has shifted. Similarly, the FT-IR study also found the drastic changes in the functional compounds at 180 to 200°C. The chemical property shows that primary and secondary level of rancidity were confirmed through peroxide value and p-Anisidine value respectively; the consistency and the flow rate was reduced due to the deterioration through rancidity.

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ISSN: 0975-7538
DOI: [https://doi.org/10.26452/ijrps.v11i2.2140](https://doi.org/10.26452/ijrps.v11i2.2140)

INTRODUCTION

Recently, the frying industries have taken advantage of the separation of terms, oils and fats produced for food use, supported by the rise of more than two and a half folds in the use of oils and fats in 2016 in comparison to the beginning of the 1990s (Boateng *et al.*, 2016). Frying is a popular form of cooking that has been used to produce food varieties both in factories and in the home. Fried food has similar sensorial features, primarily going to the consumer. Since fried food has a substantial amount of oil, it is possible to observe a quality loss for frying oil that is associated with other sensory attributes (Gertz and Behmer, 2014) but which also elicits unwanted breakdowns derivative that can adversely affect the consumer’s health. By contrast, the oxygen and moisture evolved from the eatables while cooking alleviates the mixture of physical and chemical changes in the oils that lead to thermo-oxidation, isomerisation, cyclisation, hydrolysis, and polymerisation, resulting in an unstable acceleration in the compounds (Zribi *et al.*, 2014). Eatable cooking fats, such as palm oil, soybean oil, sunflower and Rapeseed oils, are most fuel sources used for the processing of biodiesel. Too many pieces of literature have discussed that edible oils mainly contain their own experience on the prevalence of process-induced contaminants (A, 2018), particularly when...
the oils are heated to high temperatures.

Thermally processed food, fried food is eaten mostly in daily life due to its appetizing taste and flavor. The aroma of fried food typically derives from the volatile compounds formed or ingested by the frying process. The top five oil crops grown and used worldwide are Rapeseed (Brassica napus), Mustard (Brassica campestris), Peanut (Arachis hypogea), Sunflower (Helianthus annuus) and Olive (Olea europaea). Olive oil, Sunflower oil, and rapeseed oils are consumable vegetable oils commonly consumed in many countries. Currently, the production of oil crops is not enough to satisfy the national demand. Vegetable oils are worldwide heavily traded agricultural products. There is an immense variety of vegetable oils that can make an important contribution to the human diet. The utilization of oils in cooking, Deep frying, and Shadow frying. Those are widespread because of their tendency to give a flavor to the food and having healthy nutritional benefits. Brassicaceae oil seeds like Groundnut oil and mustard seed oils which are the main source of cooking oil used for global nutrition purposes (Casal et al., 2010). Besides, researchers around the world and food industries have put a lot of effort into expanding the manufacturing technique and improving frying skills. For instant fried noodles, Carnauba wax was used to shape soya bean oil to widen heavy-like oleogels that were evaluated as a deep-fat cooking form Carnauba wax was chosen as a gelator to manufacture oleogels which is more heat tolerant dependent on Arrhenius metrics (Lim et al., 2017). Because of the importance of customers, mustard oil is extremely traded worldwide through the use of salad and cooking oil. For this purpose, the mustard oil was optional biodiesel manufacture (Ciubota-Rosie et al., 2013). Many analyzes for the content for erucic acid present in the same have been investigated on mustard seed oils. Throughout Europe, mustard is eaten more commonly, paste without lumps consisting of mustard seed, spices, sugar, and vinegar. The alteration of compounds during thermo-oxidation and the formation of Free Radicals are shown in the Figure 1 Mustard oil is typically used as an emulsifier with salads, also in meat products like sausages or hamburgers and other foods (Cuhra et al., 2011).

In this study, the chemical properties such as peroxide value (PV), saponification value (SV), boiling point, viscosity, density, iodine value (IV), of the selected Mustard seed oils have been analyzed with repeated heated oils and proved that the effect of heating eventually alter the physicochemical, nutritional and sensory properties. Most importantly, human health issues associate with modified oil have also discussed.

MATERIALS AND METHODS

Sample preparation for deep heating

Oil

Mustard seed oil (Brassica juncea L.) was collected from the local market and milled utilizing an automated milled machine to obtain the new unrefined oil from the local oil mill Salem, Tamilnadu, India and stored under room temperature for more experimental utilize.

Figure 1: Alteration of chemicals during Thermo-oxidation

Figure 2: Changes in Peroxide Value on the three days of consequent heating

Heating materials

A domestic deep-fat fryer pan with a capacity of 3 liters was utilized for deep heating. Mustard oil was taken and continuously heated at various temperatures such as 120, 140, 160, 180 and 200 degrees for 3hrs, this process was continued for three more days to get the desired sample for analyzing.

Measurement of Boiling Point

Measurements of Boiling Point have been done for the oil models, which were calculated by a thermometer setup. The observed changes are highly
Figure 3: Changes in p-Anisidine Value on the three days of consequent heating

Figure 4: Changes in Saponification Value on the three days of consequent heating

Figure 5: Changes in Iodine Value on the three days of consequent heating

Figure 6: Changes in Density Value on the three days of consequent heating

Figure 7: Changes in Viscosity Value on the three days of consequent heating

Figure 8: Changes in Acid Value on the three days of consequent heating
dependent on the unsaturation nature of Triglyceride. (Zahir et al., 2017)

**Peroxide value (PV)**

The Peroxide values were predicted using the standard of ISO 3960-2007. 5g of the oil sample was dissolved in glacial acetic acid:chloroform (3:2, v/v, 30 ml) mixture, followed by 1ml of saturated potassium iodide solution was added. Further on that the desired amount of distilled water was added then titrated gradually against sodium thiosulphate solution (0.01ml), where the starch solution (1%) has been used as an indicator (Sharma et al., 2006).

**p-Anisidine value (p-Av)**

The ISO 6885:2006 standards were followed to predict Anisidine values. In acidic conditions, the resultant sample is undergone a reaction with p-anisidine, and the values have been collected (WHO, 1983).

**Totox value (TV)**

The Totox value of oil is measured using the formula, (de Abreu et al., 2010)

\[ TV = (2 \times P_v) + pAv \]

Pv = Peroxide value,

p-Av = para Anisidine value

**Density**

The density of the various oil mixtures has been calculated using a Relative Density (R. D) bottle with a capacity of 10 mL (Zahir et al., 2017).

**Viscosity**

By using Cannon - Fenske (Fisher Scientific, Pittsburgh, PA) glass capillary kinematic viscometers in a steady-temperature bath. A programmable water bath (Model F25-HE, Julabo USA Inc. Allentown, PA) was utilized to confirm the exact and concurrent results. The trials have been made with ASTM D445 for viscosity determination. The difference in viscosity as a function of temperature was calculated using this formula (Noureddini et al., 1992),

\[ V = c \times t \]

Where,

\[ c = \text{Viscometer Constant (mm}^2/\text{s}) \]
\[ t = \text{Time} \]

\[ \mu = v \times p \]

Where,

\[ v = \text{Viscosity in mm}^2/\text{s} \]
\[ p = \text{Density of the oil} \]

**Saponification value**

The known amount of oil sample is mixed with 10 mL 1 N KOH in addition to that 10 mL of de-ionized water also added and the resultant combination is heated below the reserved condenser for 30–40 min and chilled. Titrated against 0.5 M of HCl, using an indicator to get the pale pink color. Same conditions were followed for the blank (Firestone, 2007).

**Iodine value**

About 5g of the sample were treated with an excess of Iodobromine (IBr) in glacial acetic acid. The reaction between Iodobromine and Potassium iodide gives the number of iodine from the given sample. The determination of iodine was calculated using the formula, (Crowe and White, 2001).

\[ IV = (b - v) \times N \times 126.9 \times \frac{100}{w} \times 1000 \]

126.9 is the molecular weight of iodine
b = quantity of sodium thiosulphate used for blank,
v = quantity of thiosulphate for sample,
N = normality of thiosulphate solution,
w = weight of the oil sample

**Acid value**

The acid value of the cooking oil is measured using the titration method by AOCS [Cd38-63] (Alimentarius, 1999).

**Evaluation by Spectroscopy Method (FT-IR)**

FT-IR spectra of cooking oil have been taken using the assistance of a Fourier Transform Spectroscopy Model I-R Prestige 21 Shimadzu. It is utilized for analyzing the processed cooking oil before and after in room temperature (Zahir et al., 2017).

**GC-MS Analysis**

A Hewlett-Packard (Palo Alto, California, U.S.A.) flexible gas chromatograph fitted with an HP 5971 MS sensor is used to evaluate the structure of fatty acids. Groupings are conducted on an Agilent (Hewlett-Packard) HP-5 bonded capillary silica column (30 m 0.25 mm I.D.; 0.25 μm film thickness) (Folsom, California, U.S.A.). To hold the heat at 50°C - 210°C, an oven heating system is used. The wavelengths are documented on a device with interfaces. For every insulated study, the same technique is replicated.

**Statistical analyses**

Statistical investigations are measured using the SPSS software (version 20.0 for Windows). Experimental data were given as means ± standard deviations of three replications and utilized one - way ANOVA with the P< 0.05 level of significance.
RESULTS AND DISCUSSION

Peroxide value

Hydroperoxide is the first lipid oxidative product that is first to occur on the heating process. It is determined by the Peroxide value (PV) of the oil. The PV is measured per kg of fat/oil in milliequivalents of oxygen. p-Anisidine value (p-AV) is a measuring method for alternative degradation substances like volatile organic compounds and ketones (Eral et al., 2013). Aldehyde is the carbonyl compound that is developed through hydroperoxide oxidation and can be used to evaluate the deterioration of peroxidised substance from the cooking process (Majchrzak et al., 2018).

Peroxide value has been utilized as an indicator of primary oxidation on the reaction. It is not related to the heating period, rather than it is related to the formation and breakdown of the oxidative products. Figure 2 shows the chemical properties of heating on the 3 repeated cycle are compared with RT 35°C (initial heating temperature), at different overheating degrees like 120, 140, 160, 180 and 200°C, the observed PV values are 0.83, 0.87, 0.93, 0.99, 1.02 and 1.45 for the 1st cycle, 0.83, 0.89, 0.99, 1.19, 1.41 and 1.82 for the 2nd cycle and respectively. 0.83, 2.38, 3.36, 3.53, 4.88 and 4.98 for the 3rd cycle respectively. The importance of peroxide is improved by the oil models processing time, heat, and air interaction. When hot, heated oil usually undergoes broad depletion and basic chemical conversions. The involvement of water and air has increased the cooking oil oxidation (Guillin and Cabo, 2000; Grover and Patni, 2013) leading to the lift of polar compounds in the oil.

p-Anisidine Value (p-AV)

The p-AV of the cooking oil has done through the four-consecutive day of the deep-heating process which was displayed in Figure 3. An increasing p-AV of all samples was observed for a prolonged period. This finding could be explained by the fact that low constant primary oxidized compounds (hydroperoxide) decomposed to formed aldehyde compound. Aldehyde compounds are the secondary oxidized product which was formed at deep heating. The stage of aldehydes is increased with increasing by
the heating time. (Grover and Patni, 2013). Figure 2 shows the chemical properties of heating on the 3 repeated cycle are compared with RT 35°C (initial heating temperature), at different degrees of heat 120, 140, 160, 180 and 200°C, the observed p-AV values for the 1st are 7.87, 7.80, 7.90, 8.60, 8.90, and 9.02 for the 2nd cycle 7.87, 7.21, 7.98, 8.98, 8.20 and 8.97 for the 3rd cycle 7.87, 8.85, 9.09, 17.16, 19.96 and 21.04 respectively.

**Calculation of Oxidation by Totox value (TV)**

The TV is the formula that can be used to evaluate gross oxidation, which includes both primary and secondary materials. It is a combination of both Peroxide Value and p-Anisidine Value. The mustard oil has displays the largest oxidative constancy than the other cooking oils. This observation of increases in value could explain the maximum and minimum concentration of both poly and monounsaturated fatty acids in the presence of natural antioxidants in the oils. Though mustard oil had the highest erucic acid value than other cooking oils, this observation is a greater agreement with (Dabbou et al., 2011) the lower totox value.

**Saponification value (SV)**

Saponification quality (SV) in the oil sample is a metric for the total molecular fatty acid content in the sample. The higher in saponification value in vegetable fat on heating indicates the molecular weight of the fat that was hydrolysed by alkali to give glycerol. Figure 4 shows the chemical properties of heat-
ing on the 3 repeated cycle are compared with RT 35°C (initial heating temperature), at different heating degrees 120, 140, 160, 180 and 200°C, the corresponding SV values are 126.70, 127.11, 128.98, 130.98, 132.34 and 135.78 for the 1st cycle, 126.70, 129.04, 129.09, 134.78, 130.67 and 135.78 for 2nd cycle and 126.70, 130.31, 138.72, 141.12, 155.92 and 160.02 respectively. The lower value of saponification levels means that the lipid’s average molecular weight is less, or the amount of alkene bonds is smaller. This indicates that the fat molecules were not interacting with one another (Fenwick et al., 1983).

Iodine value

Iodine factor (IV) for measuring the degree of unsaturation in fat or vegetable oil was used. Figure 5 shows the chemical properties of heating on the 3 repeated cycle are compared with RT 35°C (initial heating temperature), at different heating levels 120, 140, 160, 180 and 200 degrees, the observed IV values are 95, 90.43, 89.32, 87.21, 86.54 and 84.91 for the 1st cycle, 95.00, 88.95, 87.23, 85.89, 84.73 and 82.73 for the 2nd cycle, 95.00, 82.02, 80.92, 74.34, 60.18 and 65.71 for the 3rd cycle respectively. The reduced iodine values have related to its greater storage stability in oxidative degradation. The oxidative and chemical modifications are distinguished by the increased quality of free fatty acids and reduced by the complete unsaturation of oil (Gil and MacLeod, 1980).

Density value

The transfer of heat by convection method was affected by the property of Density and the oil heating at different temperatures (in our case mustard oil heating at a different temperature). Figure 6 shows the density of heating of 3 repeated cycles are compared with RT 35°C (initial heating temperature), at different heating degrees 120, 140 160, 180 and 200, the composition of the oil changes as the oil thermal capacity increased and its density reduces. Changes in density are responsible for the changes in heat transfer (Lobo et al., 2010). The densities of mustard oil were decreased, by increasing heating levels by utilizing the heated cooking oil for more times. The frying oils usually undergo rigorous oxidation and complicated structural modifications once elevated in temperature (Ackman et al., 1977).

Viscosity value

The viscosity of the oils was affected during the heating process. Flow rate is an important measure of product consistency and quality. Figure 7 shows the decrease (thins) with increasing temperature which leads to varying in viscosity nature and that may due to the oxidation process. Fats with reduced viscosity levels are extremely significant for the wellbeing of customers. Fats/Oil have triglyceride (TG) mixtures and their viscosity depends on the quality of the TGs found thereon. The viscosity has increased because of the different structural arrangements of the lipids on the base of fatty acids in the lipid complex (Islam et al., 2013; Rossi et al., 2009). Viscosity thus refers to the molecular structure of the fats, chain length, and saturation/unsaturation (Dorr et al., 2017; Slade and Levine, 1991). While carrying out the heating process, the saturation in oil increased significantly (Gunstone, 2011). Phenomena of saturation may also impact the viscosity of oils. The polymerisation reaction, however, is primarily responsible for changing the viscosity but also similar to other saturated induced responses (Khaneghah et al., 2012).

Acid value

The AV measurement is an important metric for determining the consistency of the oil, which is also a marker of the total triglyceride concentration in the fat. The lesser AV measures are a testimonial of the decent cooking quality of fats/oil. Figure 8 shows the chemical properties of heating on the 3 repeated cycle are compared with RT 35°C (initial heating temperature), at different heating degrees 120, 140, 160, 180 and 200, the detected AV values are 0.62, 0.60, 0.58, 0.54, 0.52 and 0.50 for the 1st cycle, 0.62, 0.56, 0.53, 0.50, 0.50 and 0.46 for 2nd cycle and 0.62, 0.54, 0.48, 0.32, 0.21 and 0.24 for the 3rd cycle respectively.

FT-IR spectroscopy

FTIR spectra were used to classify edible oils and fats as they seek to distinguish between the amplitude and the exact frequency at which the maximal absorption or transmission band occurs (Manonmani and &catharin, 2015; Ciubota-Rosie et al., 2013). In Figure 9 represents the IR band for the initial heating temperature at 35°C is compared with the optimum temperature of the oil sample at 200°C for the 3 cycle of repeated heating which indicate the stretching of the double bond section that exposed at 1745.5 cm⁻¹ which corresponds to the alkene (ketones) of triglycerides and at 1654.0–1658.7 cm⁻¹ the peak indicates the C=C stretching vibration of the cis olefins. In Figure 9 (b), represents the boiling point which observed form heating of the sample Figure 9 (c) and Figure 9 (d)There is a stretching plateau in the area of 1705.0 cm⁻¹ which is -C = 0 free fatty acids and the spectra display an average signal trend similar to each
other. When the spectrum areas encounter many shifts at ambient temperature throughout the oxidation cycles and various temperatures oils reveal certain regions of other deformations and stretching at 1460–1462 cm\(^{-1}\) correlates to –C-H stretching vibrations of the heterocyclic regions CH\(_2\) and CH\(_3\) and at 1373.2–1377 cm\(^{-1}\) correlates to –C-H stretching vibrations of the group CH\(_2\) and peaks at 908.2–970.2 cm\(^{-1}\) respectively. When shown by the Mustard oil models FT-IR spectrum reveals that there is a noticeable difference in the spectrum at boiling point as opposed to ambient heating levels.

**GC–MS Analysis**

GC–MS is an excellent method for a quantitative and qualitative study of the explosive and semi-volatile bioactive complexes ( Yaşar et al., 2018) GC–MS chromatograms of Brassica juncea (L) extracts. The oils are mentioned in Figure 10. Such chromatograms clearly show the Brassica juncea (L) extracts. The seeds and leaves are complex mixtures of different types of organic compounds. Table 1 lists the corresponding compound names, concentration periods, chemical composition and estimated peak areas from the most prominent peaks. The molecules found include esters, fatty acids, aldehydes, alcohols, ketones, imines, thiols, sterols, Sulphur mixtures and their derivatives thereof.

The study results expose that the major ITCs derived from aliphatic glucosinolates were 2-phenylethyl ITC and 2-butyl ITC. The compositions of the ITCs have been reported to differ, which depends on the species of plants tested, side-chain substitutions, iron concentration, and molecular pH. ( Valdés and García, 2006; Sharma et al., 2018a). This study also showed β-sitosterols (18.24%) as the main sterols accompanied in Brassica juncea (L) seeds by stigmasterols (3.07%), stigmasten-3, 5-diene (7.2%) and γ-sitosterols (18.12%). Oleic acid has been found useful against autoimmune, various heart diseases inflammatory diseases and cancer ( Yang et al., 2018). Oil with higher erucic acid is considered toxic to humans ( Sales-Campos et al., 2013). Higher amounts of erucic acid have been reported to affect myocardial activity, causing lipodosis in children and blood cholesterol levels Win (2005). The author ( Asuquo et al., 2012) has conducted studies demonstrating the function of oleic acid in preventing breast cancer. The fatty acids considered to have high potential antimicrobial and anti-inflammatory activity are hexadecenoic acid, octadecanoic acids, tetra decanoic acid ( Cerianni et al., 2008). Hexadecenoic acid does have an antibiotic property, hemolytic 5-α-reductase, lubricant, hypocholesterolemia and anti androgenic have shown enhanced inhibitory capacity. Comparably, 9, 12-octadecadienoic acid demonstrated protective antioxidant action that included anti-inflammatory, anti arthritic and anti androgenic properties ( Pan et al., 2011). One of the prescription fatty acids noted for its anti-inflammatory effects is gamolenic acid. And helps to treat diabetic neuropathy, atopic eczema, dermatitis and other heart-related issues ( Sahasrabudhe et al., 2017). Hence, its existence of such components in Mustard seeds indicates that their effective need for conventional medicinal, beneficial diets can be elaborated on the environmental and human health growth.

In the quercetin, sitosterols are the most commonly dispersed which can enhance cholesterol absorption. Comparably, by reducing glucose levels due to serotonin inhibition, γ-sitosterol has been shown to diminish the diabetic state. Stigmasterol is used for progesterone and vitamin D3 synthesis which are anti-inflammatory compounds involved in cartilage loss caused by osteoarthritis ( Sharma et al., 2018b). There are no records in the Rapseed Mustard population for the identification and confirmation of stigmasten-3,5-diene, γ-sitosterols, stigmas- terols, and β-sitosterols This present study revealed the thorough analysis of phytoconstituents through oxidation and the fatty acid distribution pharmacological activities and confirmed in the Brassica juncea (L) seed oil use. The isolation of these individual phytochemical compounds can lead to the development of some of the novel drugs in the future.

**CONCLUSIONS**

The consistency of the mustard oil was tested at different temperature conditions with chemical values like Peroxide, p-Anisidine, Iodine, Saponification, Boiling point, Viscosity, and Density. All these chemical properties Peroxide, p-Anisidine, Iodine, Saponification, Boiling point, Viscosity, and Density standards are predicted values of oil, this cannot show the spot of double bonds or quantity of olefinic carbon present. The predicted values can suggest that the general status in the sample through its unsaturation levels, from the detected quality it is not conceivable to detect the double bond(s) site that is more prone to Rancidity or not. At various temperatures and during three times of deep heating, the percentage of transmittance was amplified in entire peaks which indicates the decline in the absorbance, it can occur owing to hydrolysis of oil through heating leads to the formation of mono, diglycerides and free fatty acids. The formation of the complex mixtures was collected in the heated
Table 1: The various information results about each component in the seed oil are mentioned as a compound name, chemical formula, molecular weight (MW), chemical abstracts service registry number (CAS No.), NIST, ID

| Compound name                          | Chemical formula | Molecul. Weight | CAS#    | Peak value | RI |
|----------------------------------------|------------------|----------------|---------|------------|----|
| Hexane                                 | C6H14            | 86             | 110-54-3| 57         | 999|
| Hexane, 2,2,3-trimethyl                 | C9H20            | 128            | 16747-25-4| 57         | 999|
| 6-Hepten-3-one, 5-hydroxy-4-methyl      | C8H14O2          | 142            | 61141-71-7| 57         | 999|
| Pentane, 3-ethyl-2,2-dimethyl           | C9H20            | 128            | 16747-32-3| 57         | 999|
| 5,5-Dimethyl-1,3-dioxan-2-one           | C6H1003          | 130            | 3592-12-9 | 41         | 999|
| Borinic acid, diethyl                   | C4H11BO         | 86             | 4426-31-7 | 57         | 999|
| Pentane, 2,2,3-trimethyl                | C8H18            | 114            | 564-02-3  | 57         | 999|
| Octane, 2,2-dimethyl                   | C10H22           | 142            | 15869-87-1| 57         | 999|
| Heptane, 2,2-dimethyl                  | C9H20            | 128            | 1071-26-7 | 57         | 999|
| Hexane, 2,2,5,5-tetramethyl             | C10H22           | 142            | 1071-81-4 | 57         | 999|
| Decane, 2,2-dimethyl                   | C12H26           | 170            | 17302-37-3| 57         | 999|
| Heptane, 2,2,4,6,6 pentamethyl          | C12H26           | 170            | 13475-82-6| 57         | 999|
| Pentane, 2,2,4,4-tetramethyl            | C9H20            | 128            | 1070-87-7 | 57         | 999|
| Nonane, 2,2,3-trimethyl                 | C12H26           | 170            | 55499-04-2| 57         | 999|
| Heptane, 4-ethyl-2,2,6,6-tetramethyl    | C13H28           | 184            | 62108-31-0| 57         | 999|
| Undecane                               | C13H28           | 184            | 17312-64-0| 57         | 999|
| Octane, 2,2,6-trimethyl                | C11H24           | 156            | 62016-28-8| 57         | 999|
| 2,2,6,6-Tetramethylheptahe             | C11H24           | 156            | 40117-45-1| 57         | 999|
| Decane, 2,2,9-trimethyl                | C13H28           | 184            | 62238-00-0| 57         | 999|
| Pentane, 2,2,4-trimethyl               | C8H18            | 114            | 540-84-1  | 57         | 999|
| Methane, isocyanato                    | C2H3N0           | 57             | 624-83-9  | 57         | 999|
| Propane, 1-bromo-2-2-dimethyl          | C5H11Br          | 150            | 630-17-1  | 57         | 999|
| Ethanedionic acid, dibutyl ester       | C10H18O4         | 202            | 2050-60-4 | 57         | 999|
| Dodecan, 2,2,11,11-tetramethyl         | C16H34           | 226            | 127204-12-0| 57         | 999|
| Butane, 2,2-dimethyl                   | C6H14            | 86             | 755-83-2  | 43         | 999|
| Butane, 2,2,3,3-tetramethyl            | C8H18            | 114            | 594-82-1  | 57         | 999|
| Hydroxylamine, methylpropyl            | o-(2-            | 89             | 5618-62-2  | 43         | 999|
| Heptane, 2,3,6-trimethyl               | C10H22           | 142            | 4032-93-3 | 57         | 999|
| Propane, 2-methyl-2-nitro-3-Pentanone   | C4H9NO2          | 103            | 594-70-7  | 57         | 999|
|                                          | C5H100           | 86             | 96-22-6   | 57         | 999|

samples, which is utilized by way of hydroperoxides and decreased by the putrefaction of hydroperoxides induced the initiation of the oxidation level. The Intensity of the bands in the spectrum was detected using Infrared which is proportional to the concentration. As observed from FT-IR spectrum, the added range of peak was detected on 3632.8 cm\(^{-1}\) are confirmed the propagation level of rancidity product has formed. This existing work was decent and substitute for the use of industrial applications during the use of a bulk amount of oils in the processing unit to produce Chips and Snacks. The impact of the rancid oils is in the food through the taste and smell which is produced with the oil that undergoes secondary level of oxidation. The outcome of this study provided the idea of recurrent heating progressively weakened the wellbeing-protecting effect and will be helpful in various features, which is to progress the standard of oil from that it will help to create an civic mindfulness that depiction of cooking oils used to Deep frying atriens temperature for an extended period is not good for
wellbeing’s.

**Conflict of Interest Statement**

The Author Declared that No Conflict of Interest

**Abbreviations**

PV- Peroxide Value, TV- Totox Value, IV- Iodine Value, p-AV- para-Anisidine value, AV- Acid Value, SV- Saponification Value, FT-IR- Fourier-transform infrared spectroscopy, R. D- Relative Density, AOCS- American Oil Chemists Society, GC-MS- Gas chromatography-mass spectrometry, RT- Room Temperature

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