

دراسة خصائص بعض المركبات الليبيدية المحلية والمستوردة ودورها في صناعة الصابون والمنظفات الصناعية.

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الملخص:

يعتمد البحث على إجراء دراسة للمركبات الليبيدية التي لها دوراً مهماً في حياة الإنسان كمادة غذائية غنية بالطاقة وفي المنتجات المختلفة الشائعة: كصناعة الصابون والمنظفات الصناعية ، ومواد التجميل ، وصناعة حبر المطابع ، ولأهمية الليبيدات تم تحليل عشرة عينات من الدهون ، والزيوت الحيوانية والنباتية، ودهن الزبدة ، دهن البقر (بالعلف المحلي، وبدون علف)، زيت الزيتون المحلي ، زيت الذرة Corn Oil، زيت عباد الشمس Sunflower وزيت الكتان ، زيت القطن، زيت الفول السوداني ، زيت الصويا، زيت النخيل (وزيت الخروع المحلي) ، والتي لها دوراً مهماً في صناعة الصابون وقُدرت درجة التصبن عن طريق معايرة الأحماض الدهنية الحرة في وزنة قدرها (5 جرام) من الدهن أو الزيت بواسطة معايرتها بحمض الهيدروكلوريك تركيزه (0.52N) وكذلك تم حساب رقم الأسترة، والرقم اليودي لكل العينات باستخدام محلول تركيزه 0.1 عياري من ثايو سلفات الصوديوم $Na_2S_2O_3 \cdot 5H_2O$ والدليل المستخدم النشا 1%.

Study the characteristics of some local and imported lipid compound and their role in the manufacture of Soap and detergents.

Abstract:

Purely depends on conducting a study of the lipid compounds that have an important role in human life as food rich in energy and in various common products. Such as the manufacture of Soap industrial detergents cosmetics manufacture of printing ink and importance of lipids.

Ten samples of animal and vegetable fats and oils were analyzed Cow fats (Cows Libya Local feed, without feed), Olive oil, corn oil Sunflower oil, Linseed oil, Cotton oil, Peanut oil, Soybean oil, Palm oil and (Libya Castor Oil) which have an important role in Soap making. (5g) fat or oil by titrating

with concentration hydrochloric acid (0.52N), and also calculated the number of Esterfication, and the number of iodine value to each the samples.

Keywords: lipid, local, Saponification, Esterfication, detergents

Introduction:

Lipids in the presence of fatty acid or their derivative are characterized as poorly soluble in water, but it dissolved in non polar organic solvents, including Chloroform, Ether, acetone, benzene, carbon tetrachloride, and it is classified among the lipids of all that represent these solvent.

Lipids generally include fats, Oils, and waxes which are organic compounds with a greasy texture, which essential components of animal, plant, and in the human body cells. Concentrated in the cell wall and nervous tissue of the brain and under the skin it is of health and therapeutic benefit for many diseases and fats act as a store of energy for the conduct of various metabolic processes (building and demolishing in vital systems) and chemically fats consist of five basic elements (carbon, hydrogen, Oxygen, and sometimes nitrogen and phosphorous). Lipids include both neutral fats and its derivatives. Such as steroids hormones, bile salts, vitamins soluble in them (1,2).

While its role lies in the manufacture of industrial detergents, such as soap, which constitutes one of the detergents that a person needs in his life, whether it is for use in cleaning his body, clothes, and residence, or environment in which he lives. Today the huge quantities of manufactured soap are considered a phenomenon of civilization, especially after the availability of new raw materials, and cleaning material were not limited to soap only, but also to other manufactured detergents such as disinfectants and bleaches, which is a mixture of sodium or potassium salts of the acids included in the composition of the fatty substance, and glycerol which is the basis for soap making (1,3,6,7).

Fats Chemical composition:

Chemically fats and oils are esters of fatty acids with glycerol, a tryhydroxalcohol, these fats – forming esters are called glycerides and fatty acids are included in the composition of fats, and they are aliphatic monocarboxylic acids. They do not absorb both visible and invisible light

rays, and the number of carbon atoms of fatty acid is even, including saturated acids such as Stearic acid, and Palmitic acid.

Including unsaturated ones, such as Oleic acid and linoleic acid.

The degree of fluidity or hardness of the fatty acid depends on the percentage of the presence of these glycerides^(4,5)

Classification of Lipids:

Lipids are often referred to as fatty substances extracted from animal and plant tissues by fat solvents and divided according to their chemical composition or their role in the body of living Organisms into simple and compound lipids, including⁽⁶⁾

Fatty acids, which are long, chain aliphatic carboxylic acids, neutral fats resulting from the union of glycerol with fatty acids, ionic esters of glycerol. Fatty acids and phosphates known phosphoglycerides. Lipids that do not contain glycerol in their composition include Sphingolipids and waxes. Lipids combined with compounds unrelated to fats such as proteins and carbohydrates.

The physical and chemical properties of Fatty acids:

- 1- Fatty acids that contain less than ten carbon atoms are liquid at normal temperature, and those that exceed are solid.
- 2- The fatty acid molecules are linked to each other and on one end by the hydrogen bond, therefore the degree of boiling and solubility is high and increases as the number of carbon atoms increases compared to other Organic materials that do not contain hydrogen bonds such as esters or that contain them on one side such as alcohols.
- 3- Fatty acids interact with alkalis and give salts (Saponification).
- 4- Fatty acids are weak acids.

Apparatus and chemicals:

To determine the Saponification value, different samples of fats or Oils are required, a solution of potassium hydroxide (KOH alcoholic) concentration (0.5N), concentration hydrochloric acid (0.52N), phenolphthalein indicator (1.0%), burette 50ml, pipette 10ml, and 2 clean dry tight-fitting conical flasks, Rad condenser and stone to regulating boil.

Samples analysis:

- **Saponification:**

Weigh a sample 5.0g of oil in conical flask then add 50ml of alcoholic potassium hydroxide solution. In the second conical flask put 50ml of potassium hydroxide solution (without fat or oil) which is considered as placebo(Blank)for comparison and put stone to regulating boiling, fix the condenser and heat about half an hour. Then add drops phenolphthalein Indicator (1.0%) and titrate the contents with hydrochloric acid concentration (0.52N) until the pink color disappear and repeat the experiment three times with the same steps and calculate the consumer average volume of HCl acid.

-Esterfication: Value of Saponification - Volume of (HCl ml)Consumer

- Iodine value: To determine the Iodine value, different samples of fats or Oils are required, a solution of sodium Thiosulfate $Na_2S_2O_3 \cdot 5H_2O$ (0.1N) concentration, And using the starch 1% indicator.

Calculations method:

- The volume HCl needed for the neutralization of the reference sample(Blank).

- Equivalent weight KOH = 56 and concentration 0.5N, $56 \times 0.5 = 28$

- Weight of KOH by milligrams needed to Saponification 1g of Oil = $\frac{\text{volume of HCL to titration the blank sample} - \text{volume of HCL to titrate the sample}}{\text{wt. of the sample}} \times 28 =$

Nº of milligrams needed to Saponification 1.0g of Oil.

- Iodine value = $\frac{\text{volume } Na_2S_2O_3 \cdot 5H_2O \text{ titration the blank} - \text{volume } Na_2S_2O_3 \cdot 5H_2O \text{ titrate the sample}}{\text{wt. of the sample}}$

x 12.7

- Esterfication value =

Value of Saponification - Volume of (HCl ml)Consumer

Results:

Table N° (1) shows the values degree of Saponification, N° of Esterfication and iodine value to samples of fat or Oil.

| N° | Sample | Volume of (HCl ml)Consumer | Value degree of aponification mg/g | Esterfication Value | Iodine value | Note |
|----|-------------|----------------------------|------------------------------------|---------------------|--------------|--------------------------|
| 1 | Butter fat | 3.8 | 214 | 210.2 | 32 | |
| 2 | Cows fat | 3.9 | 230 | 226.1 | 17.8 | *Cows (Libya Local feed) |
| 3 | Cows fat | 8.1 | 189.8 | 181.7 | 10.2 | Cows (Without * feed) |
| 4 | Olive Oil | 7.1 | 195.44 | 188.34 | 86 | Libya (Olive Oil) |
| 5 | Corn Oil | 8.9 | 185.36 | 176.46 | 112 | Libyan market (imported) |
| 6 | Soybean Oil | 7.5 | 193.22 | 185.77 | 125 | Imported |
| 7 | Peanut Oil | 8.2 | 189.28 | 181.08 | 98 | Imported |
| 8 | Linseed Oil | 6.8 | 197.12 | 190.32 | 9.05 | Imported |
| 9 | Palm Oil | 6.5 | 198.8 | 192.3 | 54.2 | Imported |
| 10 | Castor Oil | 8.4 | 188.16 | 179.76 | 9.3 | Libya (Castor Oil) |

Figure 1 show Saponification value

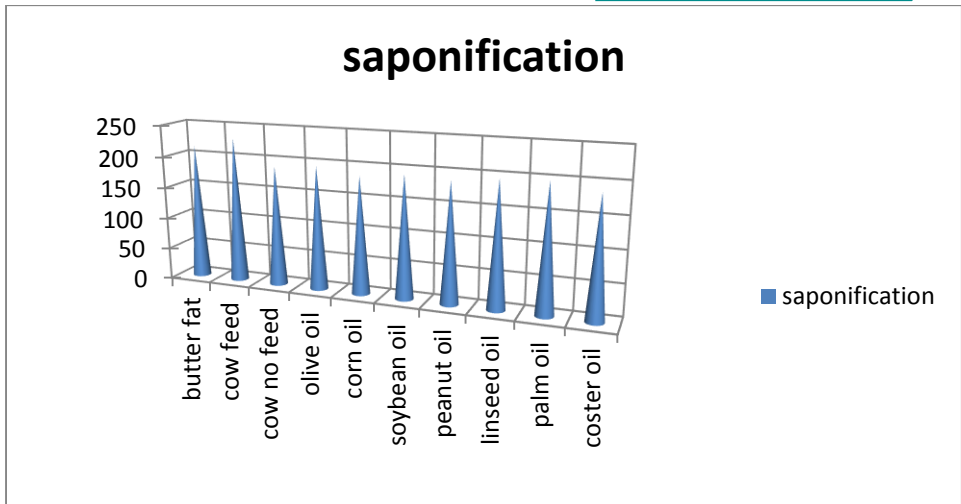


Figure 2 show Esterfication value

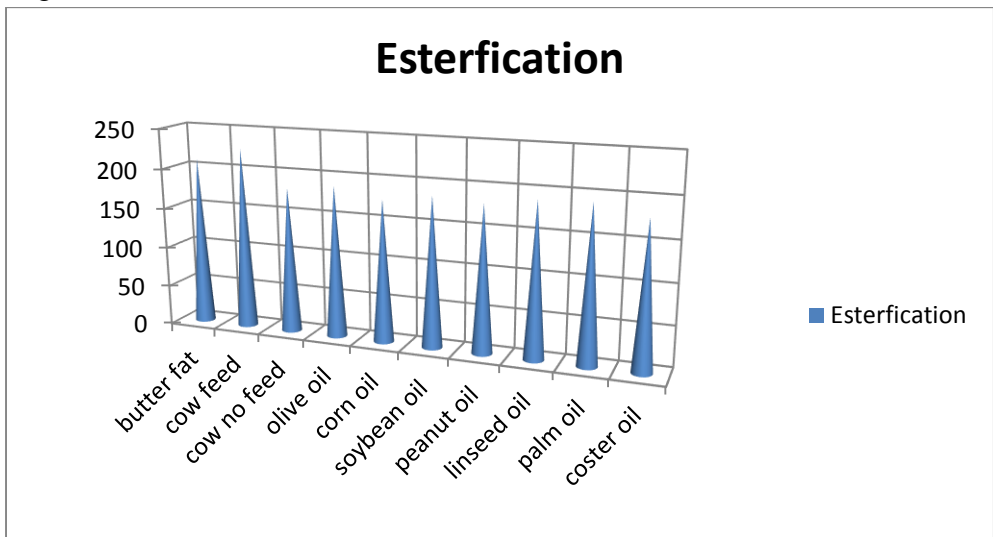
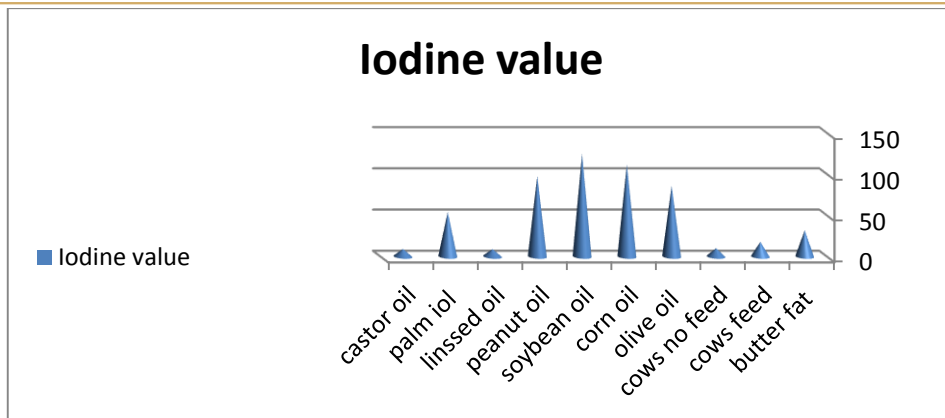


Figure 3 show iodine valu



Conclusion:

Then analysis of ten samples of fats found in Cow fate, butter, Olive oil, Corn oil, linseed oil, Cottonseed oil, peanut oil, Soybean oil, in a weight of 5g titration with hydrochloric acid concentration 0.52N and the phenolphthalein inductor the titration used.

figure-1 shows the degree of Saponification was calculated by mg/gram and all samples ranged from (185.36 -230 mg/g), we also note from the results that the labeling of palm oil 198.8 is a very appropriate value when compared to the standard labeling number for Palm oil 196, Corn oil, Castor oil, the fat Cows without feed 189.8 and soybean oil the value ranged between 185.36 - 193.22 which are reasonable values if compared to actual numbers for each of the Corn oil, Castor oil, the fat Cows without feed 187-195 this indicates that the fatty acids in Corn oil and soybean oil are long chain hydrocarbon acids compared to the acids in palm oil, olive oil, the value ranged between 193.22 – 195.44, and large Saponification in Butter fat and the fat cows feed .

When the triglycerides are hydrolyzed and boiled with Potassium hydroxide, they produce fatty acid salts of potassium and glycerol, and the degree of Saponification is known. Its plays an important role in the manufacture of industrial detergents, such as the soap industry, and must be careful not to increase the substance that works Saponification more than the permissible limit, because it caused harm especially to clothes, and cleaning materials were not limited to soap only, but also to manufactured detergents such as disinfectants bleaches and soap an important component of the detergents that a person needs in his life, And the figure 2 shows the value of Esterfication

labeling from 176.46 to 226.10, the Corn oil and costar oil is very low Esterfication, And the figure 3 shows the value of Iodine ranged between from 9.05 to 125.

Suggestion:

- 1- Conducting a similar study on the use of other materials in the manufacture of soap and other industrial detergents.
- 2- Conducting a study on the negative effects that these industrial materials may have represented in detergents.
- 3- Conducting a study on the nature of chemicals and safety methods in their industrial and commercial use.

Recommendations:

- 1- The researcher recommends training university college students who are specialized in chemistry by training on the analysis and formulation of some detergents.
- 2- The researcher recommends training students to prevent chemicals and reduce the quantities used for their harmful effect.

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