



Received: 14-02-2026  
Accepted: 24-03-2026

ISSN: 2583-049X

## Composition Determined by IR Spectroscopy of Castor Oil

**Ioana Stanciu**

Department of Physical Chemistry, Faculty of Chemistry, University of Bucharest, 4-12 Elisabeta Blvd, 030018, Bucharest, Romania

DOI: <https://doi.org/10.62225/2583049X.2026.6.2.6067>

Corresponding Author: **Ioana Stanciu**

### Abstract

In this article, we determined the composition of castor oil using FTIR spectroscopy and the ShemadzuIRPrestige-21 spectroscope as the instrument. Castor oil contains

absorption bands between the wave numbers 3384 and 458 $\text{cm}^{-1}$ . The functional groups contained in castor oil are: O-H, C-H, C=O, C-O.

**Keywords:** Chemical Composition, Castor Oil, IR Spectroscopy

### Introduction

Castor oil is a thick, odorless oil extracted from the seeds of the castor plant. Its use dates back to ancient Egypt, when castor oil was used as a lamp fuel, but it was also used for medicinal and beauty purposes. Cleopatra is even said to have used it to brighten the whites of her eyes. Today, most castor oil is produced in India. It is still used as a laxative and in skin and hair products [1-5]. Castor oil is also an ingredient in motor oil. This article will introduce what castor oil is and discuss its skin benefits, as well as how to use it and the possible side effects to expect. Castor oil is a vegetable oil that people use for a wide range of cosmetic and medical purposes. People commonly take castor oil as a laxative, but the oil also has potential benefits for hair and skin. Here are some essential facts about castor oil:

- it comes from the seeds of the *Ricinus communis* plant;
- it is applied directly to the skin;
- castor oil is relatively safe to use, but some people have reported side effects after applying it to the skin (allergic reactions);
- castor oil is believed to have anti-inflammatory, antimicrobial, moisturizing, and several other beneficial properties.

Castor oil is not considered an edible oil and has a very unpleasant taste. But some people take small amounts orally for medicinal reasons. One tablespoon of castor oil contains: calories: 120; protein: 0 grams; fat: 14 grams; carbohydrates: 0 grams; fiber: 0 grams; sugar: 0 grams [6-12].

Castor oil also contains: vitamin E; omega-9 fatty acids; Omega-6 fatty acids.

The active ingredient in castor oil is a fatty acid called ricinoleic acid.

### Materials and methods

IR spectrometer (resolution 4  $\text{cm}^{-1}$ ) for KBr pellets (2 mg sample with 500 mg KBr). Attempts were made to monitor the intermolecular interactions in solutions according to changes in the spectra.

FT-IR spectra were recorded on Shimadzu's Fourier transform infrared spectrometer (Japan) with frequency range of 4000-500  $\text{cm}^{-1}$ .



Fig 1: ShemadzuIRPrestige-21 Spectofotometer

## Results and Discussions

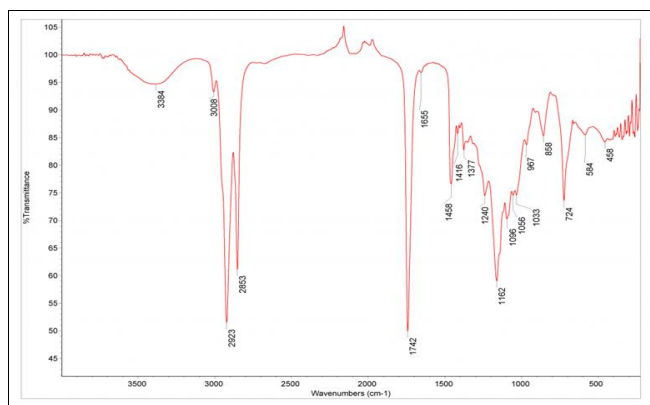


Fig 2: Spectre IR of castor oil

Castor oil has a wave number  $3360\text{ cm}^{-1}$  with a weak intensity indicating the existence of O-H bond stretch vibrations and wave number  $1745.58\text{ cm}^{-1}$  with strong and sharp intensities indicating the existence of stretching vibrations of the C=O bond as esters [13-19].

## Conclusions

Castor oil is a thick, odorless oil obtained from castor seeds. Its use dates back to ancient Egypt, when castor oil was used as a lamp fuel, but it was also used for medicinal and cosmetic purposes. Castor oil contains absorption bands between wave numbers  $3384$  and  $458\text{ cm}^{-1}$  and the functional groups contained in castor oil are O-H, C-H, C=O, C-O and were determined with the ShemadzuIRPrestige-21 spectrometer.

## References

- Subagio A, Morita N. Food Chemistry. 2003; 81:97-102.
- Dupont J, White PJ, Carpenter MP, Schaefer EJ, Meydani SN, Elson CE, *et al.* Journal of the American College of Nutrition. 1990; 9(5):438-470.
- Veljković VB, Biberdžić MO, Banković-Ilić IB, Djalović IG, Tasi MB, Nježić ZB, *et al.* Renewable and Sustainable Energy Reviews. 2018; 91:531-548.
- Beadle JB, Just DE, Morgan RE, Reiners RA. Journal of the American Oil Chemists' Society. 1965; 42(2):90-95.
- Strocchi A. Journal of Food Science. 1982; 47(1):36-39.
- Stanciu I. Rheological behaviour of biodegradable lubricant. Journal of Science and Arts. 2019; 3(48):703-708.
- Stanciu I. Rheological investigation of soybean oil from soya beans. Journal of Science and Arts. 2019; 4(49):938-988.
- Stanciu I. Modeling the temperature dependence of dynamic viscosity for rapeseed oil. Journal of Science and Arts. 2011; 1:55-58.
- Meneghetti SMP, Meneghetti MR, Wolf CR, Silva EC, Lima GE, Coimbra MDA, *et al.* Journal of the American Oil Chemists' Society. 2006; 83(9):819-822.
- Stanciu I. Journal of Science and Arts. 2018; 18(2):453-458.
- Sheibani A, Ghotbaddini-Bahraman NASER, Sadeghi FATEMEH. Oriental Journal of Chemistry. 2014; 30(3):1205-1209.
- Stanciu I. Some methods for determining the viscosity index of hydraulic oil. Indian Journal of Science & Technology. 2023; 16(4):254-258.
- Stanciu I. Rheological behavior of corn oil at different viscosity and shear rate. Oriental Journal of Chemistry. 2023; 39(2):335-339.
- Stanciu I. Rheological characteristics of corn oil used in biodegradable lubricant. Oriental Journal of Chemistry. 2023; 39(3):592-595.
- Stanciu I. Effect of temperature on rheology of corn (*Zea mays*) oil. Oriental Journal of Chemistry. 2023; 39(4):1068-1070.
- Stanciu I. Study Rheological Behavior of Rapeseed oils Compared to Mineral oil. Oriental Journal of Chemistry. 2021; 37(1):247-249.
- Stanciu I. Influence of Temperature on the Rheological Behavior of Orange Honey. Oriental Journal of Chemistry. 2021; 37(2):440-443
- Hunsom M, Saila P, Chaiyakam P, Kositnan W. Int. J. Renew. Energ. Res. 2013; 3:2.
- Catterick J, Thornton P. Adv Inorg Chem and Radio Chem H.J. Emeleus and A.G. Sharpe (eds.) Vol. 20 (Academic, 1977).