

INFORMATION PAGE ABOUT THE THESIS'S ACADEMIC CONTRIBUTIONS

1. Full name of PhD student: Nguyen Thi Minh Nguyet
2. Names of Academic Advisors: Prof. Dr. Vu Thi Thu Ha
Assoc. Prof. Dr. Nguyen Thanh Binh
3. Thesis title: **Research on the extraction, purification of lutein and zeaxanthin, and formulation of nanosized emulsion products from marigold (*Tagetes erecta* L.).**
4. Thesis Field of Study: Chemistry
5. Major: Organic Chemistry
6. Course: 2017 - 2021
7. Code: 9.44.01.14
8. Institution:: Vietnam Institute of Industrial Chemistry

NEW CONTRIBUTIONS OF THE THESIS

1. The process of extracting and purifying lutein and zeaxanthin from marigold petals was systematically studied, starting from the preliminary processing of raw materials to the preservation of the final product. The obtained lutein, after hydrolysis of the extract, was recrystallized at 50 °C using an ethanol/water solvent system (1/1 v/v ratio) to obtain high-purity lutein that met the standards specified in the United States Pharmacopeia (USP 40). This recrystallization method offers high purity, short crystallization time, low solvent volume, and does not involve the use of any toxic solvents, making it suitable for industrial-scale deployment.
2. Lutein and zeaxanthin were isolated from the product mixture using silica gel column chromatography. From a mixture containing 96% total lutein, 260 mg of lutein standard (with a content of over 98%) and 6 mg of zeaxanthin standard (with a content of over 95%) were successfully isolated. These isolated compounds met the quality criteria as analytical standards for high-performance liquid chromatography (HPLC).
3. A lutein-containing nano-emulsion was successfully prepared with an optimized formula consisting of lutein (0.5% in soybean oil), soybean oil (1%), Tween 80 (18%), Span 60 (4%), pectin (0.06%), and double-distilled water (100 ml). The resulting nanoparticles had an average size of approximately 56 nm, which remained stable in

size and shape for 43-44 days. After 24 months of storage, under specified conditions, the emulsion system did not undergo phase separation, and the particle size was measured at 97 nm.

Academic Advisor 1

Academic Advisor 2

PhD. Student

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