

Nature of Invention: Chemical molecule and synthesis route

Applicant: Ultraviolet Chemicals

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Chemical Formula: $C_8H_{16}O$

Chemical Name: 2-Octanone

Chemical synthesis routes:

The alkali fusion of castor oil at a temperature of 458–463 K for a long period (such as 13 h) using 1 mol of sodium or potassium hydroxide produces 2-Octanone (methyl hexyl ketone) as a reaction product.

Raw Materials:

- a. Castor Oil
- b. NaOH
- c. Mineral Oil
- d. Pb_3O_4

Reactions is carried out using a microwave lab station that is equipped with a magnetic stirrer, a noncontact infrared continuous-feedback temperature system, and Easydoc software. The microwave synthesis unit is resistant up to a temperature of 533 K. A distillation column was set up to distil off volatile products emanating from the reaction medium. A suitable temperature program was determined for the microwave synthesis system for the cleavage reactions.

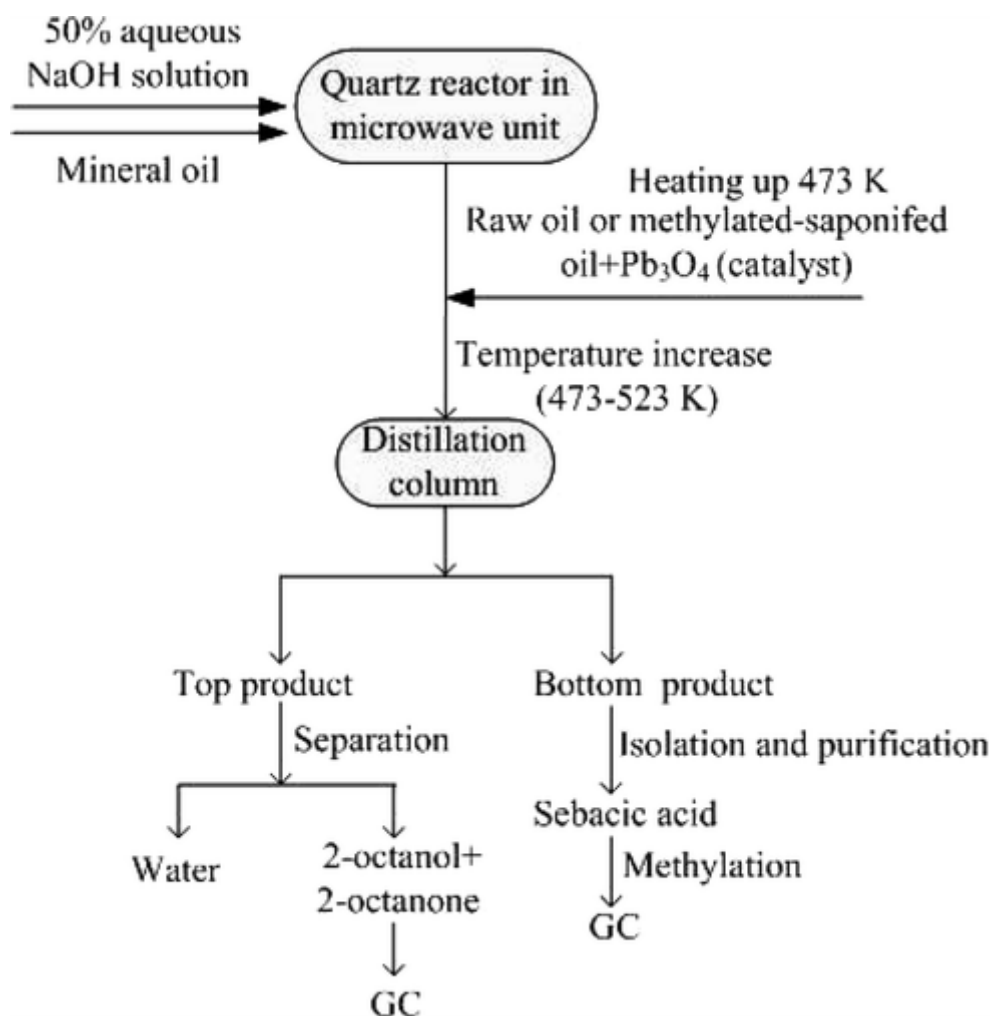
White mineral oil (7.5/35 NaOH/mineral oil, w/w), used as a thinning agent to prevent foaming, and 50% aqueous alkali solution (8:15; 12:15; 14:15, NaOH/oil ratio (w/w)) were weighed into a 250 mL quartz reactor. The reactor was placed into the cavity of the microwave system, and the distillation column was attached to the microwave unit. The contents of the reactor were heated up to 383 K and kept for 8 min at this temperature to obtain a uniform dispersion of sodium hydroxide in mineral oil before feeding castor oil and catalyst.

After removing water and reaching the temperature of 473 K, a mixture of castor oil and 1% of catalyst (Pb_3O_4) was added into the reactor dropwise to prevent foaming, and the temperature was raised to 473–523 K to start up the reaction.

The volatile products (2-octanol, 2-octanone, and water) emanating from the reaction medium were obtained as top products of the distillation column, which was installed over the microwave synthesis unit. The reaction was further continued by microwave heating for 5–20 min to increase the yield of solid product (sebacic acid). At the end of the reaction, the system was cooled to ambient temperature.

To increase the yield of oleochemicals, methylated then pre-saponified castor oil was subjected to alkali fusion. Yields of oleochemicals obtained at 513 K and 20 min reaction time are given in the Table below.

NaOH/Na-ricinoleate (w/w)	NaOH/ Mineral oil (w/w)	2-octanol%	2-octanone%	Sebacic acid %
12/15	7.5/35	57.2	43.5	70.4
14/15	7.5/35	62.6	37.4	76.2





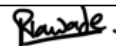

References:

<https://pubs.acs.org/doi/10.1021/ie071345u>

List the contributions of each author:

- Author 1 and 2 worked on selection of the chemical.
- Authors 1, 2 and 4 worked on selection of the manufacturing process.
- Authors 1 and 3 worked on studying the process in detail.

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