Research & Reviews: Journal of Hospital and Clinical Pharmacy

# Energy Conservation by Using Microwave as a Source for the Production of Bioenergy Production as a Refundable Source of Energy

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Commentary

**Received:** 14/07/2016
**Accepted:** 29/07/2016
**Published:** 06/08/2016

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**Keywords:** Biodiesel, Microwaves oven, Electromagnetic radiation, Infrared energy.

## ABSTRACT

Microwave is a form of electromagnetic radiation having wavelength ranges from 1 m to 1 mm with the frequency between 290 MHz to 290 GHz. Microwaves have been applied in plentiful organic and biological chemical syntheses; practicably, from the time their proficiency to work as heat source was discovered. Existing laboratory scale microwave submissions in biodiesel making presented the possible of the technology to complete superior results over conservative approaches. Energy occupation and explicit energy necessities for microwave based biodiesel combination are supposedly better than conventional techniques. Microwaves can be same well laboring in feedstock planning, withdrawal and Tran's esterification stages of the biodiesel manufacture progression. While microwave machinery has broad-minded in other food, pharmaceutical and polymer chemistry supplementary research and industry, it has up till now to demonstrate it's forthcoming in the biodiesel industry at massive scale usages.

## INTRODUCTION

In the electromagnetic band, the microwave radioactivity area is positioned between infrared radiation and radio waves. Microwave is a form of electromagnetic radiation having wavelength ranges from 1 m to 1 mm with the frequency between 290 MHz to 290 GHz. Tele- communications and microwave radar apparatus inhabit many of the band regularities in this region. In overall, in command to avoid interfering [1-4], the wavelength at which industrial and domestic microwave device proposed for heating controls is controlled to 12.2 cm, consistent to a frequency of 2.450 GHz, nevertheless other frequency distributions do exist. It has been well-known for a extended period that microwaves can be rummage-sale to heat constituents [5,6].

The squat reaction periods and lengthened reaction range that is accessible by microwave supported organic synthesis are matched to the increased anxieties in industry [7-13]. In particular, there is a condition in the pharmaceutical industry for an advanced amount of novel chemical things to be fashioned, which requires chemists to employ a sum of resources to decrease the time for the manufacture of complexes compounds.

In all-purpose, maximum organic reactions has been animated using old-style heat transfer apparatus such as oil baths, silt baths and boiler jackets. These warming methods are, however, somewhat slow and a temperature gradient can advance within the model. In calculation, confined overheating can lead to produce, substrate and component disintegration [14-24].

In peculiarity, microwave dielectric heating, the microwave energy is familiar into the chemical reactor remotely and straight admittance by the energy spring to the reaction vessel is gained. The microwave energy permits through the parapets of the vessel and warmth only the reactants and solvent, not the reaction container himself. Unknowingly the apparatus is appropriately designed; the temperature development will be even throughout the example, which can lead to less by-products and/or breakdown goods [25-28].

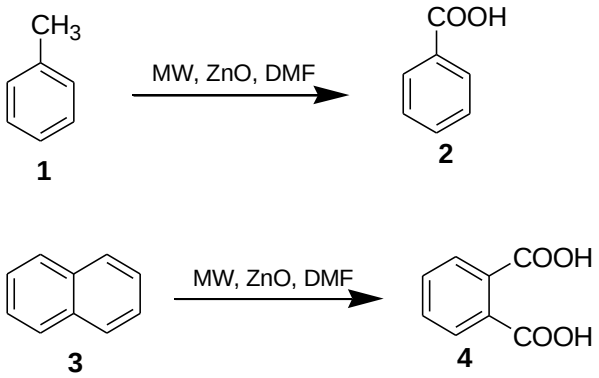
Newly it was verified that diverse organic reactions can be securely achieved in conservative local microwave oven. The beneficial turn the microwave supported approach environmentally benign for planning of significant complexes [29,30].

## Electromagnetic Radiation Role in Biodiesel Production

Currently, marketable biodiesel engineering procedures are based on either conventional or supercritical heating approaches. Normally used methods are: 1) Oxidation reactions, 2) Reduction reactions, 3) Condensation reaction. To takeout oxidation, reduction and condensation reactions using microwave oven [31].

### *Oxidation reactions*

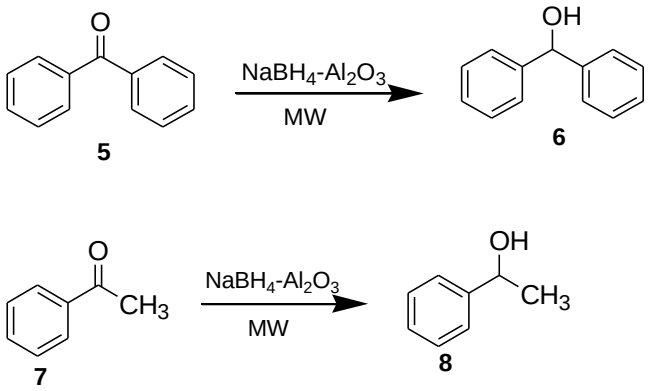
#### *1. Benzylic oxidation*




Toluene (1) and napthlene (3) (10 mmol), zinc oxide (0.2 g, 2.5 mmol) and N,N-dimethylformamide (0.18 ml, 2.5 mmol) were placed in aborosil beaker (50 ml) . The combination was assorted properly with the support of a glass rod (15 s) and then irradiated under safe conditions in a domestic microwave oven at 800 W for 6 min. The reaction mixture was air-conditioned to room temperature and diluted with DMF (5 ml) [32-37]. It was filtered and ice-cold water (100 ml) was added to the filtrate. The solution was extracted with CHCl3 and the solvent was removed under reduced pressure after drying over anhydrous sodium sulphate. Finally, the products 2 and 4 were purified either by crystallization from CHCl3 pet. ether or by column chromatography on silica gel using pet. ether as eluent . The structures of the product were confirmed by 1H NMR [38].

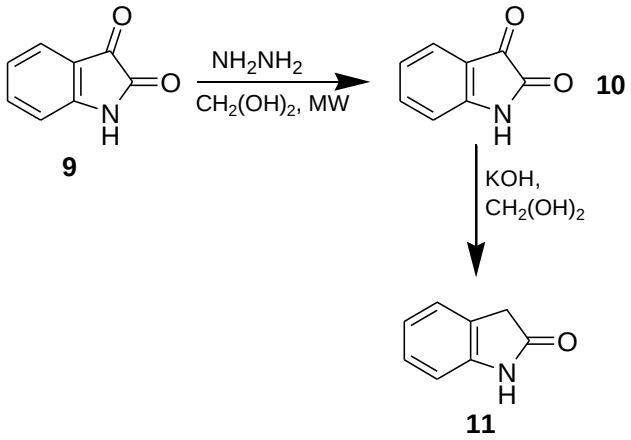
### *Reduction reactions*

#### *1. Reduction of carbonyl compounds*




Freshly prepared NaBH4 - alumina is thoroughly mixed with neat benzophenone (5) or acetophenone (7) (0.36 g, 3.0 mmol) in a beaker and placed in an alumina bath inside the microwave oven and irradiated (30 sec). Upon completion of the reaction, monitored on TLC (hexane: EtOAc, 8:2 v/v), the product is extracted into methylene chloride (2 × 15 ml). Removal of solvent under reduced pressure essentially provides pure sec-alcohols 6 and 8 as products [38-51].

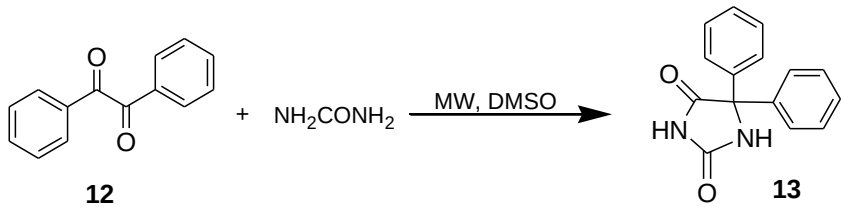
*2. Wolf kishner reduction*




Isatin (0.25 g, 1.7 mmol), 55% hydrazine (0.30 g, 0.425 mmol) and ethylene glycol (1 ml) were added to 50 ml beaker. The mixture was shaken gently to ensure proper mixing. The beaker was then covered with a watch glass and irradiated in microwave oven in medium power for 30 s. After the beaker was removed from the oven and cooled to the room temperature, the mixture was further cooled in an ice bath for 5 min [52-69]. The yellow powder were collected in a suction flask and washed with cold ethanol (2 × 0.5 ml), and air dried M.P. – 220°C.

A 50 ml beaker containing 0.5 ml of ethylene glycol and KOH (62 mg, 1.1 mmol) was irradiated in microwave oven for 10 s to dissolve the base. Isatin-3-hydrazone (10) (58.5 mg, 0.36 mmol) was the added to the beaker and irradiated in microwave oven for 10 s [70-80]. The beaker was removed from the oven and cooled to the room temperature. The brown solution was then diluted with 1 ml of deionised water, acidified with 6 M HCl until pH=2, and extracted with diethyl ether (3 × 1.5 ml). The ether solution was dried with anhydrous sodium sulphate and evaporated in hood to give a yellow solute. The solid was recrystallised from 0.7 ml deionised water to yield 15.5 mg of oxindole as white needles [81-91]. M.P. -126°C.

*Condensation reaction*




2.5 ml of 1.2 M aqueous KOH were added to amixture of Benzil (2 g, 9.62 mmol) and Urea (1 g, 16.7 mmol) dissolved in 4ml DMSO in a beaker.

Following an initial 90 sec, 750 W pulse the mixture was stirred for 5min. 30 sec pulses were then applied at 6, 9, 12, 15, 18, 21, 24 and 30 min, the mixture was stirred between pulses. The mixture was then poured into 300 ml of cold water. The precipitate was filtered and then filterate was acidified with glacial acetic acid.

The white precipitate 13 (Diphenyl imidazolidine) was collected, dried and recrystallized from ethanol. Spectral data similar top commercial sample of the product [91-103]. M.P. – 296°C

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