

# Technical Brief

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## One pot synthesis of flavoring ketones such as ginger and raspberry ketones

### Technology Summary

A green and an efficient route for the synthesis of flavoring ketones such as Ginger and Raspberry Ketones. The method uses acetoacetic ester and substituted benzylic carbons catalyzed by a commercial heterogeneous solid catalyst- Amberlyst-15. The reaction takes place in one pot under mild reaction conditions.

### Background

Common food additives and substitutes like monosodium glutamate, trans fat, sodium nitrite, artificial sweeteners, etc can cause issues such as weight gain and hypertension. Thus, there is an increasing demand to find safer alternatives. Flavoring aryl ketones are known to be useful as they aid in burning subcutaneous fats, serve as dietary supplements, promote weight loss, are used in skin-lightening cosmetics, and have anti-inflammatory and anti-oxidative activities, are in huge demand in the fragrances, pharmaceuticals, and agrochemical industries. Thus, there is significant interest in synthetic methods for the synthesis of such ketones. Traditional methods for the synthesis of ketones use a stoichiometric amount of an alkaline/alkaline metal as the base, leading to the formation of many byproducts.

### Technology Description

The aryl ketones were synthesized using a one pot reaction via alkylation followed by decarboxylation using the industrial-grade solid acidic Amberlyst-15 catalyst. Several strong solid acid catalysts were screened for the alkylation and Amberlyst-15 was found to be the most efficient catalyst for this reaction, and was used for further reaction optimization. The scientists also studied the effect of varying catalytic amounts, the effect of the solvent, and substrate scope. They concluded that the reaction successfully proceeded under the solvent-free condition and was suitable for all of the substrates to produce the aryl ketones with excellent yield.

### Market Potential\*

The Flavouring Ketones Market is estimated to be valued at USD 443 million in 2019 and is projected to reach a value of USD 640 million by 2025, growing at a CAGR of 6.3% during the forecast period.

\*[https://www.marketsandmarkets.com/food-and-beverages-market-research-6\\_3.html](https://www.marketsandmarkets.com/food-and-beverages-market-research-6_3.html)

### Value Proposition

- Low cost final product
- High selectivity in presence of solid acid catalyst which is reusable up to 8-9 times
- High conversion rate up to 99%
- High purity & yield up to 70-80%
- Reaction can be carried out under solvent free condition
- One pot synthetic process, easy to carry out
- Scalable process
- Current solid acid catalyst overcomes palladium hazard
- Impurities can be separated by simple distillation
- Raw material and catalyst are easily available in India, no import dependence

### Applications

- Flavoring agents/Food additives
- Dietary supplements
- Skin lightening cosmetic products
- Perfumery
- Anti-inflammatory, anti-oxidative properties
- Promote weight loss by burning subcutaneous fats

### Technology Status

- Demonstrated at lab scale; 10 g scale
- Patent protected
- Seeking interested industry partners