AMINE PROMOTED SYNTHESIS OF HYDROXYMETHYLFURFURAL

IITM Technology Available for Licensing

Problem Statement

- The invention addresses the challenge of efficiently **converting glucose to 5-hydroxymethylfurfural (HMF)**, a valuable precursor for various chemicals, by utilizing a novel **one-pot process involving amine-promoted isomerization and subsequent dehydration.**
- This innovative approach aims to **overcome the limitations of existing methods**, offering improved selectivity, higher yield, and the potential for amine recovery and reuse.
- There is a demand for a simplified, **high-yield approach** to **directly transform glucose into HMF in a single step**, addressing sustainability and renewable resource concerns.

Technology Category/ Market

Category – Green Chemistry & Chemical Analysis, Chemical Synthesis.
Applications -Chemical Synthesis and Catalysis
Industry – Chemical Industry, Renewable energy
Market -Green Chemical Market size was valued at USD 9.89 billion in 2021 and is poised to grow from USD 10.76 billion in 2022 to USD 21.13 billion by 2030, growing at a **CAGR of 8.8%** in the forecast period (2023-2030).

Key Features / Value Proposition

Technical Perspective:

- The invention offers an **innovative, sustainable process** combining **amine-promoted isomerization** and **Amadori rearrangement** for efficient **glucose-to-HMF conversion,** enhancing yield and **aligning with green chemistry principles.**

User Perspective:

- The invention benefits from a **resource-efficient method generating versatile HMF for bio-based products,** supporting sustainability and **addressing demand for eco-friendly chemical synthesis.**

TRL (Technology Readiness Level)

TRL- 3/4, Proof of Concept ready & validated

Intellectual Property

- **IITM IDF Ref. 2447**
- **IN 202341004179**

Technology

▪The present disclosure relates to a method for **synthesis of 5-hydroxymethylfurfural (HMF)** from **monosaccharides, disaccharides or oligosaccharides.**

▪The invention employs a **one-pot process** that combines **amine-promoted isomerization** and subsequent dehydration reactions.

▪The process addresses the challenge of efficiently **converting glucose to HMF by leveraging the Amadori rearrangement**, a chemical transformation that **converts aldose sugars to amino-ketose derivatives under mild conditions.**

This unique approach improves **selectivity, yield, and environmental friendliness compared to traditional methods**

▪The technology has applications in **producing valuable chemical intermediates from renewable sources**, contributing to the development of **sustainable and bio-based chemicals in the chemical industry.**

Research Lab

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Image

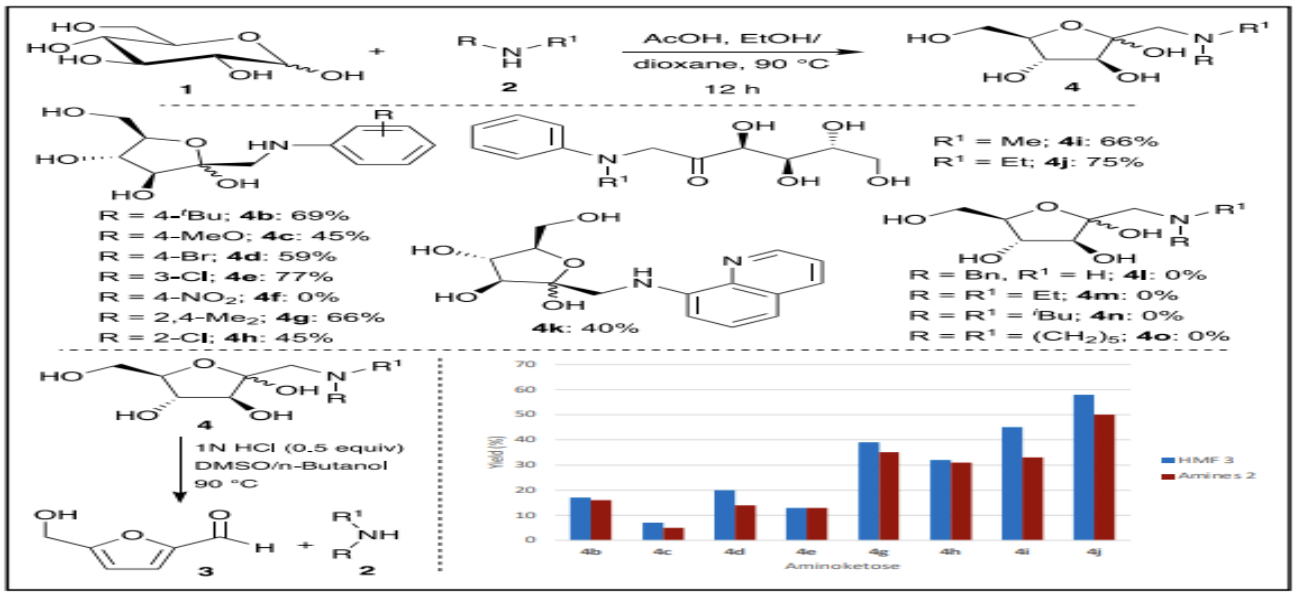

Fig. 1 illustrates Scheme 1. Synthesis of aminoketose 4. All are isolated yields. (a) Dehydration 4 to 3 (1N HCl (0.5 equiv), DMSO/n-Butanol, 90 °C), Yields mentioned in the chart are based on GC.

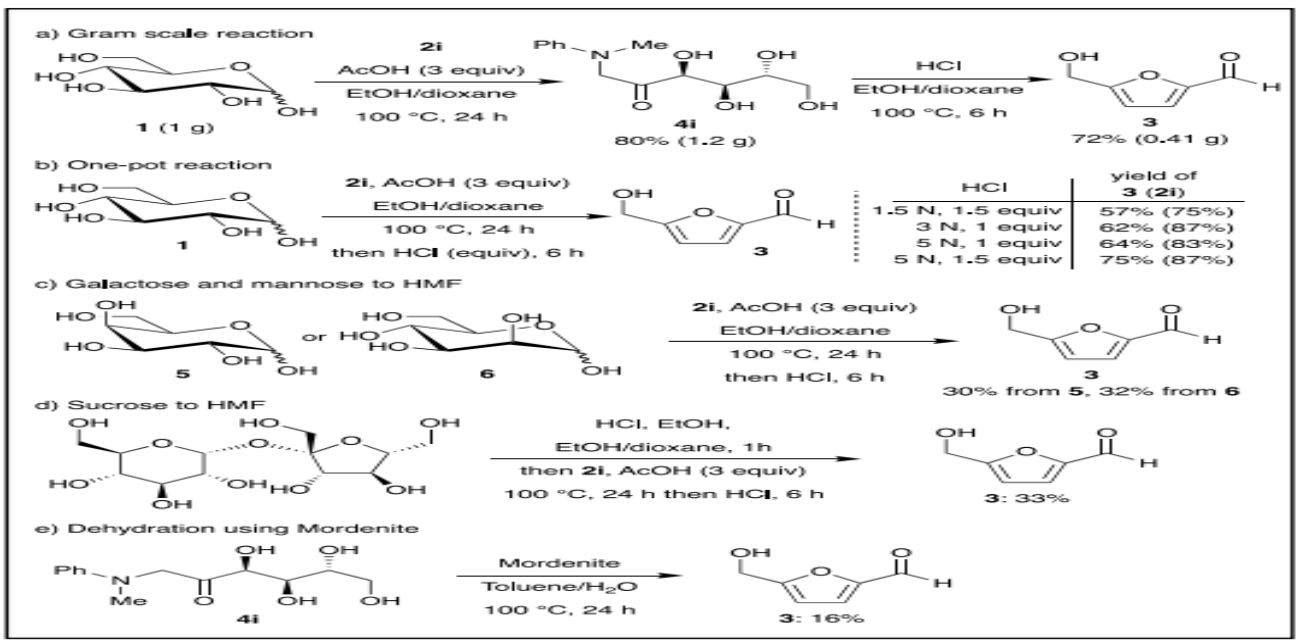

Fig. 2 illustrates Scheme 2. Conversion of carbohydrates to HMF 3

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