

Preface

The increasing emphasis on sustainable materials has sparked interest in using bio-based polyols in industrial polyurethane production. This book addresses the critical need for sustainable materials by focusing on the unique application of coconut oil-derived polyols in polyurethane (PU) foam production. PU foams amounted to \$49.5 billion in 2023 and will likely grow further in the upcoming years. While incorporating bio-based materials into polymers is not new, coconut oil introduces a novel approach due to its unique properties. This book investigates innovative methods for producing sustainable polyol and polyurethanes from coconut oil, demonstrating how these novel approaches, despite existing challenges, can reduce reliance on petroleum-based chemicals and promote more sustainable polymer technologies. Notably, coconut oil is the 10th most consumed oil in the world, reflecting its substantial role in the global market.

The book focuses on all about polyurethane foams, particularly applying coconut oil-derived polyols in polyurethane foam production, offering a detailed examination of their potential benefits and associated difficulties. The introductory chapter outlines the history, markets, applications, and the critical need for greener alternatives in polyurethane industry and emphasizes the emerging role of coconut oil in addressing environmental concerns. Subsequent chapters delve into the chemistry and synthesis of coconut oil-derived polyols and polyurethanes, providing insights into their properties and contributions to polyurethane formulations. The book overviews how coconut oil's high saturation impacts the polyol production process and explores methods to overcome these challenges. It bridges the gap between raw material science and practical application using coconut oil in polymer studies, providing valuable information for researchers and industry professionals aiming to innovate with sustainable polymer materials.

Lastly, the book examines coconut oil-based sustainable foams' diverse applications and benefits in insulation, furniture, automotive interiors, and packaging sectors. Demonstrating the advantages of reduced environmental impact and enhanced performance, it provides a practical guide for manufacturers and stakeholders. It concludes with exploring emerging trends, technological advancements, and future opportunities in sustainable polyurethane foams. This forward-looking approach aims to inspire innovation and guide industry players in navigating this evolving landscape, especially in the coconut industry.

This book benefits researchers and academics by offering insights into innovative methods for producing sustainable polyols from coconut oil, particularly in functionalizing highly saturated oils for polyurethane foam applications. Polyurethane industry professionals, such as chemists, chemical engineers, and industry researchers, will find practical guidance in incorporating coconut oil-derived polyols into polyurethane foam production. This will help reduce petroleum reliance and enhance sustainability in line with the growing emphasis on integrating sustainable practices in industry operations.

In this collection, we hope it inspires further research into fully implementing bio-based materials for polymer applications, and prompting commercial development of coconut oil-based polymers and polyurethanes. We wish you all the best!

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