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ALCOHOL-HYBRID SOLVENT FOR COTTONSEED EXTRACTION

Dr. Pawan D. Meshram

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Kripa-Drishti Publications, Pune.

Book Title: **Evaluation of Alcohol-Hybrid Solvent for Cottonseed Extraction**

Author By: **Dr. Pawan D. Meshram**

Price: ₹499

1st Edition

ISBN: **978-81-978152-0-1**

Published: **August 2024**

Publisher:

Kripa-Drishti Publications

A/ 503, Poorva Height, SNO 148/1A/1/1A,
Sus Road, Pashan- 411021, Pune,
Maharashtra, India.
Mob: +91-8007068686
Email: editor@kdpublications.in
Web: https://www.kdpublications.in

PREFACE

In developing a process for solvent extraction of edible oil-bearing seeds; the prime objects are to produce superior quality meal and premium grade oil by economical methods. There are certain inherent as well as adventitious toxic factors in certain protein rich oil seeds like cottonseed, soybean etc., which vitiates the nutritive value of the concentrates. Towards the goal of utilization of protein rich deoiled cakes for human consumption, these toxicants have to be eliminated altogether or brought down to safe limits during solvent extraction. Hexane has been the major solvent used for vegetable oilseed extraction. Although hexane is presently the solvent of choice worldwide for oil extraction, it has some characteristics and lacks certain attributes that keep it from being an ideal extraction solvent. Furthermore, Federal Clean Air legislation implies that hexane may have only a brief commercial life remaining. One more disadvantage of hexane is that it can't extract these anti-nutrients during processing.

Alcohols have long been attractive alternative solvents to hexane for vegetable oil extraction. Methanol, ethanol, n-propanol, isopropanol, n-butanol, isobutanol, and allyl alcohol are all good solvents at temperatures close to their boiling points; provided they remain anhydrous. Isopropyl alcohol (IPA) may be advantageous among the alcohols in certain applications. The main advantage of

IPA is its greater solvency and the ability to detoxify the oil-bearing material. It also allows energy saving non-evaporative methods (chill separation) for solvents recovery from miscella.

In India cottonseed is one of the major oil seed and the cake left after extraction of oil is used for cattle feeding only, as it contains free gossypol and available protein is devoid of lysine. Considering its amino acid composition, processing of cottonseed deserves immediate attention for its utilization as a possible source of protein for human consumption. Therefore, this book is authored to explore the investigation of the efficiency of IPA as a solvent in terms of oil yield and its detoxification capability for cottonseed. **This book includes development of extraction methodology to process the cottonseed kernels using IPA-hexane hybrid solvent systems.** Further, effect of adjusting acidity of the water portion of the isopropanol-water azeotrope (IPAWA) and its hybrid with hexane on oil extraction, free gossypol reduction and protein recovery is investigated.

The author wishes to acknowledge with gratitude to Prof. D. N. Bhowmick for constructive comments and invaluable suggestions.

Abbreviations and Trade Names

CAA	Clean Air Act
DT	Desolventization and Toasting
HAPs	Hazardous Air Pollutants
Hvtox	Toxic Hazard Value (0.0 – 5.0 mg/m^3 or ppm)
IPA	Isopropyl Alcohol
IPAWA	Isopropanol-Water Azeotrope
TLV	Threshold Limit Value (mg/m^3 or ppm)
USFDA	United State Food and Drug Administration
VOCs	Volatile Organic Compounds
WCS	Whole Cottonseed

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KRIPA DRISHTI PUBLICATIONS

Price: ₹499

Kripa-Drishti Publications
A-503 Poorva Heights, Pashan-Sus Road, Near Sai Chowk,
Pune – 411021, Maharashtra, India.
Mob: +91 8007068686
Email: editor@kdpublications.in
Web: https://www.kdpublications.in

ISBN: 978-81-978152-0-1