

Separation & Characterization

(Lipchen98 - SSS)

LIPCHEN98 Specialty Chemical Consultant
(LIPCHEN98 特殊化工咨询顾问公司)

August 2024

Objectives and Customers

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To offering free technical consultancy and services for customers on material sciences, particularly on characterization and processing questions.

Separation Science

Analytical Chemistry

Materials Science

Characterization

Separation science plays a critical role in many industrial processes and applications.
We can be called as Lipchen98 – SSMS *(Lipchen98 - SSMS)*

Lipchen98 - SSMS

- **Free Technical Consultancy & Services!**

What We Offer:

- **Expert Guidance:** Leverage our extensive experience in material science for your characterization and processing needs.
- **Customized Solutions:** Tailored advice to address specific challenges in your projects.
- **State-of-the-Art Techniques:** Access to advanced methods for material characterization.
- **Processing Support:** Expert help with material processing questions to optimize your outcomes.

- **Why Choose Us?**

- **Proven Expertise:** Decades of experience in the field.
- **Cutting-Edge Knowledge:** Stay ahead with our up-to-date industry insights.
- **Cost-Effective:** Free consultation, saving you time and resources.

- **How to Get Started:**

- **Reach Out:** Contact us with your material science queries.
- **Discuss Your Needs:** We'll analyze your requirements.
- **Receive Tailored Advice:** Get actionable solutions for your project.

- **Contact Us Today!**

Email: [Your Email Address]; *Phone:* [Your Phone Number]; *Website:* [Your Website URL]

- **[Your Company's Contact Information]**

(Include physical address, additional contact details, or social media handles here)

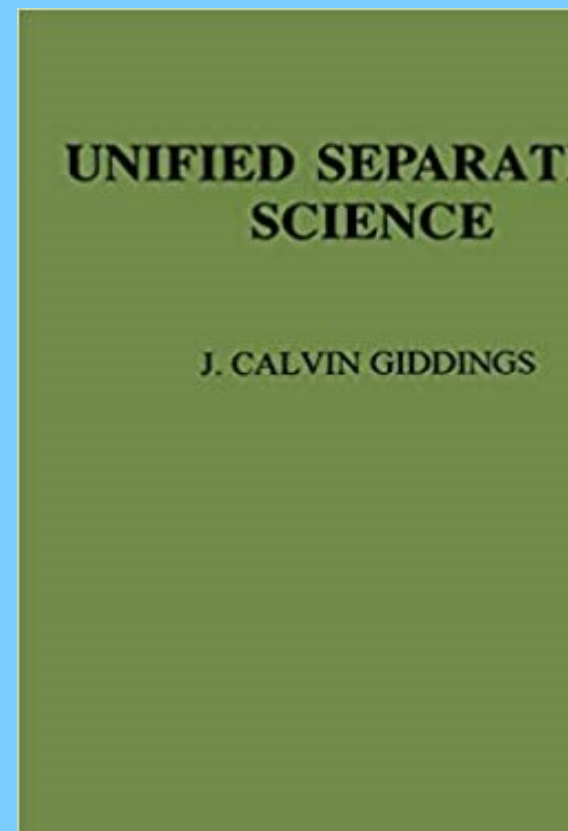
Separation Science

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Separation science and techniques play critical roles in many industrial processes and applications. They are especially important in Specialty Chemical industries to ensure the success on the product development, performance evaluation, quality control, troubleshooting and characterization. Separation science is a broad and complicated field. Here we just focused on some popular chromatographic separation techniques and applications..

Just as Dr. Giddings described in his book “Unified Separation Science” that unifies the complex welter of techniques used for chemical separations by clearly formulating the concepts that are common to them. The mass transport phenomena underlying all separation processes are developed in a simple physical-mathematical form. The limitations and optimum performance of alternative separation techniques and the factors enhancing and limiting separation power can thus be described and explored.”

“Unified Separation Science by J. Calvin Giddings is a **great book** for people starting in any type of **separation sciences**. It is easy to understand and explains many important concepts that are necessary to understand the chromatographic phenomena.”



Materials Science Study the properties and applications of **materials** of construction or manufacture (such as ceramics, metals, polymers, and composites). **Materials Science Study** the properties and applications of **materials** of construction or manufacture (such as ceramics, metals, polymers, and composites).

Materials scientists work with diverse types of **materials** (e.g., metals, polymers, ceramics, liquid crystals, composites) for a broad range of applications (e.g., energy, construction, electronics, biotechnology, nanotechnology) employing modern processing and discovery principles (e.g., casting, additive manufacturing ...

Technical Services: Separation and Characterization Techniques

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- i. Chromatography
GC, HPLC, GPC, IC, FFF
- ii. Spectroscopy
FTIR, NMR, AFM, NIR, MS, MALDI
- iii. Thermal
DSC, TGA, DMA, TMA
- iv. Compatibility
VTS, Calorimetry

Technical Services: Separation and Characterization Techniques

(Lipchen98 - ISMS)

Characterization Techniques:

- i. Chromatography
- ii. Spectroscopy
- iii. Thermal
- iv. Compatibility

Materials:

- i. Polymers
- ii. Water treatment and oil field
- iii. Mining chemicals
- iv. Polymer additive
- v. Coating chemicals (melamine, epoxy and urethane)
- vi. Energetics
- vii. Resin and Composite
 1. Phenolic Resin
 2. Epoxy Resin
 3. Amino Resin
 4. Isocyanate
 5. Polyimide
 6. Polyacrylate

- i. Polymers
Hydroxyl terminated, carboxyl terminated polymers, polyester and polyamide
- ii. Water treatment and oil field
Acrylate polymer
- iii. Mining chemicals
Cynate
- iv. Polymer additive
Phenolic and analine type antioxidant
- v. Coating chemicals (melamine, epoxy and urethane)
- vi. Energetic material
TNT, HMX, RDX, NG, NC, CL-20
- vii. Resin and Composite
 - 1. Phenolic Resin
Novolac and resole
 - 2. Epoxy Resin
Aromatic and aliphatic epoxy, curative
 - 3. Amino Resin
 - 4. Isocyanate
Aromatic and aliphatic isocyanate, curative
 - 5. Polyimide

Prepare A Proposal after The Meeting with A Customer

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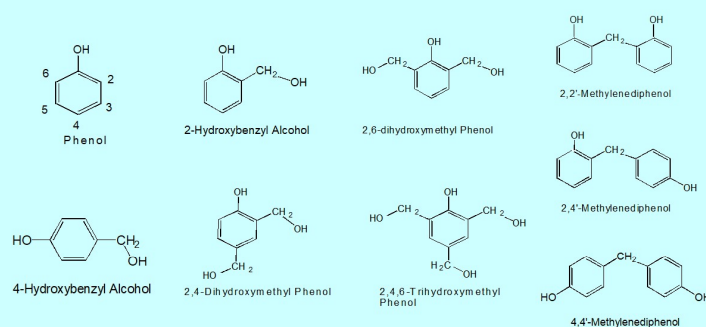
- Objective
- Summarize what has been talked
- What you will get
- What we are going to do
- What will be the schedule

Application examples

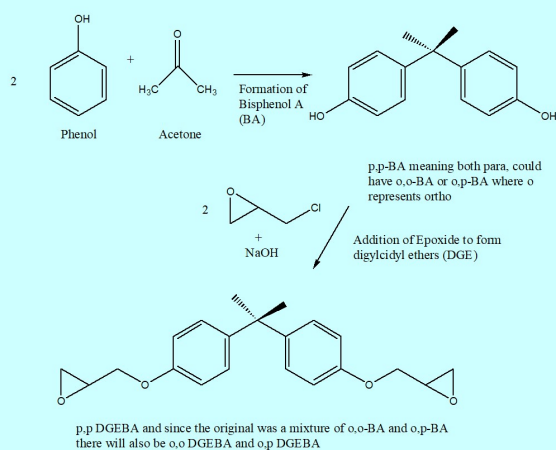
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● Phenolic, amino and epoxy resin

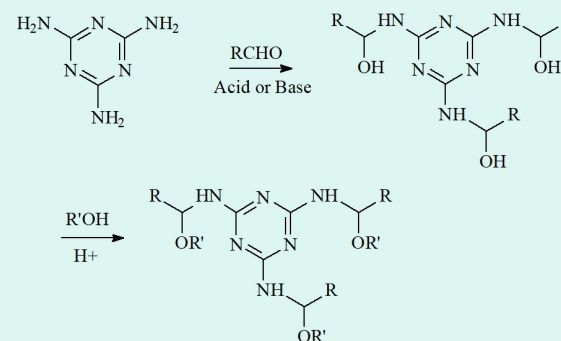
Chemical Structure of Phenolic Resin Monomers and Dimers



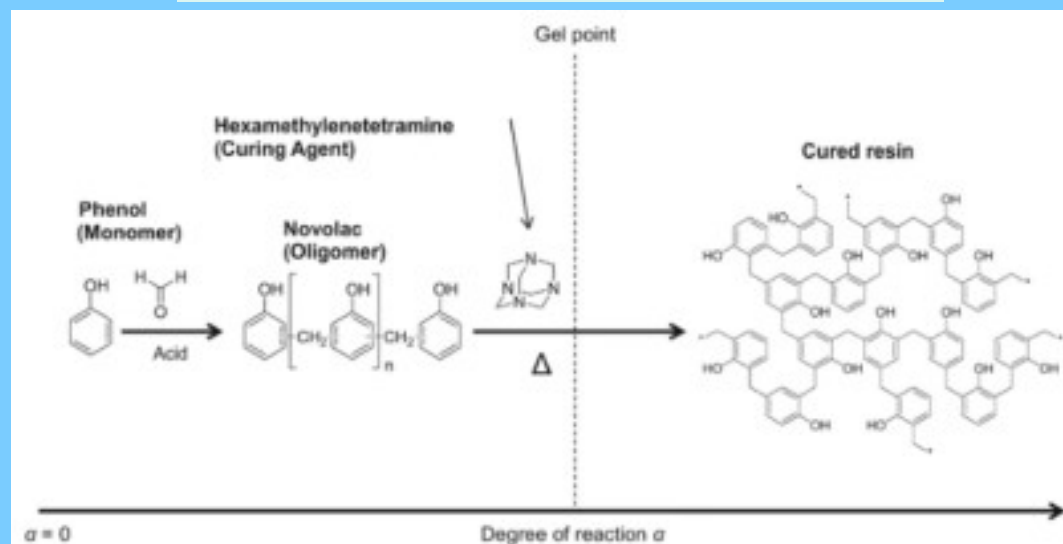
Chemical Structure of Bisphenol A Epoxy Resin



Schematic Structure of Melamine-Aldehyde Resin Production



R = Methyl
R' = single or mixed (Methyl, i-Propyl, Ethyl, n-Butyl, i-Butyl, or oligomer site)



Application examples

Phenolics: Fractionation and characterization of phenolic resins HPLC and GPC combined with UV, RI, MS and light-scattering detection

P Li 1, D W Coleman, K M Spaulding, W H McClennen, P R Stafford, D J Fife
J Chromatogr A, 2001, Apr 20; 914(1-2):147-59. doi: 10.1016/s0021-9673(00)01198-5

ChatGPT said: Here are the key points from the paper:

Objective: The study focuses on the fractionation and detailed characterization of phenolic resins using advanced chromatographic techniques.

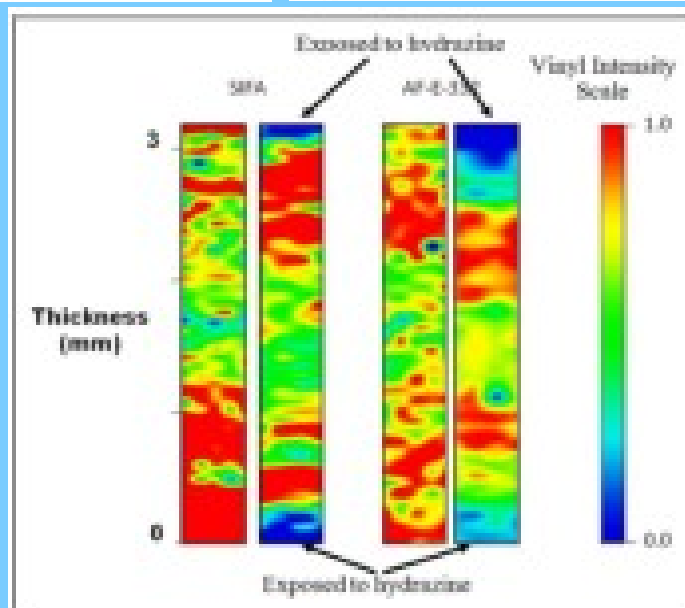
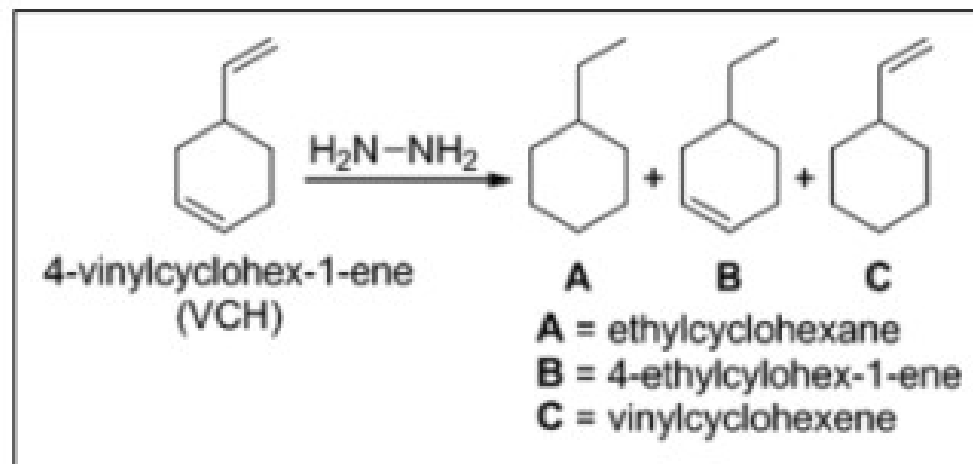
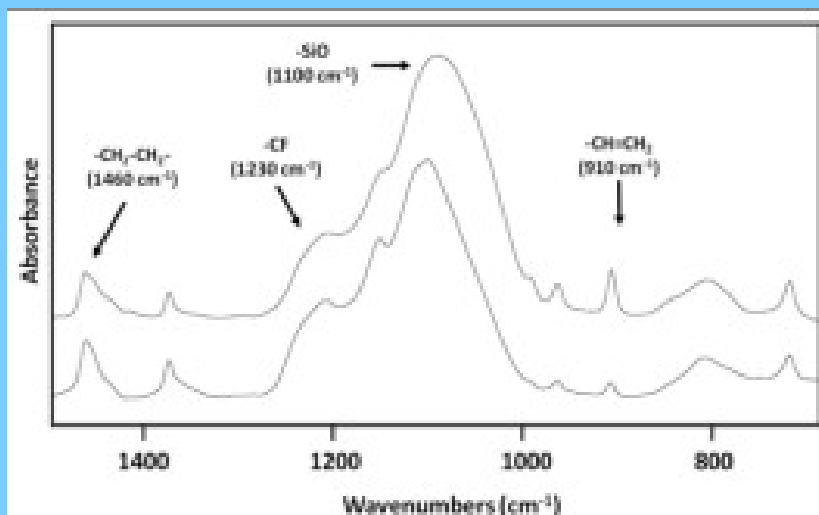
Techniques Used: High-performance liquid chromatography (HPLC) and gel-permeation chromatography (GPC) were combined with UV, refractive index, mass spectrometry (MS), and light-scattering detection to analyze the resins.

Findings: The study provided a comprehensive method to characterize the molecular weight distribution and structural composition of phenolic resins, offering insights into their chemical behavior and properties.

Application examples

(Lipchen98 - ISSMS)

● EPDM: Compatibility of hydrazine and EPDM rubber containing polybutadiene



Compatibility of hydrazine and EPDM rubber containing polybutadiene coagent

Ping Li Ping.Li@ATK.com,

Fernando Aguirre, Michael O Killpack, Stephen L Rodgers, and Ian A Ballinger

Journal of Elastomers & Plastics , Volume 46, Issue 6, pp. 499–513

ChatGPT said: Here are the key points from the paper:

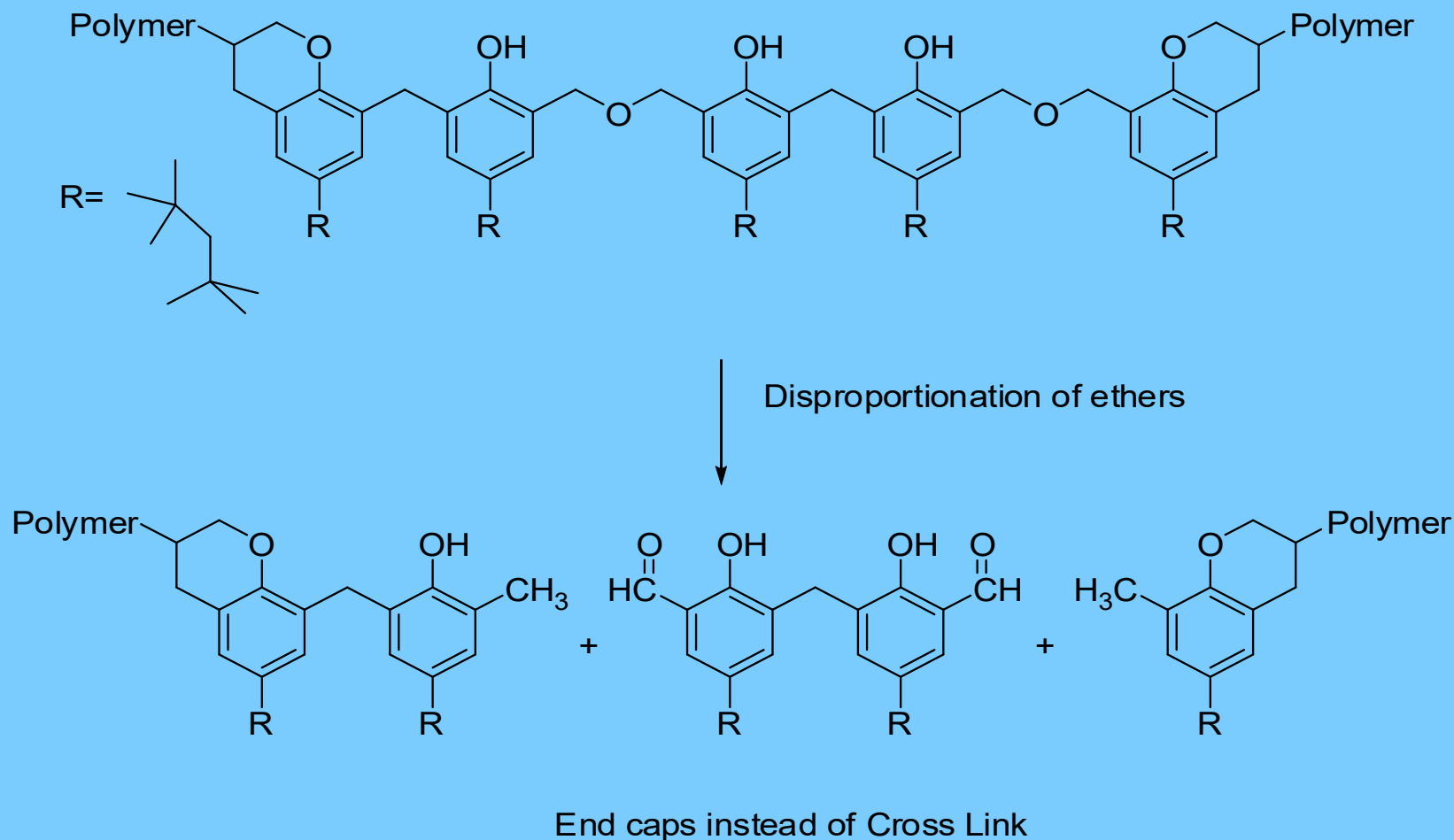
Objective: The study examines the compatibility of hydrazine with EPDM rubber containing polybutadiene coagent.

Methodology: Techniques like FT-IR spectroscopy and atomic force microscopy (AFM) were used to analyze the chemical changes in the rubber after exposure to hydrazine.

Findings: Hydrazine causes hydrogenation of the vinylic double bonds in the polybutadiene, altering the surface composition of the rubber.

Significance: The results are important for the use of EPDM rubber in environments where it may come into contact with hydrazine.

- **Delaminations in Resin-EPDM Monomer Bondlines as a Result of Solvent Exposure and Adhesive-Induced Phenolic Resin Disproportionation Reactions**



Application examples

Delaminations in Resin-EPDM Monomer Bondlines as a Result of Solvent Exposure and Adhesive-Induced Phenolic Resin Disproportionation Reactions

Michael O. Killpack, Michael W. Lesley, William H. McClennen & Ping Li

The Journal of Adhesion, Volume 89, 2013 - Issue 6, Pages 507-520 | Received 24 Oct 2011, Accepted 05 Dec 2012, Published online: 05 Mar 2013

ChatGPT said: Here are the key points from the paper:

Objective: The study investigates the delamination in resin-EPDM bondlines caused by solvent exposure and adhesive-induced disproportionation of phenolic resin.

Key Focus: It examines the chemical reactions between the adhesive and phenolic resin, leading to degradation of the bondline.

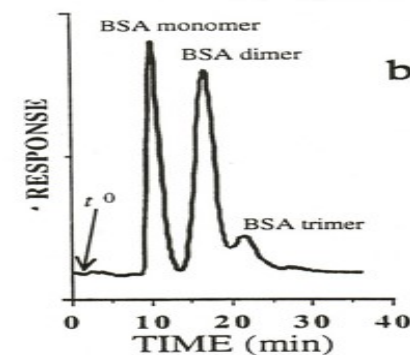
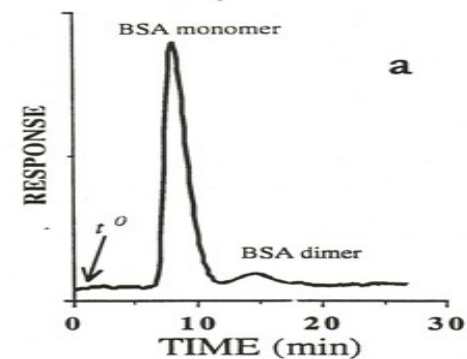
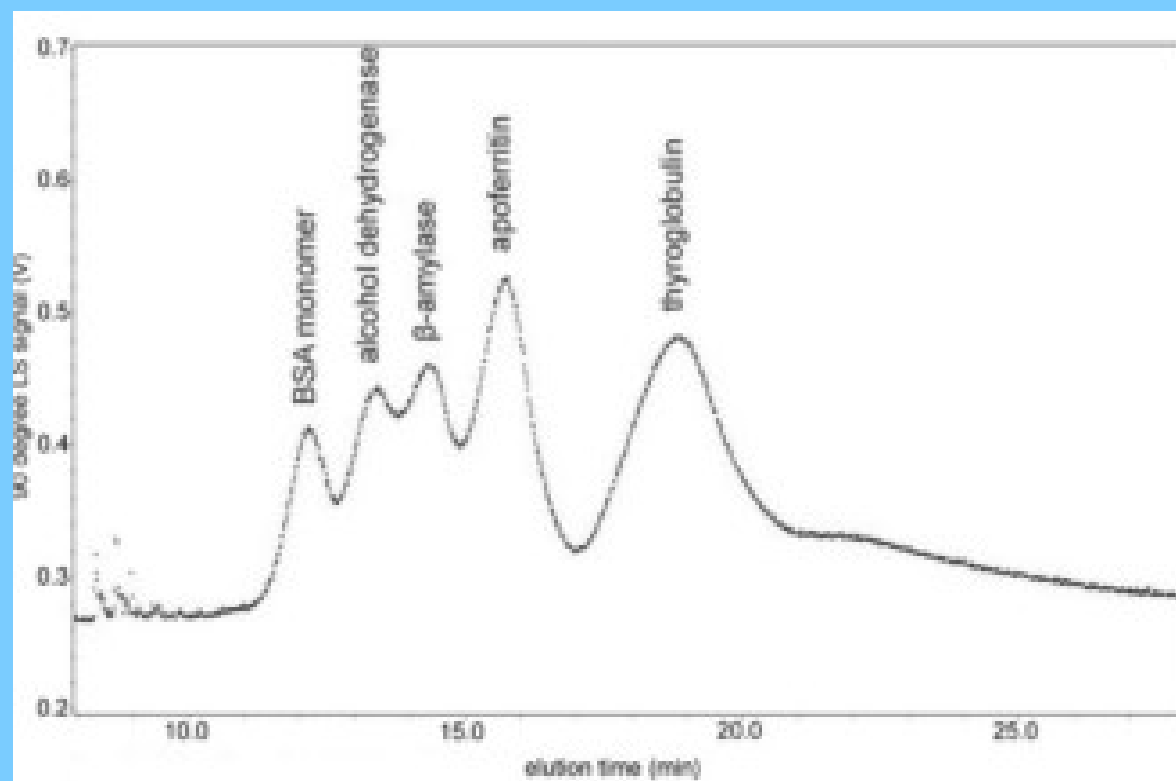
Methodology: The research involved analyzing the effects of different solvents on the bondline and identifying the disproportionation reactions.

Findings: Solvent exposure and adhesive-induced reactions were found to significantly weaken the resin-EPDM bondline, causing delamination.

Application examples

(Lipchen 98 - SPM)

- Protein aggregates



Separation of Lipoproteins from Human Plasma by Flow FFF

Ping Li, Marcia Hansen, and J. C. Giddings, *J. Liq. Chromatogr. & Related Tech.*, 20, 2777 (1997)

ChatGPT said: Here are the key points from the paper:

Focus: Application of Flow Field-Flow Fractionation (Flow FFF) for separating lipoproteins from human plasma. Methodology and effectiveness of Flow FFF in analyzing complex plasma samples.

Key Points: Flow FFF Technique: Utilizes a flow-based separation method to differentiate lipoproteins based on size and density.

Lipoprotein Separation: Provides detailed analysis of lipoprotein fractions in human plasma.

Applications: Demonstrates the capability of Flow FFF to resolve lipoprotein subclasses for biomedical research and diagnostics.

Significance: Enhances understanding of lipoprotein profiles in human plasma. Contributes to advancements in lipid research and related health studies.

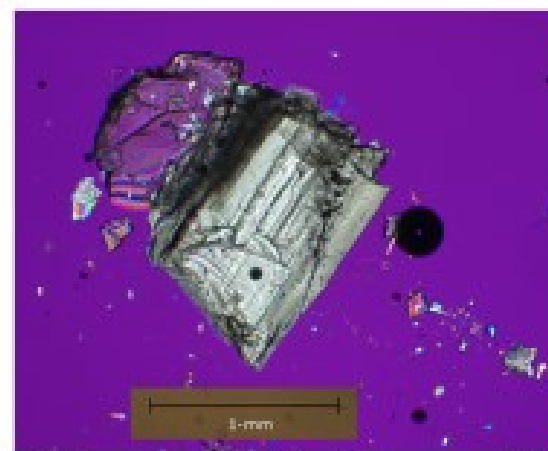
Application examples

(Lipchen 98 - SSM)

- **ABDNAZ**

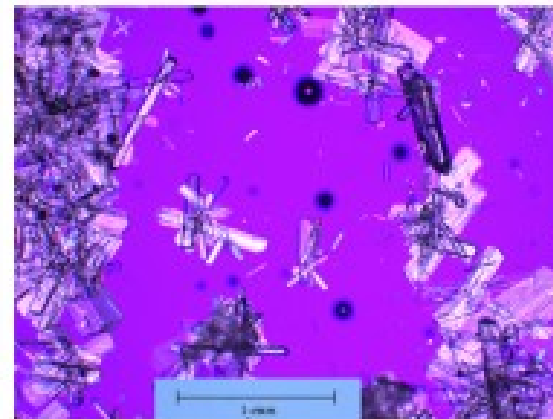
Old Primary Reference Standard

Recrystallized from an old ABDNAZ product and used for analytical method development



New Primary Reference Standard

Recrystallized from a new AB-DNAZ product



Methods of synthesizing and isolating N-(bromoacetyl)-3,3-dinitroazetidine and a composition including the same

Nicholas A. Straessler, Louis F. Cannizzo,

Ping Li, Michael P. Kramer, David M. Rosenberg. US Patent 8471,041 B2, June 25, (2013).

ChatGPT said: Here are the key points from the paper:

Objective: The patent describes methods for synthesizing and isolating N-(bromoacetyl)-3,3-dinitroazetidine, a compound useful in energetic materials.

Process: It details the chemical synthesis process, including the steps for purifying and isolating the compound to achieve high purity.

Application: The composition containing this compound is intended for use in propellants, explosives, and other energetic applications, where stability and performance are critical.

Application examples

(Lipchen 98 - JSM)

Anti cancer Alkaloids

ChatGPT said: Here are the key points from the paper:

Title: HPLC Studies of Indole Alkaloids

Authors: Ping Li et al.

Journal: Acta Pharmaceutica Sinica

Volume: 24

Page: 212

Year: 1989

Focus:

The study centers on the use of High-Performance Liquid Chromatography (HPLC) for analyzing indole alkaloids.

Key Points:

HPLC Methodology: Describes the development and optimization of HPLC techniques specifically for the separation and analysis of indole alkaloids.

Indole Alkaloid Profiles: Provides detailed chromatographic profiles of various indole alkaloids, likely including their retention times and detection parameters.

Analytical Applications: Discusses the relevance of these HPLC methods for pharmaceutical and natural product research, particularly in identifying and quantifying indole alkaloids.

Significance:

Advances the understanding of how HPLC can be effectively utilized in the study of indole alkaloids, which are significant due to their pharmacological properties.

Offers insights that could be beneficial for researchers working with indole alkaloids in drug discovery and natural product chemistry.

This summary highlights the main aspects of the research.

HTPB and CTPB

Derivatization of HTPB (hydroxyl-terminated polybutadiene) and CTPB (carboxyl-terminated polybutadiene) for determining relative functionality distribution

Nicholas A. Straessler, Ping Li, Shawn A. Parry, David W. Coleman, Michael O. Killpack, Michael E. Wright, Journal of Applied Polymer Science 123(2), (2012).

ChatGPT said: Here are the key points from the paper:

Objective: The study focuses on the derivatization of carboxyl-terminated polybutadiene (CTPB) to determine the distribution of relative functionality within the polymer.

Methodology: Chemical derivatization techniques were applied to CTPB, allowing for the analysis of its functionality distribution.

Significance: Understanding the functionality distribution in CTPB is important for tailoring its properties in various applications, such as in adhesives and sealants.

Application examples

Heavy Water (重水)

The Seasonal Variation of Deuterium Content in Underground Water by GC/MS

Authors: X. Zhou, Ping Li

Journal: Huaxue Tongbao (Chemistry Bulletin)

Volume: 6

Page: 17

Year: 1983

Focus:

Investigation of seasonal changes in deuterium content in underground water.

Application of Gas Chromatography-Mass Spectrometry (GC/MS) for precise measurement of deuterium levels.

Key Points:

Seasonal Variation: Detailed study on how deuterium levels in groundwater fluctuate throughout different seasons.

GC/MS Technique: GC/MS was used for its high sensitivity and accuracy in detecting and quantifying deuterium in water samples.

Environmental Impact: The paper likely discusses factors that influence deuterium content, such as temperature changes, precipitation, and hydrological cycles.

Significance:

Provides valuable insights into the natural processes that affect isotopic composition in water.

Contributes to the broader understanding of water cycle dynamics and environmental monitoring.

This summary captures the essence of the research, emphasizing the methodology, findings, and their implications. Let me know if you need any additional information!