



A CHROMATOGRAPHIC METHOD FOR SEPARATION OF β -DIBROMO- AND TRIBROMO-MESO-TETRAPHENYLPORPHYRINS

IITM Technology Available for Licensing

Problem Statement

- A few isomers exist for H_2TPPBr_2 , but their **separation is hindered due to poor solubility in low polarity solvents**, leading to resolution challenges in column chromatography.
- Current chromatographic methods involve resin, alumina, silica gel, and reverse phase supports, often demanding large amounts of low polarity solvents and proving to be **time-consuming and intricate processes**.
- Hence, there is a need to selectively synthesize and efficiently separate H_2TPPBr_n ($n = 2$ and 3) derivatives.

Technology Category/ Market

Category - Chemicals, Porphyrinic materials

Applications - Porphyrinic materials and medicine, Chemical Synthesis, Materials Science, Catalysis, Renewable energy devices.

Industry - Chemical Manufacturing, Materials and Nanotechnology, Pharmaceuticals.

Market - The global chromatography columns market is projected to surpass US\$ 3.3 Billion by 2024, with a **CAGR of 8.4%** during the forecast period 2023 - 2030.

TRL (Technology Readiness Level)

TRL - 4: Technology validated in lab scale.

Research Lab

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Intellectual Property

- IITM IDF Ref. **1265**
- IN 338544 - Patent Granted**

Technology

- The present invention relates to a **combined use of chromatographic method with moderate to more polar solvent / polar solvent mixtures for the separation of porphyrins** in particular β -dibromo and tribromo-*meso*-tetraphenylporphyrins.
- The main aspect of the present invention is **chromatographic separation of H_2TPPBr_n ($n = 2$ and 3) mixture (as shown in Fig. 1,3) using single column** consisting of a mixture of two chromatographic supports such as alumina/silica gel/charcoal/cellulose, with varying composition.

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- Solvent Selection:** Employs moderately to highly polar solvents or solvent mixtures (e.g., $CHCl_3$, CH_2Cl_2 , CCl_4 , toluene) to achieve precise separation of H_2TPPBr_n ($n = 2$ and 3) derivatives.

2

- Rapid and Controlled Process:** Enables separation completion within 12 hours, marked by colorless elution, and ensures clear differentiation between H_2TPPBr_2 and H_2TPPBr_3 derivatives.

3

- Characterization Tools:** Utilizes electronic absorption, 1H NMR spectroscopy, and low-resolution ESI mass spectrometry for accurate identification and validation of separated compounds.

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- The process is rapid for the separation of **0.5 grams of a porphyrin mixture within few hours and total elution time taken is 10-12 hours.**

CONTACT US

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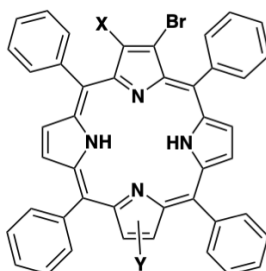
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Key Features / Value Proposition

- Having facile separation of two brominated porphyrins, H_2TPPBr_n ($n = 2$ and 3) from a single column consisting of a mixture of two chromatographic supports with varying composition.
- Useful for at least 0.5 g scale brominated porphyrin mixture in moderate to more polarity solvents / solvent mixtures within several hours.



X = Br, Y = H, H_2TPPBr_2
2,3-Dibromo-5,10,15,20-tetraphenylporphyrin
X = H, Y = Br, H_2TPPBr_2
2,12 or 2,13-Dibromo-5,10,15,20-tetraphenylporphyrin

FIG. 1. Depicts molecular structures of H_2TPPBr_2 derivatives.

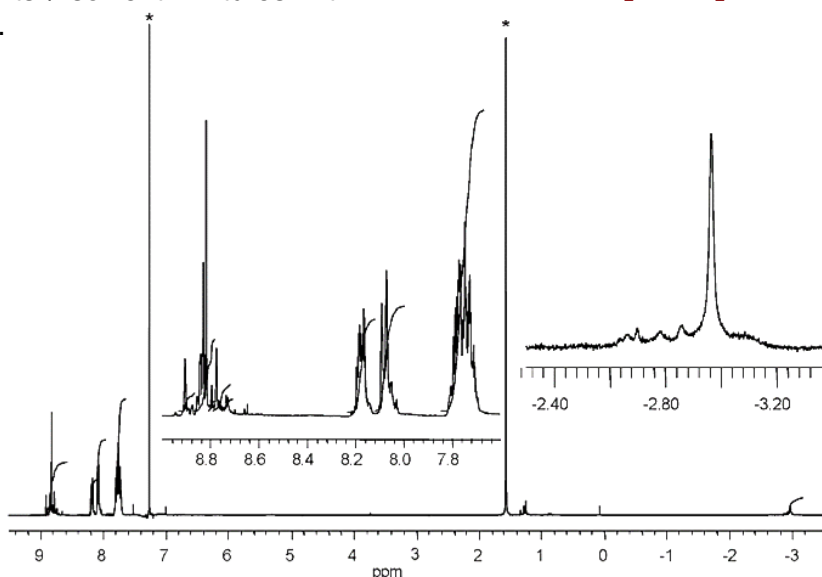


FIG. 2. Illustrates 1H NMR spectrum of H_2TPPBr_2 in $CDCl_3$ at 298 K (* denotes impurity peaks).

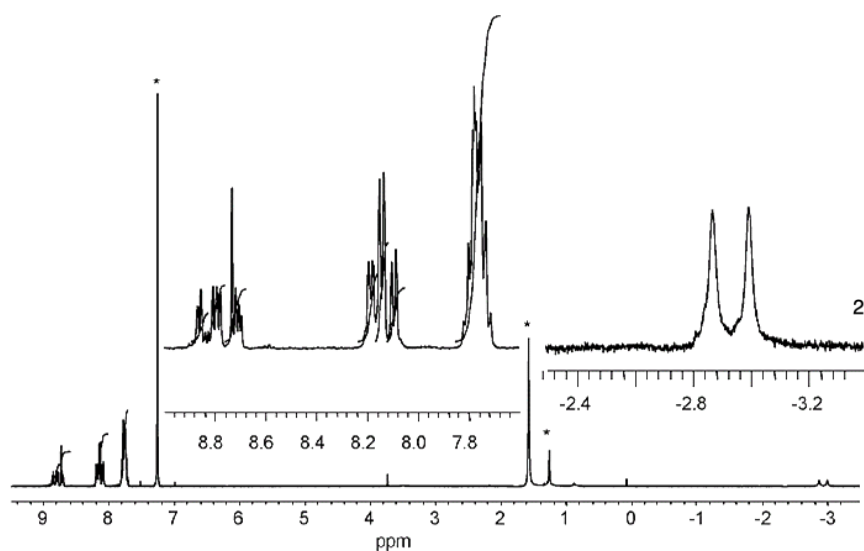
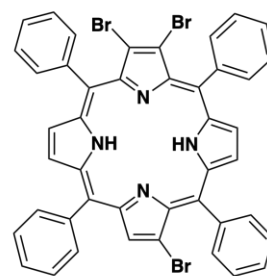


FIG. 4. Illustrates 1H NMR spectrum of H_2TPPBr_3 in $CDCl_3$ at 298 K (* denotes impurity peaks).



2,3,12-Tribromo-5,10,15,20-tetraphenylporphyrin, H_2TPPBr_3

FIG. 3. Depicts molecular structure of H_2TPPBr_3 .

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