



IIT MADRAS

Indian Institute of Technology Madras

Technology Transfer Office TTO - IPM Cell



Industrial Consultancy & Sponsored Research (IC&SR)

UNSATURATED ANACARDATE BASED FOAMING AGENT(S) FOR THE PREPARATION OF FOAM CONCRETE IITM Technology Available for Licensing

PROBLEM STATEMENT

- ❑ **Foam concrete** is a lightweight construction material used in precast blocks, panels, and partition walls.
- ❑ It is produced through mixed foaming or preformed foam and **requires suitable surface-active agents**.
- ❑ The development of foam concrete focuses on using **geopolymer materials**, which are sustainable and environmentally friendly cementitious materials.
- ❑ Foam concrete development uses **eco-friendly geopolymer materials**, produced from agricultural and industrial waste, for strength, durability, and fire resistance, with optional calcium for ambient curing and early strength gain.
- ❑ The market offers proprietary **foaming agents but from petrochemicals**, This necessitates the **identification of alternate foaming agents** which are more sustainable than synthetic foaming agents.

TECHNOLOGY CATEGORY MARKET

Technology: Foam Concrete

Category: Civil Infrastructures & Structural Engineering

Industry: Chemical/Construction.

Application: Preparation of foam concrete.

Market: The global market size was valued at **USD 95.6 Billion in 2022** and is poised to grow from **USD 103.15 Billion in 2023 to USD 175.64 Billion by 2031**, growing at a **CAGR of 7.9%** in the forecast period (2024-2031).

INTELLECTUAL PROPERTY

IITM IDF Ref. 2636

Patent No: IN 530064

TRL (Technology Readiness Level)

TRL-4, Experimentally validated in Lab;

Research Lab

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TECHNOLOGY

- ❖ The **lightweight cellular foam concrete** prepared by **mixing**
 - Preformed foam, obtained by mechanical foaming of aqueous solution of salt of **unsaturated anacardic acid(s)** and
 - **Admixture** for foam stabilization, and
 - **Base mix**, obtained from **Portland cement or geopolymer binder**, aggregate, and water.
- ❖ A foam concrete comprising **5-70 vol%** of a pre-formed foam and a base mix.
- ❖ **Salts of unsaturated anacardic acid(s)** are selected from the group comprising of **monosodium anacardate, disodium anacardate, monopotassium anacardate, and dipotassium anacardate** or other mono/di anionic derivatives of anacardic acids.
- ❖ **Admixture** is selected from the group comprising of **Xanthan gum, Guar gum, and carboxyalkyl cellulose** or other viscosity modifying agents/materials.
- ❖ The **addition of admixtures** significantly **enhanced the foam stability**.
- ❖ Foam stability has been assessed in terms of **percentage liquid drained and foam density variation with time**.
- ❖ The **pre-formed foam is obtained** from the foaming composition by **passing compressed air through the said foaming composition or by high-speed stirring** of the said foaming composition.

CONTACT US

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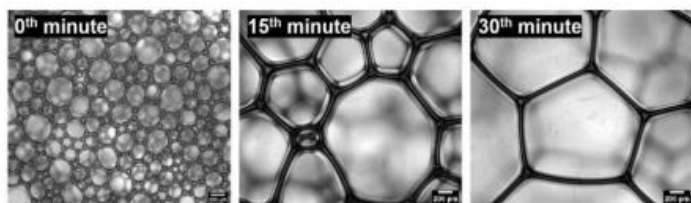
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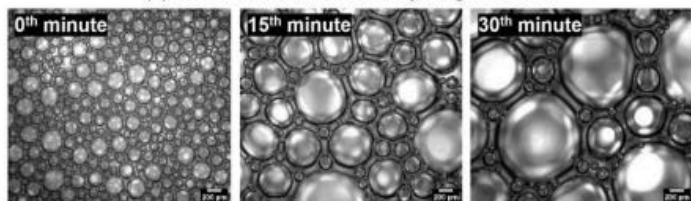
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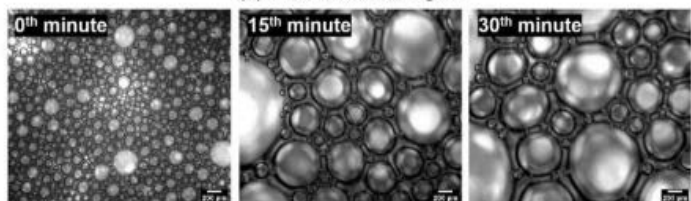
Effect of admixtures on foam morphology at different time interval post generation.



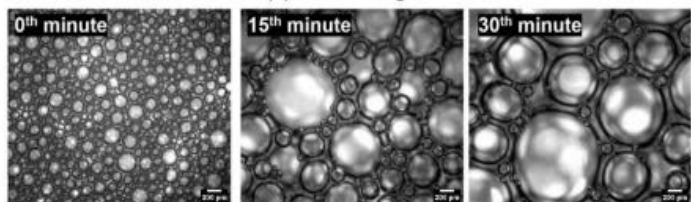
(a) 5% Disodium anacardate by weight of water



(a) + 0.15% Xanthan gum



(a) + 1% Guar gum



(a) + 0.8% Sodium carboxymethyl cellulose

Fig 1 shows a visualization of change in foam bubble morphology with time for aqueous foam without and with different admixtures.

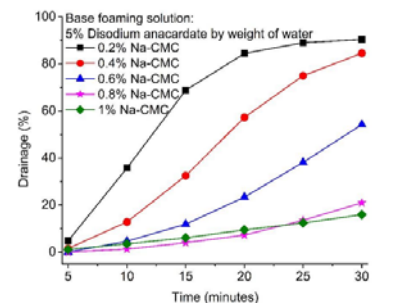
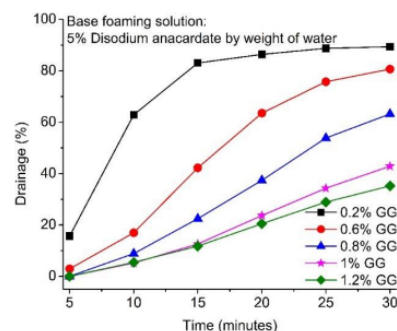
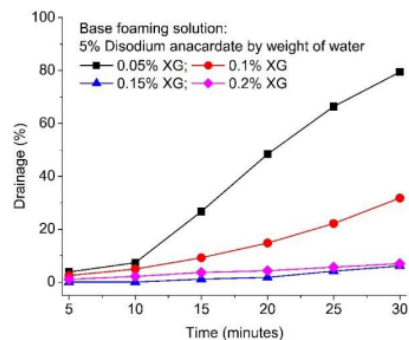


Fig 2 illustrates the Effect of admixture dosage on foam drainage with time.

Key Features / Value Proposition

- ❑ A **light-weight construction** block prepared from the foam concrete.
- ❑ The foaming composition comprises **0.1 – 10 wt. % of salts of unsaturated anacardic acid(s)**, **0.01 – 2 wt. % of the stabilizing agent**, and water, such that the sum of the three components is **100 wt.%**.
- ❑ **speed of stirring is 500 – 5000 rpm.**

- ❑ Pressure of the compressed air is **30 – 350 kPa.**
- ❑ Mixture of unsaturated anacardic acid(s), derived from **cashew industry waste.**
- ❑ Foam concrete mix design is carried as per **ASTM C796.**

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