TECHNOLOGY

Water Proton NMR for Monitoring Sedimentation Process of Multiphase Mixtures

OVERVIEW

Summary

The technology developed by the University of Maryland, Baltimore utilizes water proton Nuclear Magnetic Resonance (NMR) to monitor the sedimentation process in multiphase mixtures in real-time. This analytical method is particularly valuable in the pharmaceutical and specialty chemicals industries, where understanding and controlling the sedimentation process is crucial for optimizing formulations and ensuring product stability. The potential market for this technology is vast, with the global pharmaceutical market valued at approximately USD 1.3 trillion and the specialty chemicals market at around USD 732.4 billion. The novelty of this technology lies in its ability to provide real-time monitoring of the sedimentation process, which is critical for product development and quality control in various industries.

Market

The technology has significant potential applications in various industries, particularly in the pharmaceutical and chemical sectors. In the pharmaceutical industry, this technology can be instrumental in drug development, quality, and manufacturing. The global pharmaceutical market was valued at approximately USD 1.3 trillion in 2021 and is expected to reach USD 1.5 trillion by 2023. The sedimentation process is crucial in the formulation of suspensions, emulsions, and other drug products. Monitoring and understanding this process can lead to the optimization of formulations, ensuring the stability and efficacy of pharmaceutical products. This is especially important in vaccine development, where adjuvants and other components need to be in a stable suspension. The global vaccines market was valued at USD 43.79 billion in 2021 and is expected to grow at a CAGR of 10.9% from 2021 to 2028.

The global specialty chemicals market was valued at around USD 732.4 billion in 2020 and is expected to grow at a CAGR of 5.0% from 2021 to 2028. Monitoring the sedimentation process is critical in the production of specialty chemicals and materials, especially in applications where the purity and composition of the product are critical. This includes the production of coatings, adhesives, advanced materials, and nanomaterials. The technology can help in optimizing production processes, improving product quality, and reducing waste.

Technology

The patent titled "Water Proton NMR for Monitoring Sedimentation Process of Multiphase Mixtures" describes a novel method for real-time monitoring of the sedimentation process in multiphase mixtures. The technology utilizes water proton Nuclear Magnetic Resonance (NMR) to analyze the sedimentation process. NMR can provide detailed information about the structure, dynamics, reaction state, and chemical environment of molecules. Water proton NMR is specifically used to monitor how particles in a multiphase mixture settle over time under the influence of gravity.

The method provides valuable information on the sedimentation rate, dynamics of supernatant and sediment buildup, and sedimentation volume ratios. This is particularly important in the pharmaceutical industry, where the stability of suspensions and emulsions is critical for the efficacy of drug products. The technology can also be applied to other multiphase mixtures in various industries, including specialty chemicals and materials science. The ability to monitor the sedimentation process in real-time provides insights into the physical and chemical properties of the mixture, which can be used to optimize formulations and production processes.

References:

1. Global Pharmaceutical Market Size: "Global Pharmaceuticals Market Report 2021: Market was Worth $1.2 trillion in 2020" - ResearchAndMarkets.com. 2021 Pharmaceuticals Research Review - Research and Markets
2. Global Vaccines Market Size: "Vaccines Market Size, Share & Trends Analysis Report By Type (Influenza, Hepatitis, HPV), By Age Group (Pediatric, Adult), By Disease, By Region, And Segment Forecasts, 2021 - 2028". Grand View Research. Vaccine Market Size Growth & Share | Global Industry Report, 2024 (grandviewresearch.com)
3. Global Specialty Chemicals Market Size: "Specialty Chemicals Market Size, Share & Trends Analysis Report By Product (Agrochemicals, Flavors & Fragrances), By Region (North America, APAC), And Segment Forecasts, 2021 - 2028". Grand View Research. Specialty Chemicals Market Size, Share & Trends Report, 2030 (grandviewresearch.com)

Other Potential Fields:

- Food and Beverage Industry: Monitoring the sedimentation process in beverages to ensure product quality and stability.
- Environmental Science: Studying sedimentation processes in natural water bodies for environmental monitoring and pollution control.
- Mining and Metallurgy: Monitoring the sedimentation process of ores and minerals during processing.

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Additional Information

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CATEGORIES

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ATTACHMENTS

- Download BY-2020-149 (Bruce Yu) Monitoring Sedimentation by NMR.pdf

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