

Polyacrylamide Hydrogel for Methane-Enriched Biogas Production

Technology Domain: Green Technology

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Technology Summary:

This invention presents a novel polyacrylamide-piperazine hydrogel for the efficient purification of raw biogas. The key technical solution is a specific hydrogel formulation prepared by mixing partially hydrolyzed polyacrylamide (PHPA), NaCl, and piperazine in distilled water, followed by crosslinking with chromium (III) acetate. The key inventive feature is the hydrogel's ability to simultaneously and highly efficiently absorb both CO₂ and H₂S from raw biogas.

Results demonstrate a remarkable purification, with raw biogas containing 54.64% methane, 41.43% CO₂, and 204 ppm H₂S being purified to 92.25% methane, 3.82% CO₂, and 0 ppm H₂S. This significant enhancement in methane content makes the purified biogas suitable for use as bio-CNG in the automobile sector. The use of this low-cost, high-efficiency hydrogel provides an improved and sustainable solution for biogas purification in anaerobic digesters and treatment plants, addressing limitations of conventional, costly, and less efficient methods.

