Forward osmosis as appropriate technology with starch-based draw agent

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ABSTRACT

The appropriate technology (AT) has been gaining attention for securing safe water resources in developing countries. Despite its promising energy-saving operation, forward osmosis (FO) system is a lack of suitable draw agent to be implemented as an AT. In this study, we propose a conceptual small-scale FO system with a starch-based draw agent. This FO system successfully produced about 17.3 L/m²d of drinking water and achieved 95% of the arsenic removal rate using a starch paste combined with amylase as a draw agent. The osmotic pressure, which is necessary for producing permeate water, was generated by small molecules, such as maltose. These molecules were formed from the decomposition of starch by amylase. Because the draw agent used in this study is edible, the permeate water is directly drinkable without any further separation. In addition, diverse starch-containing foods such as flour, raw potatoes, raw sweet potatoes, and bananas were also confirmed as an alternative starch source for draw agent.

Keywords: Appropriate technology; Forward osmosis; Starch; Draw solution; Arsenic; Amylase

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