

Removal of carbon dioxide using water-in-oil emulsion liquid membrane containing triethanolamine

Abstract

Liquid membranes are emerging as solid, liquid and gaseous extractors, replacing the conventional methods of separation for metals, enzymes and gases. For carbon dioxide separation, amine based chemical absorption have been commercially used because of their ability to form complexes at moderate temperature. However, the use of chemical absorption using aqueous amine can caused corrosion. Emulsion liquid membrane becomes an alternative to reduce the contact between the amines and metal surfaces. This paper discusses the preparation of emulsion liquid membrane using triethanolamine (TEA) as an extractant to remove carbon dioxide. The emulsions were prepared by varying the concentration of the extractant and the surfactant, in order to obtain a stable emulsion that can effectively remove carbon dioxide from gas mixtures. High speed homogenizer was used to produce micro-sized emulsion that can increase the mass transfer of carbon dioxide from the gas phase to the liquid phase. It was found that the optimum amount of surfactant (Span 80) in the organic phase and extractant (TEA) in the aqueous phase to produce stable emulsion is 6 vol %. A stable micro-sized emulsion was produced at a stirring speed of 20,000 rpm for 3 hours. This emulsion liquid membrane can remove 88 % of the carbon dioxide introduced into the rotating disc contactor.