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Interlayer free - Nickel doped silica membranes for desalination

(Conference Paper) (Open Access)

Darmawan, A.[a], Karlina, L.[a], Astuti, Y.[a], Sriatun[a], Wang, D.K.[b], Motuzas, J.[b], Da Costa, J.C.D.[b]

[a]Diponegoro University, Department of Chemistry, Semarang, 50275, Indonesia
[b]University of Queensland, FIM2Lab-Functional Interfacial Materials and Membranes Laboratory, School of Chemical Engineering, Brisbane, QLD 4072, Australia

Abstract

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This work shows for the first time the potential of nickel oxide silica membranes for desalination applications. Nickel oxide silica xerogels were synthesised via a sol-gel method including TEOS, nickel nitrate with and without addition of hydrogen peroxide. The effects of nickel addition (5% - 50 mol %) on the structure-property relationship of the silica materials were systematically studied. The membrane performance were tested as a function of feed salt concentration (0.3-3.5 wt% NaCl) and temperature (27-60 °C). The membranes which were prepared using equal sol-gel conditions to the xerogel samples showed the raised feed temperatures resulted in increased water fluxes, whilst increasing the salt concentration resulted in decreased water fluxes. The membranes with addition of hydrogen peroxide exhibited better performances than their H_2O_2 absence counterpart. The salt rejection was in excess of 90% and the maximum flux observed was 7.3 kg m^{-2} h^{-1} at 60°C for a 0.3 wt% NaCl feed concentration.

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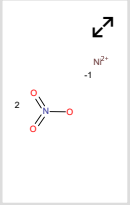
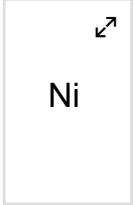

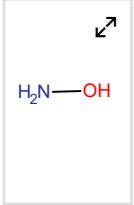

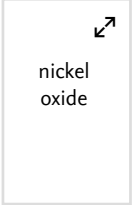

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Engineering controlled terms: Desalination | Hydrogen peroxide | Nickel | Oxidation | Peroxides | Silica | Silica gel | Sol-gel process | Sol-gels | Xerogels

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Darmawan, A.; Diponegoro University, Department of Chemistry, Semarang, Indonesia;
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