

The Fluorinated Olefin R-1234ze(Z) as a High-Temperature Heat Pumping Refrigerant

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Abstract - Estimates are provided for R-1234ze(Z) of its: (1) critical temperature, pressure, and density, acentric factor, and ideal gas specific heat at constant pressure, and (2) various thermodynamic and transport properties, which are used to predict the performance potential of R-1234ze(Z) in high-temperature heat pumping applications. In particular, for an idealized cycle, the Coefficient of Performance and Volumetric Heating Capacity for R-114 are 3.24 and 1667 kW m⁻³, respectively, and for R-1234ze(Z) are 3.40 and 1645 kW m⁻³, respectively. The attractiveness of R-1234ze(Z) is confirmed further through heat exchanger simulations. Based on other fluorinated propene isomers, R-1234ze(Z) probably has a Global Warming Potential on the order of 10. What is unknown, however, is its toxicity and flammability. However, based on other fluorinated propene isomers, R-1234ze(Z) could very likely be toxic and/or flammable to some greater or lesser degree. Despite these potential drawbacks, R-1234ze(Z) deserves further consideration as a possible R-114 replacement.