Fast and simple determination of the thermodynamic properties of refrigerants is very important for analysis of vapor compression refrigeration systems. Although tables are available for refrigerants, limited data of tables are not useful in the simulation of refrigeration systems. The aim of this study is to determine the thermodynamic properties such as enthalpy, entropy, specific volume of the R413A, R417A, R422D, and R423A by means of the artificial neural networks (ANN) and adaptive neuro-fuzzy (ANFIS) system. The results of the ANN are compared with the ANFIS, in which the same data sets are used. The ANFIS model is slightly better than ANN. Therefore, instead of limited data as found in the literature, thermodynamic properties for every temperature and pressure value with the ANFIS are easily estimated.