TOWARDS THE NEXT GENERATION OF ABSORPTION HEAT PUMPS

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Introduction: Absorption Heat Pumps and Refrigeration Systems are well known and their interest has been growing in the last years because they are driven by thermal energy (waste heat, solar energy, gas exhaust, etc.) and they use natural refrigerants. Although it has been proposed many working pairs, the commonly used fluids are still water/LiBr for air conditioning applications or heat transformers and ammonia/water for industrial refrigeration.

Due to the drawbacks of the absorbents (LiBr and water) of these working fluids: limited solubility, thermal decomposition and corrosiveness of the salt solutions at temperatures higher that about 150ºC in the case of LiBr and the relative volatility between water and ammonia, the performance and operating conditions of the absorption cycles are relatively poor and limited to use the potential in temperature of the thermal energy sources. The possibility to replace these absorbents by tailor-made ionic liquids will allow to develop new concepts, extend the operating conditions range of the present devices making it possible air-cooled chillers, reversible operation mode (heating and cooling) of the absorption chillers working with water as refrigerant, the development of multieffect absorption chillers or heat transformers, or in the case of ammonia based systems the elimination of the rectifier [1-10]. Also the reduction of the corrosiveness will allow reducing the investment cost of the units.

In this paper, it is reviewed the current research lines in the field of new working pairs based on ionic liquids in absorption heat pumps and refrigeration systems. The reviewer studies are classified in several groups according to the target: measurement and modeling of the thermodynamic and transport properties [11-20], cycle simulation and performance analysis [20-25], experimental tests of components and complete devices [26-27] studies of related issues of interest: corrosiveness, thermal stability, use of IL as additive of the conventional mixtures [28], etc.

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