Grazia Leonzio, Trends in Green chem, 3:2
DOI: 10.21767/2471-9889-C1-003

Analysis of absorption heat pump in parallel flow powered by the biogas

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The energy crisis and the environmental problems have focused the researchers on absorption heat pumps [1]. In this research, a sensitivity analysis is carried out for a double effect absorption heat pump in parallel flow powered by biogas, using ChemCad software. The system uses 350 kg/h of LiBr-H_2O working fluid at 56 % w/w to avoid crystallization phenomena. The cycle is involved between the absorber and sub-cooling condenser temperature equal to 277 K and 310 K respectively. In this heat pump with two levels, the condensation heat in the higher-pressure generator is used in a lower pressure generator. The study is developed varying the temperature of the higher-pressure generator. Results show that this parameter has a negative effect on the coefficient of performance (COP). Lower pressure in the higher-pressure generator could increase the COP, but determines lower pressure in the lower-pressure generator and in the condenser. In this condition, the heat pump needs of a refrigerant solution with very low temperature in the condenser, making the choice unattainable. For this reason, it is necessary to avoid high value of COP. The temperature of the higher-pressure generator has also a negative effect on the cooling capacity, because the pressure difference between the condenser and evaporator increases, increasing the feeded steam and then reducing the cooling power. The analyzed factor has a positive effect on the heat exchanged in the two generators, because the heat needed to the evaporation increases. The temperature of the higher-pressure generator has a negative effect on the heat exchanged in the condenser, because increasing the condensation temperature the latent heat decreases. The heat transferred to economizers and their efficiency increase with the maximum cycle temperature especially for the low temperature economizer. Future researches should optimize the system considering the efficiency and the costs.

Biography

Grazia Leonzio is a PhD student from L'Aquila University. She published several articles and participated to several international and national congresses about environmental and energy aspect of chemical processes. She wrote an article about waste management in Italian regions and published in Columbia University web-side. She participated to M.U.N conferences and she is a member of several associations: A.I.D.I.C. (Italian Association of Chemical Engineering), S.C.I. (Italian Chemical Society), I.S.S.N.A.F. (Italian Scientists and Scholars in North America), E.C.A.S. (European Commission Authentication Service). She is a referee of several journals.

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