Feasibility Study of a Solar Solid Desiccant Cooling System in Algerian Areas

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Abstract : The interest in air conditioning using renewable energies is increasing. The Thermal energy produced from the solar energy can be transformed to useful cooling and heating through the thermo chemical or thermo physical processes by using thermally activated energy conversion system. Solid desiccant conditioning systems can represent a reliable alternative solution compared with other thermal cooling technologies. Their basic characteristics refer to the capability to regulate both temperature and humidity of the conditioned space in one side and to its potential in electrical energy saving in the other side. The ambient air contains so much water that very high dehumidification rates are required. For a continuous dehumidification of the process air the water adsorbed on the desiccant material has to be removed, which is done by allowing hot air to flow through the desiccant material (regeneration). Basically, solid desiccant cooling system transfers moisture from the inlet air to the silica gel by using two processes: absorption process and the regeneration process; The silica gel in the desiccant wheel which is the most important device in the system absorbs the moisture from the incoming air to the desiccant material in this case the silica gel, then it changes the heat with an rotary heat exchanger, after that the air passes through an humidifier to have the humidity required before entering to the local. The main aim of this paper is to study how the dehumidification rate, the generation temperature and many other factors influence the efficiency of a solid desiccant system by using TRNSYS software.