



## Development of an Absorption Air – Conditioning System Using Aqua – Ammonia Solution

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**Abstract:** The price of basic commodities such as fuel and energy is continuously increasing nowadays, thus people are looking for alternative ways to provide the same amount of comfort and satisfaction while cutting down on their expenses. One area where energy and cost savings play a big role is in comfort cooling since a large amount of energy is spent for this. This study focused on the development of an absorption air – conditioning system utilizing aqua – ammonia solution as the refrigerant. Its objective is to design a laboratory set – up of an aqua – ammonia system making sure that there will be no leakage and to be able to attain the optimum coefficient of performance (COP). The components of the aqua – ammonia system were designed and fabricated to include the generator, rectifying column, absorber, condenser, evaporator, and heat exchangers. Most of the connections were arc – welded to make it seamless and prevent leaks. To simulate the performance of the system using waste heat, a Bunsen burner was used which was attached to a propane tank via a rubber hose with a regulator. One of the limitations of this study was the use of aqua ammonia solution with a concentration of only 28%. This is because high concentration of aqua ammonia solution is not readily accessible. The system was tested to determine its performance. Temperatures and pressures at various points in the system were measured while the cooling effect and the coefficient of performance were calculated. The maximum COP obtained by the system was 0.3685 while the maximum average COP was 0.078. Although these values were a bit low compared to the maximum attainable COP for an absorption refrigeration system, it proved its potential for air – conditioning application. The system did not have leakage during the entire testing. Further studies to improve the performance of this aqua – ammonia system were recommended.

**Key Words:** absorption refrigeration system; aqua – ammonia; coefficient of performance