

## Performance Evaluation of Hemispherical Basin Type Solar Still

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**Abstract :** For so many reasons, fresh water scarcity is one of major problems facing the world and in particularly in the third world in the Northern Africa, the Middle East, the Southwest of Asia, and many other desert areas. Solar distillation offers one of the most promising solutions of renewable energy to this aggravated situation. The main obstacle hindering the spread of the use of solar technology for fresh water production is its low efficiency. Therefore, enhancing the solar stills performances by studying the parameters affecting their productivity and implementing new ideas and a different design are the main goals of the investigators in recent years. The present research is experimental work that tests a new design of solar still with a hemispherical top cover for water desalination with and without external reflectors under the climate of the Kingdom of Bahrain during the autumn season. The hemispherical cover has a base diameter of 1m and a depth of 0.4m, die cast from a 6 mm thick Lexan plastic sheet. The net effective area was 0.785 m<sup>2</sup>. It has been found that the average daily production rate obtained from the hemispherical top cover solar still is 3.610 liter/day. This yield is 11.1% higher than the yield of a conventional simple type single slope solar still having 20° slope glass cover and a larger effective area of 1 m<sup>2</sup> obtained in previous research under similar climatic conditions. It has also been found that adding 1.2m long by 0.15 curved reflectors increased the yield of the hemispherical solar still by 5.5 %, while the 1.2 long by 0.3m curved reflector increased the yield by about 8%.

**Keywords :** hemispherical solar still, solar desalination, solar energy, the Northern Africa

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