

# Experimental investigation of ice-chamber for melting of ice based on Scheffler solar concentrator for high altitude regions

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## Abstract

This experimental analysis was performed with the aim to melt the ice into hot water at very high altitude regions such as Leh Ladakh. Three different designs of ice-chamber were used to melt the ice with direct heating in minimum time. The radiations were focused on the receiver with the help of 1 m<sup>2</sup> Scheffler solar concentrator exposed to the atmospheric situations of NIT Kurukshetra. The Scheffler solar concentrator was fabricated with fiber-reinforced plastic material. The fabrication process is discussed in detail. The results obtained from the design showed that the ice frozen at -5°C completely melted, converting into water. The maximum temperature of water attained in the ice-chamber with receiver 1 (circular plate with fins), 2 (CPC with fins), and 3 (copper crucible) was 57.7°C, 64.3°C, and 67.4°C, respectively.

## KEYWORDS

direct heating, fabrication process of concentrator, melting of ice, receiver-cum ice-chamber, Scheffler solar concentrator

## 1 | INTRODUCTION

Delivering a clean, limitless, and environmental-friendly energy, solar power is one of the greatest natural resource. The Earth captures almost 3.85 million EJ of sunlight every year.<sup>1</sup> Hot water and hot air are the basic necessities of the people living in high altitude regions. Among all the renewable energy sources, solar power has emerged as the most promising solution at an