

Power production by salt gradient solar pond using  
brine and controlling pollution



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## **RESEARCH COMPLETION CERTIFICATE**

Certified that the research work contained in this thesis titled, “**Power Production by Salt Gradient Solar Pond using Brine and Controlling Pollution**” has been carried out and completed by **Tania Rao, Roll No.13002139009**, under my supervision during her study of Master of Philosophy in Physics.

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## DECLARATION

I, **Tania Rao, Roll No.13002139009**, student of **Master of Philosophy in Physics**, hereby declare that the matter printed in this thesis titled, “**Power Production by Salt Gradient Solar Pond using Brine and Controlling Pollution**” is my own work and has not been printed, published and submitted as research work in any form, in any university, research institutions etc. in Pakistan or abroad.

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## **DEDICATION**

To our beloved Prophet Hazrat Muhammad (SAW) who provide me the guidance  
and support in all dimensions of my life.

To my Elder Brother Rao Mubasher Ali Khan whose love and support made me to  
excel in life.

## **ACKNOWLEDGEMENTS**

*In The Name of Allah, Most Gracious, Most Merciful*

I would like to start this page with my heartfelt, deepest gratefulness and gratitude presented to Allah Almighty “Praise be to Allah, the Lord of the worlds”. His Benevolence, Affection, Generosity, and Blessings are even beyond our imaginations and deeds. The completion of this dissertation would have been entirely a dream without the strength and guidance provided by Allah Almighty. Thanks to God for wisdom and perseverance which has been bestowed upon me as we are able to turn impossible into possible through Him who gives us strength.

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**Abstract:**

The pollution in present atmosphere has been damaging health and enhancing death number due to that almost in the entire world. There is another kind of pollution, not as much noticeable as the air pollution, which could be life threatening hazardous on the ground. This kind of pollution is created by the brine, produced in oil industry, which is disposed of without taking care of its hazardous effects. This type of pollution is proposed to be controlled by disposing of the brine in some useful manner. One of the effective ways of controlling the pollution is to utilize it in salt gradient solar pond. The objective of this study is to find out the source of Power Production in the form of Salt Gradient Solar Pond using Brine as well to overcome the pollution which is spread out by wastes of oil companies in consolidated brine.

## ABBREVIATIONS

APL	Attok petroleum limited	MINLP	
Cd	Cadmium	NCZ	Non-Convecting Zone
CDGL	City District Government of Lahore	OARDC	Ohio Agricultural Research and Development Center
CIGS	Copper Indium Gallium Diselenide	ORC	Organic Ranking Cycles
CNS	Central Nervous System	Pb	Lead
Cr	Chromium	PEOz	Polyethylene oxide
DC	Direct Current	PM	Particulate Matter
ETL	Electron Transport Layer	PV	Photovoltaic
GJ	Giga Joules	SC	Solar Chimney
GT	Grand Trunk	SGSP	Salt Gradient Solar Pond
HSD	High Speed Diesel	SSP	Shallow Solar Pond
HTL	Hole Transport Layer	TEG	Thermoelectric Generator
LCZ	Lower Convecting Zone	UCZ	Upper Convecting Zone
LNG	Liquefied Natural Gas	Zn	Zinc

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# Chapter 1

## Introduction:

I happened to spend a night in a village of my forefathers one night and see the clear shiny sky with shiny stars. I realized that the time we are spending in big cities and the area in which we are breathing in is so much pollutant that we are even unable to see the beauty of clear shiny night. The air in which we and our generations are breathing in is something pollutant.

It doesn't only inspire us to see and appreciate the beauty of nature it adversely effect on our lives. Future is seemed to get even worse if no action is taken to cover the present situation. In this worse condition, there is an element which is being added to the environment that is called brine which is the prime matter of the study. Brine is a composition of Sodium Chloride and water. It is being produced in an immense quantity from Oil industries. Oil industries usually do not dispose of brine in an appropriate way. Consequently they disposed it off in lands where this brine make that land barren and non-fertile and finally cause land pollution.