



Cairo University

# **COMPARISON BETWEEN RO AND EDR DESALINATION SYSTEMS IN IRON FACTORY COOLING TOWERS' WATER TREATMENT**

By

**Ahmed Alaa El-Din Mahmoud Ali Khalil**

A Thesis Submitted to the  
Faculty of Engineering at Cairo University  
in Partial Fulfillment of the  
Requirements for the Degree of  
**MASTER OF SCIENCE**  
in  
**Civil Engineering - Public Works**

FACULTY OF ENGINEERING, CAIRO UNIVERSITY  
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**Title of Thesis:**

Comparison between RO and EDR desalination systems in iron factory cooling towers' water treatment

**Key Words:**

RO; EDR; Desalination; Cooling towers water treatment; Iron factory.

**Summary:**

Due to the water shortage all over the world, it becomes need to look for renewable water resources including the reuse/recycling of industrial wastewater. As such this study aims to compare between the reverse osmosis system (RO) and the reverse electro dialysis system (EDR) in the treatment of iron factory cooling towers water, in terms of quality and cost of construction based on case study in one of the iron factories in Egypt. The study includes practical comparison through actual application using a simulation model for the RO plant system carried out in Cairo, however, the EDR system practical part performed on an existing system in iron factory in Alexandria. The results show that the RO system gives better effluent water quality than EDR system. At the end of the study, the return of the investment for each system has been calculated and the results showed that the RO system is less expensive than EDR system with better return of the investment.



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عنوان الرسالة:

دراسه للمقارنه بين طريقه التناضح العكسى و طريقه الديلزة الكهربائيه العكسيه لتحليه المياه  
المستخدمه فى ابراج التبريد الخاصه بمصانع الحديد

الكلمات الدالة:

التناضح العكسى، الديلزة الكهربائيه العكسيه، تحليه المياه، المياه المستخدمه فى ابراج التبريد، مصانع  
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ملخص الرسالة:

نظرا لقله المياه فى جميع أنحاء العالم الان، اصبح من الضروري البحث عن مصادر جديده للمياه المتجددة بما  
فى ذلك إعادة استخدام و إعادة تدوير مياه الصرف الصناعى. كما تهدف هذه الدراسة إلى المقارنة بين نظام  
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## **Dedication**

This work took some years from my life, I wish to express special dedication to people who have suffered to educate, prepare, and help me to be the best.

To my eyes , my father , my mother and my wife

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