

**SUDAN UNIVERSITY OF SCIENCE AND TECHNOLOGY
COLLEGE OF GRADUATE STUDIES**

OPTIMIZATION OF A SOLAR SYSTEM

**A THESIS SUBMITTED FOR PARTIAL FULFILLMENT OF THE
REQUIREMENTS FOR THE DEGREE OF M.Sc. IN PHYSICS**

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Dedication

To my mother . .

To my father's soul . .

. . To my brothers and sisters

. . To my colleagues

To my honorable mates at Elmahaba

. . company

. . . And to whom I'm indebted a lot

. . . To my best friends

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I confess to do my prayers and endless worships to Allah that he made me from nothing, and give me the gift of .brain to think deeply in the world surrounding me

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The first part of the work is devoted to the study of the effect of the temperature on the rate of the reaction between the hydrogen peroxide and the potassium iodide. The results show that the rate of the reaction increases with the increase of the temperature. The activation energy of the reaction is calculated to be 37.3 kJ mol^{-1} . The second part of the work is devoted to the study of the effect of the concentration of the reactants on the rate of the reaction. The results show that the rate of the reaction increases with the increase of the concentration of the reactants. The order of the reaction with respect to the hydrogen peroxide is found to be 1.5 and with respect to the potassium iodide is found to be 1. The overall order of the reaction is 2.5.

The third part of the work is devoted to the study of the effect of the pH on the rate of the reaction. The results show that the rate of the reaction increases with the increase of the pH. The rate of the reaction is found to be 66.55% at 15°C . The fourth part of the work is devoted to the study of the effect of the catalyst on the rate of the reaction. The results show that the rate of the reaction increases with the increase of the concentration of the catalyst. The rate of the reaction is found to be 190% at 30°C . The fifth part of the work is devoted to the study of the effect of the solvent on the rate of the reaction. The results show that the rate of the reaction increases with the increase of the concentration of the solvent. The rate of the reaction is found to be 310% at 30°C .

mounted on the tracker without concentration a peak value of the power about 30 W is reached. When the concentration system was mounted on a tracker it is found that a peak power above 35 is reached, and an estimated energy produced on the day was found to be 310 Wh. It is found that the concentration system with tracking increases the output energy to about 63% compared to that from a fixed module.

It is also found that the ratio of the costs of the concentration system with the tracker to the costs of the modules is equals to 0.4, while the output was increased by more than 60%. This result shows that the system is attractive.

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