بسم الله الرحمن الرحيم

Ain Shams University Information Network

جامعة عين شمس

شبكة المعلومات الجامعية

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شبكة المعلومـــات الجامعية

التوثيق الالكتروني والميكروفيلم

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﴿ قسم ﴾

نقسم بالله العظيم أن المادة التي تم توثيقها وتسجيلها
علي هذه الأفلام قد اعدت دون آية تغيرات

يجب أن

تحفظ هذه الأفلام بعيداً عن الغبار

في درجة حرارة من 15 – 20 مئوية ورطوبة نسبية من 20-40 %

To be kept away from dust in dry cool place of
15 – 25c and relative humidity 20-40 %

بالرسالة صفحات

لم ترد بالأصـــل

بعض الوثائق الأصلية تالفة

DEVELOPMENT OF A SOLAR COOKER FOR DRYING USING SOLAR ENERGY

By

Yousri Ahmed Habib Esmail

B.Sc. (Mech. Eng.) Helwan University, 1983

M.Sc. (Ag. Eng.) South Dakota State University, USA, 1994

A thesis submitted for Doctor of Philosophy

in

Environmental Science

Department of Engineering Science

Institute of Environmental Studies & Research

Ain Shams University

2002

APPROVAL SHEET

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ABSTRACT

Yousri Ahmed Habib Esmail, studies on "Development of a Solar Cooker for Drying Using Solar Energy", Unpublished Ph. D., Ain Shams University, Institute of Environmental and Research.(2002).

The main objectives of this study are constructing and testing a new design of the solar cooker. The cooker was designed as semi-circle shape and fabricated from wood and the absorber plate made of aluminum sheet. The effect of some factors such as number of glass covers, plane reflector and tilt angle on the cooker performance were studied. Doubling the glass cover increased the temperatures inside the cooker and extended the water-boiling period to 2 hours. The absorber plate temperature increased from 107°C to 127°C when plane reflector was used. In order to accelerate the cooking process, contour maps indicate the temperature distribution inside the cooker were introduced in the present work. Analyzing these maps can help determining the appropriate placement for cooking pots and usefulness of the highest temperature locations. Energy balance equations of the cooker and its components were introduced. Thermal heat exchange among surfaces depends on geometry and orientation of these surfaces, so shape factor was introduced in this work. Economic study on the cooker was carried out and comparison of the solar cooker operational cost with traditional gas cooker was established. Constructing air inlet and outlet gates in order to be used as drier, drying tests on some agricultural products were conducted. The drying cost of some agricultural products was calculated and the drier contour maps were introduced. The effect of using the solar cooker on the environmental protection from fossil fuels exhausts was estimated.

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CONTENTS