Dedication

I dedicate this work to my mother Haja Hawaa and my father Haj Ishag who had offered me their love, spared their unlimited effort to, and spent their valuable time to care for and educate me. In addition, I dedicate this work to my honest wife Khansa Ibrahim Suleiman, who has given me unlimited support to accomplish this work, and my sisters, my brothers and their families.

The same dedication is extended to my teachers, friends and for all the people who have stood by me and appreciate all needed they have given me, asking Allah to bless them.

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Abstract

Three brick clay samples were prepared by mixing the garirh earth from Jazeera state and kaolin from North state with different percentages for three samples. The refractory bricks components, were for sample-1 (75% garirh, 25% kaolin), sample-2 (70% garirh, 30% kaolin), and sample-3 (80% garirh, 20% kaolin). The specific heat capacity of the three samples and the thermal conductivity were calculated. The three samples were analyzed using a Canberra 35+ device and the concentrations were obtained. The results of the thermal conductivities of the brick sample products were found to decrease from 0.0261 (W/m K) for the sample-1(75% garirh, 25% kaolin) to 0.01799(W/m K) for the sample-3 (i.e. ~32%), for the sample 80% garirh, 20% kaolin.

A device assembled by the researcher Mohamed Ishag measured the humidity ratio of the three samples. It is an electronic device consisting of a port connected to LCD water screen to display the reading of humidity inside and outside the room, and a microcontroller of 16L mega, which was programmed by the computer using the program Bas com AVR and the data was then transferred to the electronic port. Finally, two DHT11 sensors were used to measure the internal and external humidity. The reading were recorded every hour after performing measurements of the humidity of the three samples, a graph with the ratio of humidity versus the time of each sample was drawn from 6 am to 10 pm. The results of all three samples were obtained, all of which showed high humidity in the morning, and very low humidity at noon interval, then it rises and becomes very high at evening again.

The idea of a humidity Sensor was transferred to the humidity meter by an electronic circuit assembled by the researcher which consists of microcontrollers and the computer program as basic components.

The researcher concluded that in the hot area, the best sample of the refractory bricks samples was sample-3, which consists of (70 % garirh, 30 % kaolin). While in the humid areas, the best sample was sample 1. It is made up of (75% garirh and 25% kaolin).

المستخلص

أعدت ثلاثة عينات من طوب الطين بواسطة خلط تراب القريرة من ولاية الجزيرة والكاولين من ولاية الشمالية بنسب مختلفة للعينات الثلاثة، وهي مكونات الطوب الحراري. العينة الاولي تتكون من (75% قريرة و25% كاولين)، العينة الثانية (70%قريرة و30% كاولين) والعينة الثالثة (80% قريرة و20% كاولين). حللت العينات الثلاثة وتم الحصول على التركيز بواسطة جهاز الكامبيرا 35+. ثم حسبت الحرارة النوعية والموصلية الحرارية للثلاثة عينات. وتم الحصول على نتائج الموصلية الحرارية لمنتجات عينات الطوب ووجد بانها تقل من 0.0261 وات لكل متر كلفن للعينة المكونة من (75% قريرة و25% كاولين) الي 0.01799 وات لكل متر كلفن للعينة المكونة من نسبة 80 في المئة من القريرة ونسبة 20 في المئة من الكاولين.

حسبت نسبة الرطوبة للعينات الثلاث بواسطة جهاز تم تجميعه من قبل الباحث محمد اسحق مصطفي وهو جهاز إلكتروني يتكون من منفذ الكتروني متصل بشاشة مائية LCD وهي تستخدم لعرض قراءة الرطوبة داخل وخارج الغرفة, و متحكمة 16 ميقا والتي تم برمجتها بالكمبيوتر باستخدام برنامج باص كوم ومن ثم نقلت البيانات الي المنفذ, وأخيرا حساسين DHT11 لقياس الرطوبة الداخلية والخارجية . بعد تسجيل قراءات الرطوبة للعينات الثلاثة لكل ساعة، من الساعة 6:00 صباحا وحتى الساعة 10:00 مساءا، رسم رسماً بيانياً لنسبة الرطوبة مقابل الزمن. وقد تم الحصول على نتائج العينات الثلاثة، وكلها ذات رطوبة عالية عند الصباح، ومنخفضة جدا عند فترة الظهيرة، ثم ترتفع وتصبح عالية جدا عند المساء.

تم تحويل فكرة جهاز حساس الرطوبة الي جهاز قياس الرطوبة بواسطة دائرة الكترونية تم تجميعها بواسطة الباحث والتي تتكون من الميكروكنترولـه وبرنامج الحاسوب كمكونات اساسية

يوصي الباحث في المناطق الحارة باستخدام العينة الثالثة، المكونة من (70% قريرة، 30% كاولين). أما في المناطق الرطبة، فالعينة الأفضل هي العينة الاولي المكونة من (75% قريرة و75% كاولين)