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قسم

نقسم بالله العظيم أن المادة التي تم توثيقها وتسجيلها
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يجب أن

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في درجة حرارة من ١٥-٢٥ مئوية ورطوبة نسبية من ٢٠-٤٠%

To be Kept away from Dust in Dry Cool place of 15-25- c and relative humidity 20-40%

بعض الوثائـــــــق الاصليـــــة تالفـــة

بالرسالة صفحات لم ترد بالاصل

EFFECT OF IONIC EXCHANGE ON THE PROPERTIES OF THE CLAY USED IN CASTING MOLDS

Thesis submitted

By

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for

M.Sc. degree

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To my Wife,

To my Children;
Marawan and Mona

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SUMMARY

The aim of the work is to study the effect of clay structure and its activation on the properties of clay used in casting molds . Egypt contains large amount of bentonitie clay . Thus Egyptian bentonitie clay from Hammamat and Qasr- El- Sagha were used as a binding agent in molding sand . The two different clays (Hammamat and Qasr- El – Sagha) were investigated and evaluated for application in foundry .

The chemical and mineralogical composition of the received samples were determined by X-ray fluorescence, X-ray diffraction and thermal analysis. The samples were activated by using NaCl solution as activator ranging from 0-10% to produce Na-bentonite clay suitable as bonding agent for molding sand in foundries. The physical properties of the two bentonite samples including moisture content, the cation exchange capacity, Gel index and the specific surface area were determined to qualify clay as binder for molding sand. The sand was mixed with the investigated clay, unactivated and activated in three contents (5%, 7% & 9%) at different water ratios. The foundry-technical properties of the two bentonitic samples including gas permeability, bulk density, green compression strength and dry compression strength of sand bonded with bentonite were studied.

The results showed that montmorillonite and kaolinite minerals were detected in the clay fraction of the two samples Hammamat sample denotes as A and Qasr-El-Sagha sample denotes as B. Illite minerals was detected in the clay fraction of the sample (B) only. Quartz and calcite were detected in the non-clay fraction of sample B, but only Quartz was detected in the non-clay fraction of the sample (A). The semiquantitative analysis shows that sample (A) contains 86.26% montmorillonite and 13.73% kaolinite

while sample (B) contains 58.4% montmorillonite, 39.0% kaolinite and 2.48% illite. The cation exchange capacities were 90 and 35 meq / 100 gm for sample A and sample B respectively, sample A shows large surface area (699.7 m^2/g) compared to tower surface area of sample B (494.5).

Alkali activation of samples A and B using NaCI solution as activator improved the reheologieal and binding properties and this is appeared in the increasing of optimum green compression for sample A than B . These results are attributed to the higher bentonite content in sample A . So sample A is considered as a good sample for application in foundry comparing to sample B .

LIST OF FIGURES