

## تأثير المواد المضافة (C,ZnO,TiO<sub>2</sub>) على خواص راتنج الايبوكسي

( Matrix )  
( Reinforcing )  
( ZnO TiO<sub>2</sub> )  
( 0.3% 18%, 185%, 300%  
( 20%, 115%,  
( 50%  
( 26%, 11%, 22%

### Abstract

The wide range of application in composite materials with wide variation in the properties, such as; any part in the vehicles required special properties (i. e. heat resistance, environment l degradation, stiffness and high mechanical properties). All these properties are produced by selected the suitable matrix and reinforcing materials.

This wide Varity in properties gives the designer more flexibility. In this paper study Epoxy resin behavior when added different particle material with different present the materials were used TiO<sub>2</sub>, Carbon Black and ZnO.

Result shows an improvement in the hardness by 300%, 185%, 18% at 0.3% from TiO<sub>2</sub>, Carbon Black and ZnO respectively. The result show also increases in density at same percent by 50%, 115%, 20% when added TiO<sub>2</sub>, Carbon Black and ZnO respectively. The heat resistance also increases with it above case by 22%, 11%, and 26%.

### Introduction -1

(Thermosetting Polymer)  
(Thermoplastic polymer)  
(Matrix Phase)  
(Reinforcing Phase)  
(Flaks) (Filler) (Particles) (Fiber)  
(Laminas)  
(Lukhassen 2003)  
(Composite Materials)

(hybrid)

Polyether Liquid Rubbers

.(2003)Jörg

TiO<sub>2</sub> -

Drazal *et al* (2005) . Kar (2004)

nm( 250-20)

UV

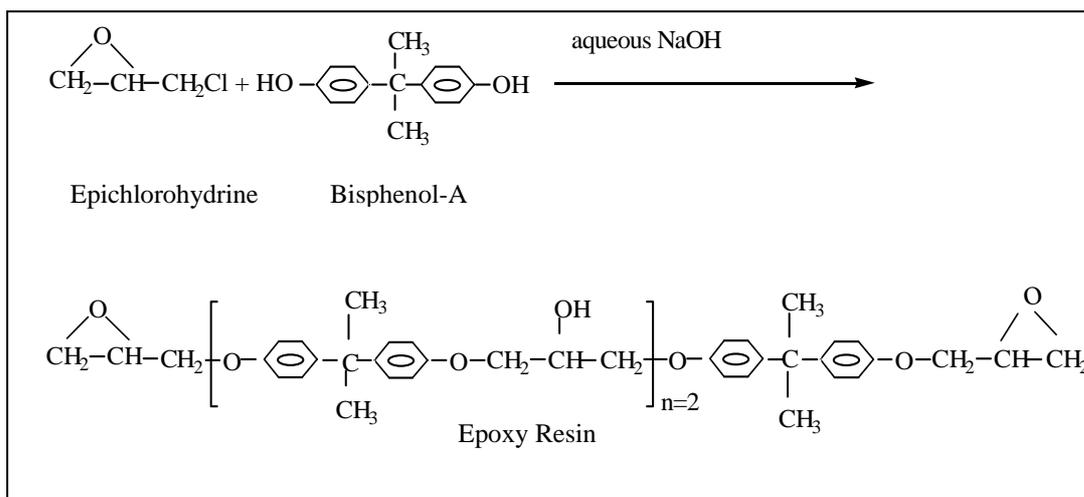
**Experimental Work - 2**

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-1

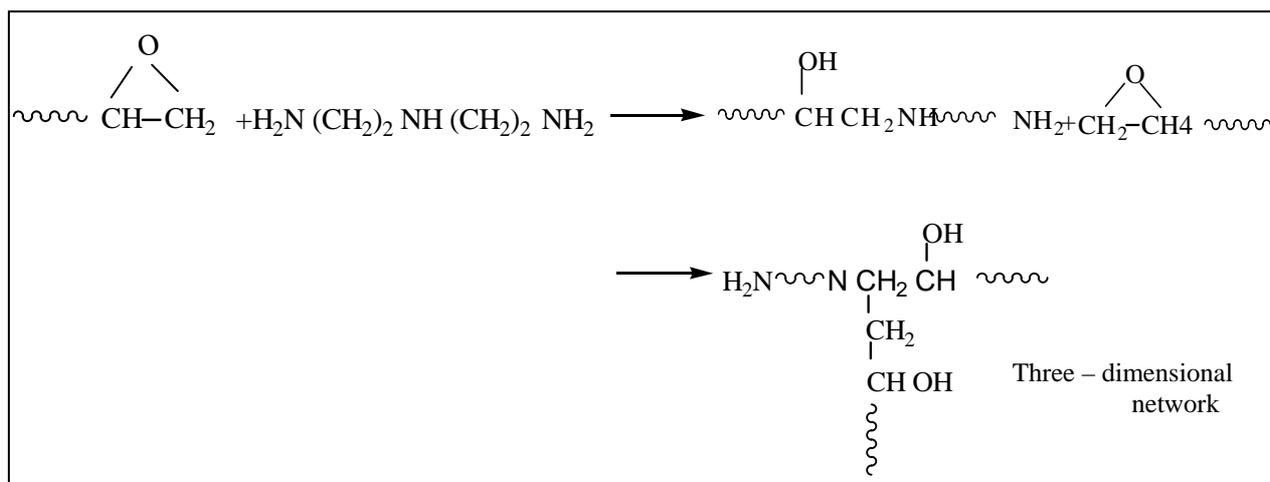
( Thermoset)

A-



( AL-Asadee 2007).

(1)



(AL-Asadee 2007).

(2)

( temperature resistance)

."

(%0.3 )

. AL-Asadee(2007)

**:TiO<sub>2</sub>**

**-2**

:

79.87gm/mol

4.23gm/cm<sup>3</sup>

1870 °C(3398 F)

2972 °C

:

(TiO<sub>2</sub> 90 % )

Chloride process

TiO<sub>2</sub>

( )

( )

. Kakni ( 2004)

**: ZnO**

**-3**

..5.5

. %10 + %90  
. Kakni ( 2004) :  
: -4

.....

Kakni ( 2004)  
:  
(TiO<sub>2</sub>,ZnO,C)  
: 7:3 (7cc)  
24

PHYWE universal testing machine

ASTM D785-89

120 °C

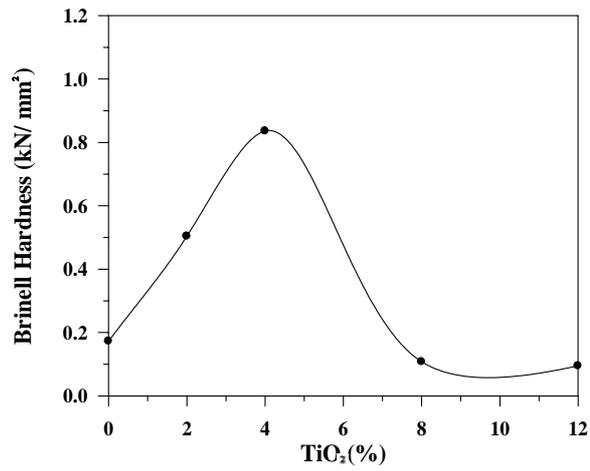
. (Young& Lee 2001)

**Results and Discussions** - 3

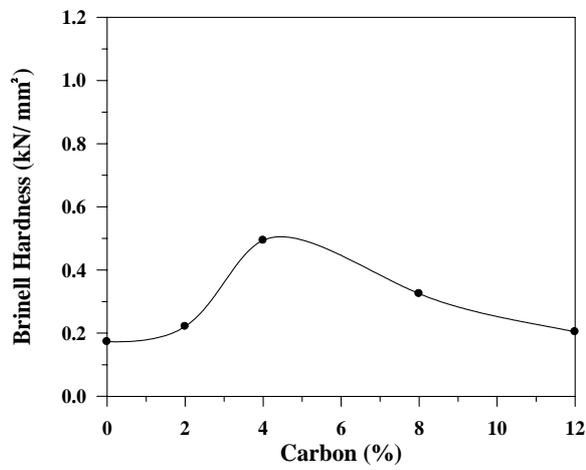
**Hardness Test** -

(5-3)

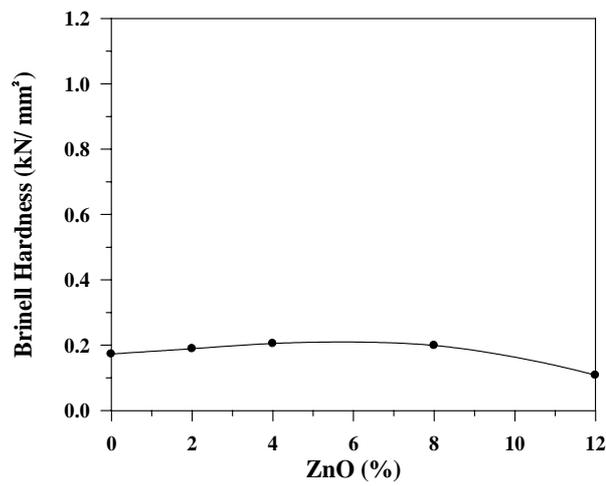
Amandal and Stephanie(2005)



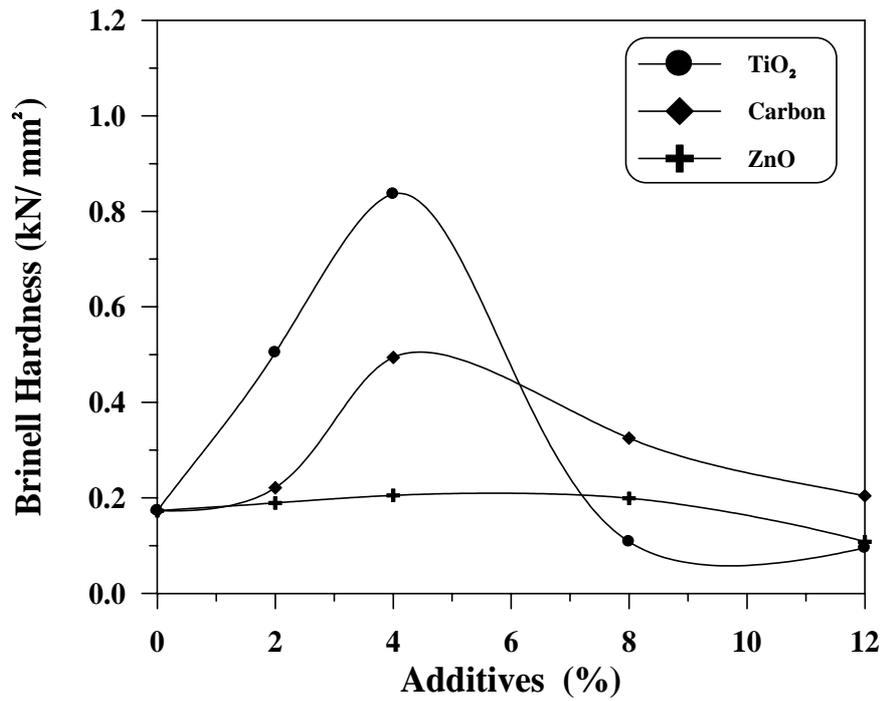
(3)



(4)



(5)

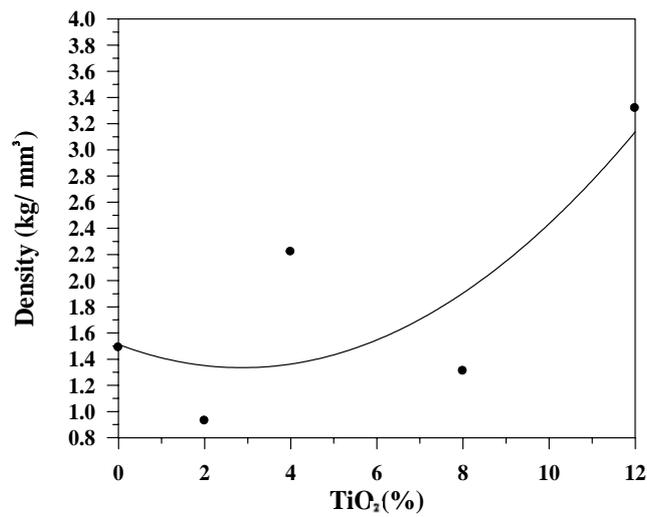


(6)

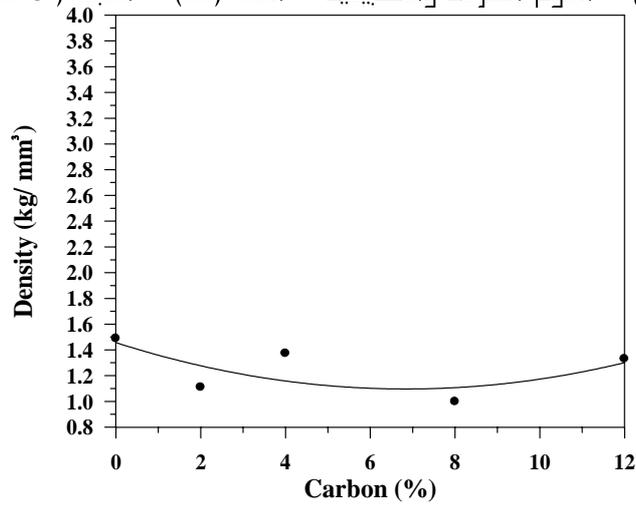
### Density Test

(8-6)

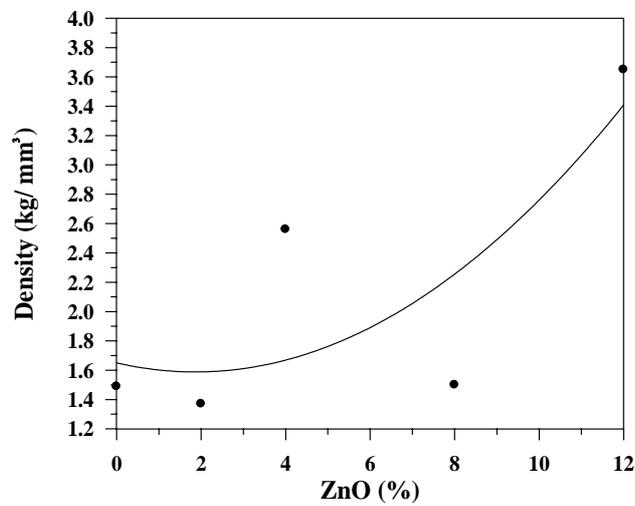
filler



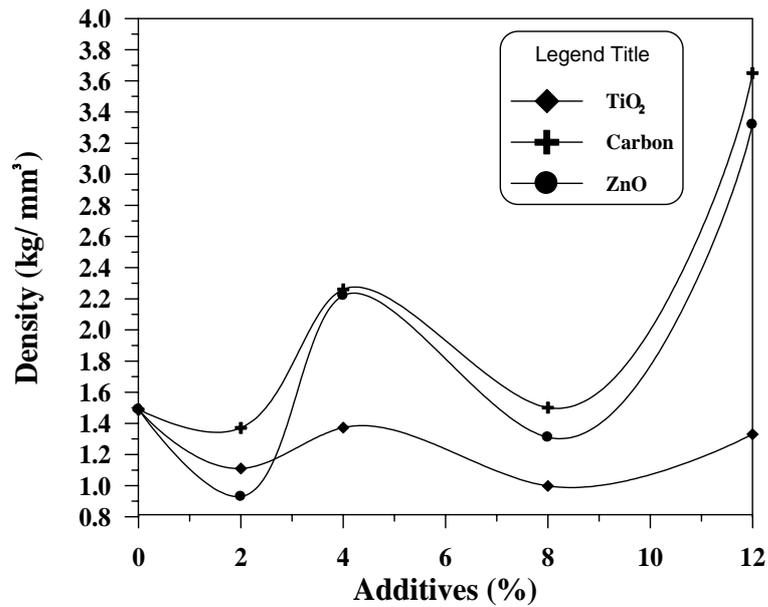
(7)



(8)



(9)

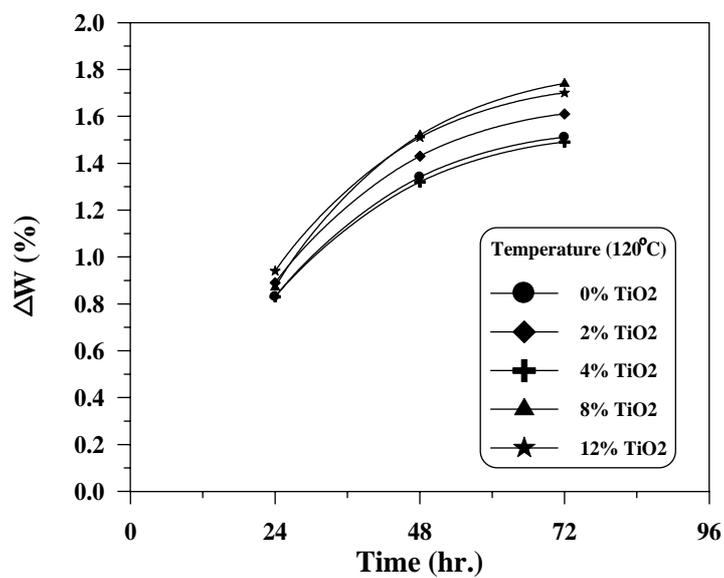


(10)

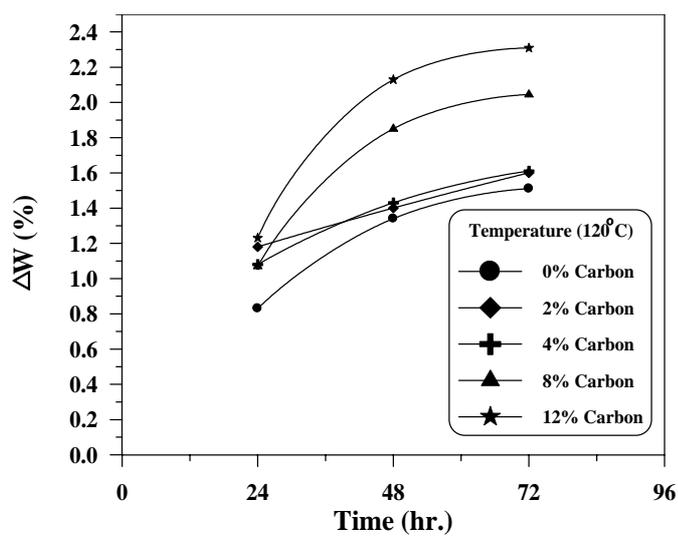
### Heat Resistance Test

(11-9)

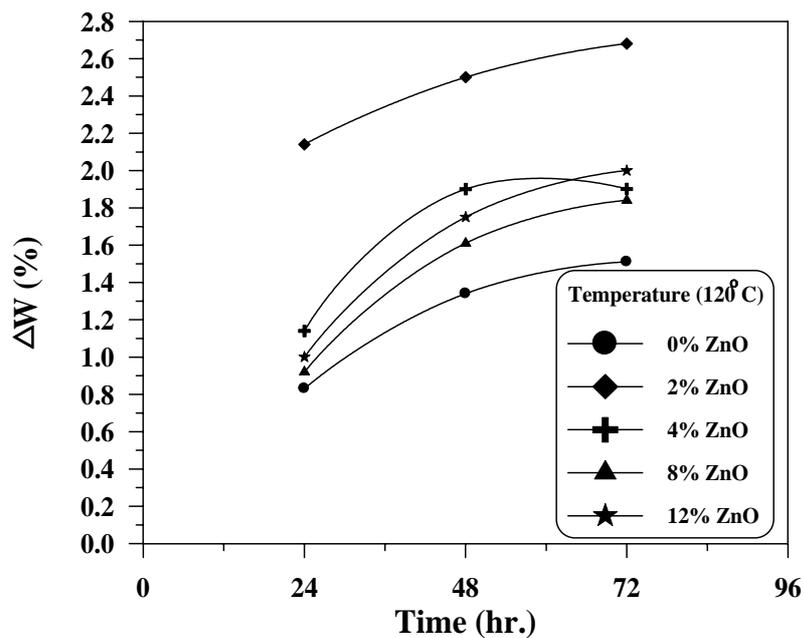
Nandhan and Ravi V(2005)



(11)



(12)



(13)

### Conclusion

-5

(1)

0.3%

(1)

Test	Improvement Percent in Epoxy When Added		
	TiO <sub>2</sub>	C	ZnO
Hardness	300	185	18
Density	50	115	20
Heat Resistance	22	11	26

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