

(DBP) (DEHP) :

- - -

2011/02/22

2011/07/05

(additives)

:
 /A/ (D
 .UV (20) (DBP) (DEHP) /C/ /B/
) (C⁰ 70 C⁰ 40 C⁰ 20) (%95)
 HPLC
 /C/ (%95) - -
 /B/ /B/ /A/
 .A/

:

...

Effect of temperature and exposure time on the stability of plasticizers, which are Used in plastic Packing Industry, in food simulants

Part (I)-Stability of Diethylhexyl phthalate (DEHP) and Dibutyl phthalate (DBP)

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ABSTRACT

Additive migration levels in food simulants from polymeric materials that are intended to be into contact with food can be affected by additive stability under the migration test conditions. In this work, the stability of two plasticizers: Diethylhexyl phthalate (DEHP) and Dibutyl phthalate (DBP) was studied in aqueous food simulants A, B, C and ethanol 95% (as a substitute for olive oil- which is a fatty food simulant- simulant D), at different temperatures 20, 40 and 70 C⁰, during 20 days. Samples were analyzed by high performance liquid chromatography (HPLC) with UV detector.

In general, DEHP and DBP plasticizers appeared to be more stable in both Ethanol (95%) and simulant C than in simulants A and B, while, they are less stable, even at low temperatures, in Simulant B than in simulant A .

Key words: Food Simulants, Additives Migration, (HPLC), Plasticizers Stability.

[4-1]

..

:

[5]

:"

"4.5 pH /A/ -1

" (V\W %3) /B/ -2

." 4.5 pH (V\V %10) /C/ -3

." /D/ -4

.[6]

... %95) /D/

.[8,7] (

(additives)

.[9]

(DEHP)

(DPPD)

(DEHA)
[15-10]

[19-16]

(DEHP)

- (DBP)

-[20]
/C/ /B/ /A/

[9] (3ppm)

() (%95)

(mol \ g 390.56 =

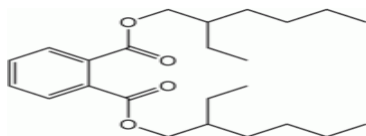
Used materials

-1

) (DEHP)

(

$C_6H_4 (CO_2C_8H_{17})_2$:



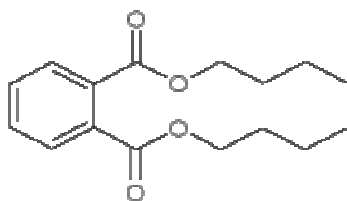
(DBP)

(

(mol \ g 278.35=

)

$C_{16}H_{22}O_4$:



SHAMLAB (Aldrich, Milan, Italy) (ت)
 (%99) 2- :
 (%99) (Scharlaus Chemies A, Barcelona, Spain) (ث)
 HAMILTON LABORATORY GLASS) (ج)
 - (LTD

"High Performance liquid Chromatography" : -2
 -
 : (Japan – Kyoto) SHIMADZU
 . UV – PDA (SPD – M2oA)
 .CTO – 20A .LC – 20 –AT
 .(LC Solution)
 C₁₈ -
 (Merck, Germany) (4.6x 250mmx 4 μ_m)
 (ml 0.01) μL 100 : -
 (HAMILTON – BONDUZ, SCHWEIZ, SWITZERLAND)
 : -
 10 /90 (MPh) : •
 (Acetonitrile 90: Methanol 10)
 .(nm270) :(Wavelength) •
 .(μL20) :(injection Volume) •
 .((C⁰ 30)) :(Column oven temperature) •
 :(flow rate) •
 (DEHP) ml/min1
 (DBP) ml/min 0.8

DBP DEHP

(UV)

0.75 PPm 1.5 PPm 3) :

.(PPm 0.188 PPm

(Germany) Memmert : -3

Stability test procedure : -4

/C/ /B/ /A/

(C⁰ 70 40 20)

(PPm 3)

(%95)

/20/

.(HPLC)

: -5

(Preparation of samples and test stability conditions)

(PPm 3) DEHP DBP

.2 -

(mg/L1000)

(Stock Solution)

(working solution)

. 2 -

(mg/L 100)

3)

(sample solutions)

)/B/

() /A/

: (PPm

(%95)

(%10) /C/

(%3

./D/

/20/

.[21] (1)

.*

(1)

5 °C	T ≥ 5 °C
40 °C	20 °C < T ≤ 40 °C
70 °C	40 °C < T ≤ 70 °C

*

%50 >

[16]

DBP DEHP

(3 - 1)

(%95)

/C/ /B/ /A/

20)

/20/

/D/

(C⁰ 70 40

[24-22] GC

[23]

[26-25,10]HPLC

C⁰ 20

DBP DEHP

(1)

/C/

DBP DEHP

(%95)

/B/

/A/

C⁰ 20

(%13)

DEHP

DBP

DEHP

/B/ /A/

DBP DEHP

(2)

(C⁰40)

(PPm3)

(%95)

/C/

(%4)

DBP

/A/

(%95)

/C/

(%10)

DEHP

/B/

(C⁰ 20)

(%34)

DEHP

(%95)

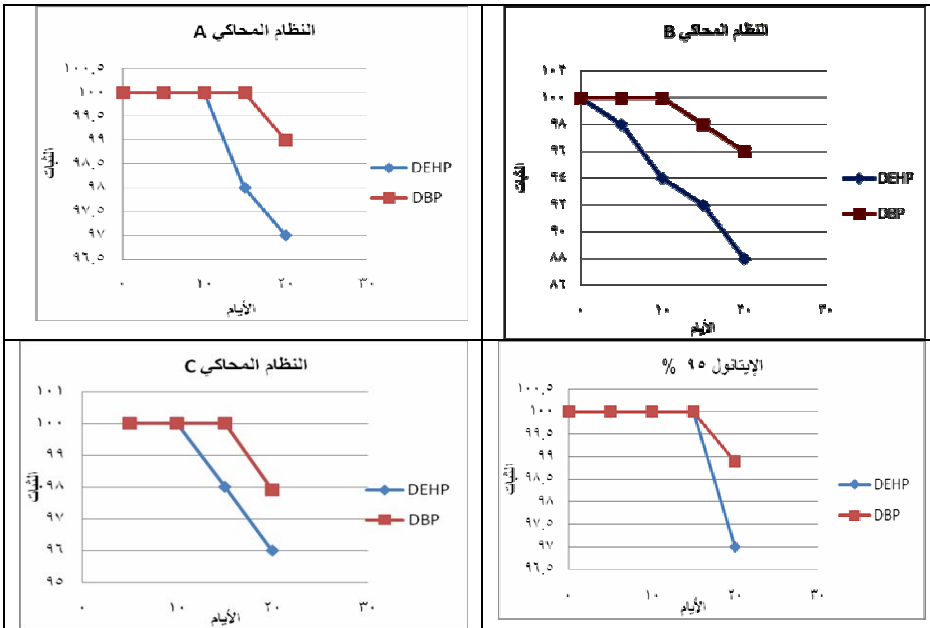
(%12)

DEHP

DBP

.DBP

DEHP



C⁰ 20

(1)

(C⁰ 70)

(%95)
 (%87) DEHP
 (%88) DBP
 /B/ .
 (C⁰ 40 C⁰ 20)
 " " DBP DEHP
 (%60) (%10)
 (%50) /C/
 .[16]
 DEHP /A/
 .DBP (%74)

/C/

/A/ /B/

(%95)

/C/

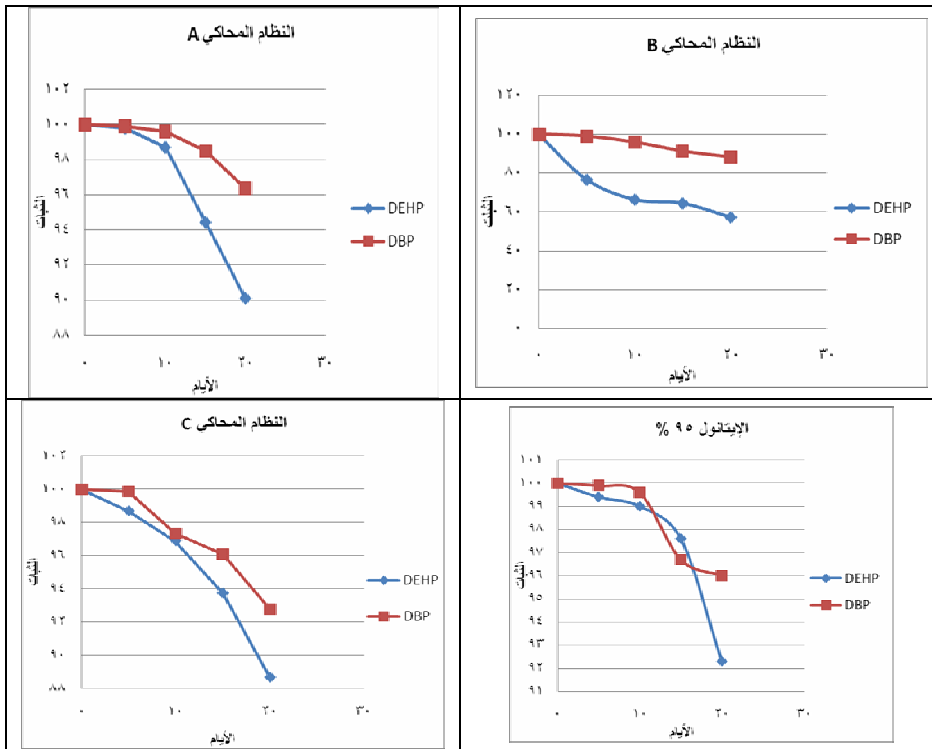
(C⁰ 70)

DEHP

(%50)

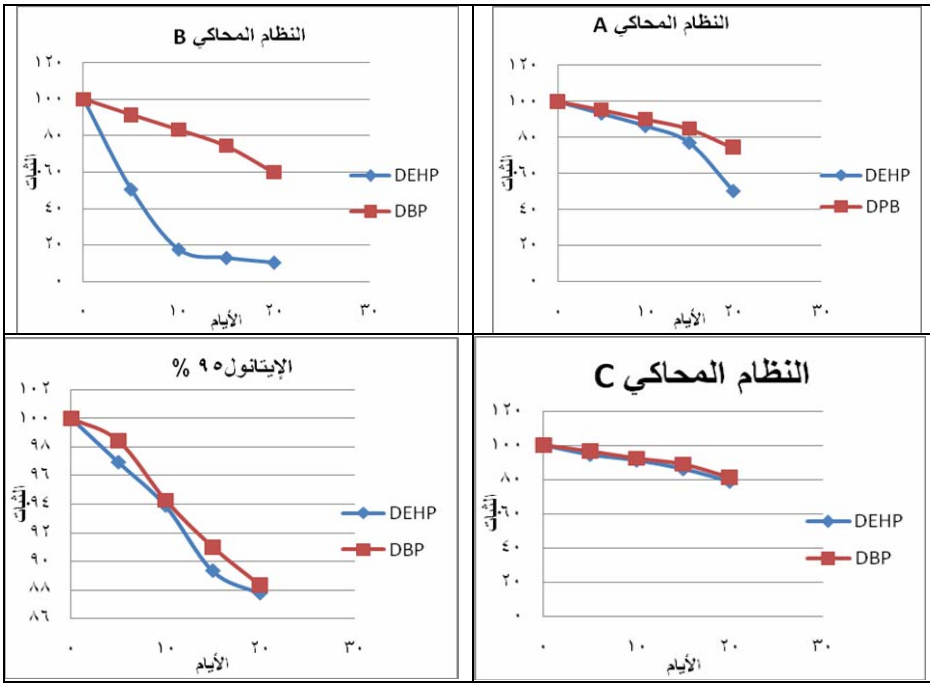
DBP

.B/



C⁰ 40

(2)



C⁰ 70

(3)

:

-1

(%95) /A/ /B/
/C/

(%95) -2

DEHP /B/ DBP -3
(%95)

-4

DBP DEHP

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