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Novelties of solid-liquid phase transfer catalyzed synthesis of benzyl diethyl phosphate from the sodium salt of diethyl phosphate

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Nucleophilic substitution
Organic phosphate
Mechanism

ABSTRACT

Solid-liquid phase transfer catalysis coupled with mixed solvents, which could be recycled, as a green chemistry procedure, was applied to the synthesis of phosphate from the sodium salt of diethyl phosphate. The benzyl diethyl phosphate was synthesized in good yield via one-pot method from the reaction of the industrial by-product sodium salt of diethyl phosphate with benzyl chloride in solid-liquid phase transfer catalysis and toluene-water mixed solvents. The effects of catalyst structure, the amounts of catalyst, the raw material molar ratio, water loading, and reaction temperature on the conversion of the reaction were investigated. The structure of the benzyl diethyl phosphate generated was confirmed by Elemental Analysis, IR, ^{1}H NMR and GC/MS.

Supplementary Material

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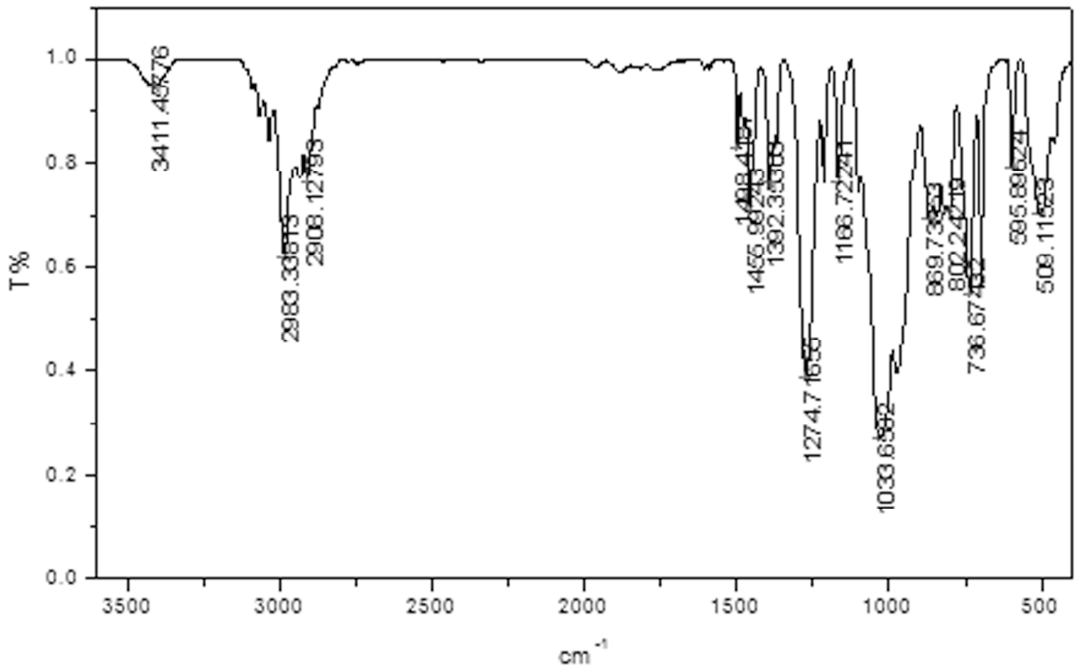

^{1}H NMR:

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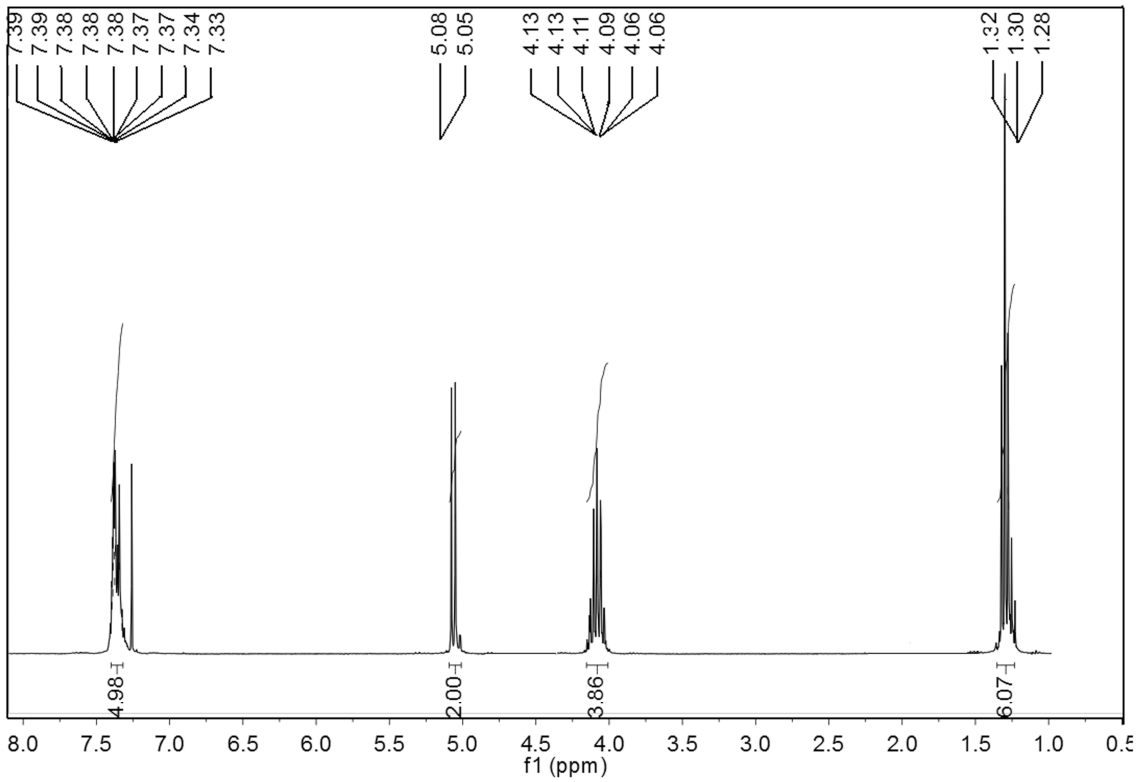
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4.13
4.11
4.09
4.06
4.06
1.32
1.30
1.28
4.98
2.00
3.86
6.07
8.0
7.5
7.0
6.5
6.0
5.5
5.0
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3.5
3.0
2.5
2.0
1.5
1.0
0.5
f1 (ppm)

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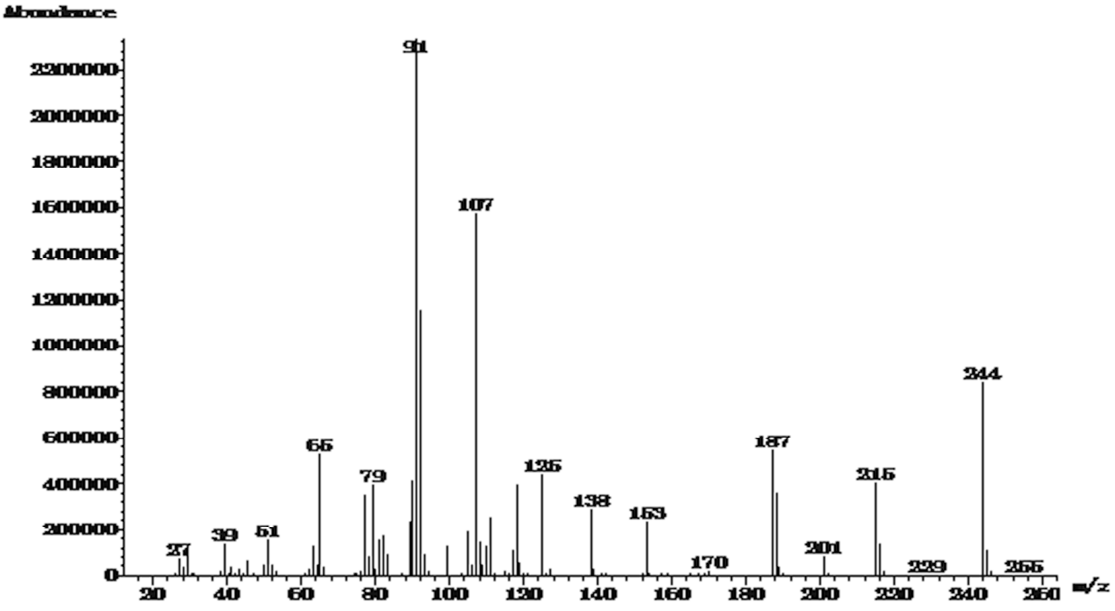
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51
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201
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229
255
20
40
60
80
100
120
140
160
180
200
220
240
260
m/z