The Diels-Alder reactions of carbomethoxy-p-benzoquinones with simple dienes

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INTRODUCTION

The Diels-Alder reactions of p-benzoquinones and derivatives with simple dienes provide functionalized cycloadducts that can be employed in the synthesis of bioactive terpenes.\(^1\)\(^-\)\(^3\) We now present our results on the Diels-Alder reactions of carbomethoxy-p-benzoquinones with simple dienes, performed at room temperature, with Lewis acid catalysis, and with microwave irradiation.

RESULTS AND DISCUSSION

We have studied the Diels-Alder reactions of 2-carbomethoxy-6- and -5-methyl-p-benzoquinones (1 and 2 respectively) with cyclopentadiene (3) and 2,3-dimethyl-1,3-butadiene (4) (Table 1), and with trans-piperylene (5) and isoprene (6) (Table 2).

Table 1. Diels-Alder reactions of carbomethoxy-p-benzoquinones 1 and 2 with dienes 3 and 4.

<table>
<thead>
<tr>
<th>Entry</th>
<th>R(_1)</th>
<th>R(_2)</th>
<th>diene</th>
<th>Yield (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Me</td>
<td>H</td>
<td>3</td>
<td>92</td>
</tr>
<tr>
<td>2</td>
<td>Me</td>
<td>H</td>
<td>4</td>
<td>71</td>
</tr>
<tr>
<td>3</td>
<td>H</td>
<td>Me</td>
<td>3</td>
<td>89</td>
</tr>
<tr>
<td>4</td>
<td>H</td>
<td>Me</td>
<td>4</td>
<td>70</td>
</tr>
</tbody>
</table>

The Diels-Alder reactions of dienophiles 1 and 2 show high chemoselectivity for the carbomethoxy substituted double bond. The Diels-Alder reactions of p-benzoquinone 7 with dienes 3 and 4 show variable chemoselectivity, depending upon the reaction conditions. We suggest a methyl group non-bonded interaction with the carbomethoxy group to explain this chemoselectivity difference.

CONCLUSION

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REFERENCES