

### 3,4,5-Triarylpyrazoles

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Substituted benzoin reacts with hydrazine hydrochloride to give the title compounds.

BENZON and hydrazine hydrochloride react in ethanol to give several products including 3,4,5-triphenylpyrazole, probably by fission of the hypothetical benzoinazine.<sup>1</sup> Substituted benzoin reacts similarly. This

the residue with ether then with water, and recrystallizing the insoluble fraction from ethanol or aqueous ethanol. In some cases the hydrochlorides were also obtained. N-Acylation and -sulphonylation took place on heating with

	M.p. (°C)	Yield (%)	Formula	Found (%) *			$\nu_{\max.}(\text{KCl})/$ $\text{cm}^{-1}$
				C	H	N	
3,4,5-Tri- <i>p</i> -tolylpyrazole	252—253	27	C <sub>24</sub> H <sub>22</sub> N <sub>2</sub>	84.7(85.2)	6.1(6.5)	8.2(8.3)	
Ethyl 3,4,5-tri- <i>p</i> -tolylpyrazole-1-carboxylate	122—123		C <sub>27</sub> H <sub>26</sub> N <sub>2</sub> O <sub>2</sub>	79.2(79.0)	6.2(6.4)	7.2(6.8)	1770
3,4,5-Tri- <i>p</i> -tolyl-1- <i>p</i> -tolylsulphonylpyrazole	222—224		C <sub>31</sub> H <sub>28</sub> N <sub>2</sub> O <sub>2</sub> S	75.6(75.9)	5.95(5.7)	5.3(5.7)	1385, 1195
1-Benzoyl-3,4,5-tri- <i>p</i> -tolylpyrazole	166—167		C <sub>31</sub> H <sub>26</sub> N <sub>2</sub> O	84.6(84.1)	6.1(5.9)	6.6(6.3)	1700
3,4,5-Tris- <i>p</i> -methoxyphenylpyrazole	233	26	C <sub>24</sub> H <sub>22</sub> N <sub>2</sub> O <sub>3</sub>	74.0(74.6)	5.9(5.7)	7.5(7.25)	
3,4,5-Tris- <i>p</i> -methoxyphenylpyrazole hydrochloride	227		C <sub>24</sub> H <sub>23</sub> ClN <sub>2</sub> O <sub>3</sub>	68.9(69.2)	5.5(5.4)	6.4(6.6)	2300—2800
1-Acetyl-3,4,5-tris- <i>p</i> -methoxyphenylpyrazole	136—137		C <sub>26</sub> H <sub>24</sub> N <sub>2</sub> O <sub>4</sub>	73.0(72.9)	5.8(5.65)	6.5(6.5)	1705
1- <i>p</i> -Bromobenzoyl-3,4,5-tris- <i>p</i> -methoxyphenylpyrazole	177—178		C <sub>31</sub> H <sub>25</sub> BrN <sub>2</sub> O <sub>4</sub>	66.0(65.4)	4.5(4.4)	4.8(4.9)	1700
1-Benzoyl-3,4,5-tris- <i>p</i> -methoxyphenylpyrazole	210—212		C <sub>31</sub> H <sub>26</sub> N <sub>2</sub> O <sub>4</sub>	76.0(75.9)	5.4(5.3)	5.5(5.7)	1700
3,4,5-Tris- <i>p</i> -isopropylphenylpyrazole	209—210	28	C <sub>30</sub> H <sub>34</sub> N <sub>2</sub>	85.4(85.3)	8.0(8.1)	6.9(6.6)	
3,4,5-Tris- <i>p</i> -isopropylphenylpyrazole hydrochloride	215		C <sub>30</sub> H <sub>35</sub> ClN <sub>2</sub>	78.4(78.4)	7.4(7.6)	5.9(6.1)	2200—2700
Ethyl 3,4,5-tris- <i>p</i> -isopropylphenylpyrazole-1-carboxylate	161—163		C <sub>33</sub> H <sub>38</sub> N <sub>2</sub> O <sub>2</sub>	80.5(80.1)	7.9(7.7)	5.8(5.7)	1765
3,4,5-Tris- <i>p</i> -isopropylphenyl-1- <i>p</i> -tolylsulphonylpyrazole	135		C <sub>37</sub> H <sub>40</sub> N <sub>2</sub> O <sub>2</sub> S	77.3(77.05)	7.3(7.0)	4.8(4.9)	1390, 1195
1-Benzoyl-3,4,5-tris- <i>p</i> -isopropylphenylpyrazole	208—210		C <sub>37</sub> H <sub>38</sub> N <sub>2</sub> O	84.4(84.4)	7.1(7.3)	5.6(5.3)	1710
3,4,5-Tris-(3,4-methylenedioxyphenyl)pyrazole	283—285	19	C <sub>24</sub> H <sub>16</sub> N <sub>2</sub> O <sub>6</sub>	67.0(67.3)	3.8(3.8)	6.7(6.5)	
1-Benzoyl-3,4,5-tris-(3,4-methylenedioxyphenyl)pyrazole	206—207		C <sub>30</sub> H <sub>20</sub> N <sub>2</sub> O <sub>7</sub>	69.7(70.0)	3.9(3.8)	5.5(5.3)	1700
3,4,5-Tri-(2-naphthyl)pyrazole	276—278	28	C <sub>33</sub> H <sub>22</sub> N <sub>2</sub>	88.4(88.8)	5.2(5.0)	6.5(6.3)	
1-Benzoyl-3,4,5-tri-(2-naphthyl)pyrazole	255		C <sub>40</sub> H <sub>20</sub> N <sub>2</sub> O	86.8(87.25)	4.7(4.8)	5.15(5.1)	1705
3,4,5-Tris- <i>p</i> -chlorophenylpyrazole	272—274	24	C <sub>21</sub> H <sub>13</sub> Cl <sub>3</sub> N <sub>2</sub>	62.65(63.1)	3.4(3.25)	6.7(7.0)	
1-Benzoyl-3,4,5-tris- <i>p</i> -chlorophenylpyrazole	191—193		C <sub>28</sub> H <sub>17</sub> Cl <sub>3</sub> N <sub>2</sub> O	67.2(66.7)	3.2(3.4)	5.5(5.6)	1710

\* Required values in parentheses.

affords a general and convenient route to 3,4,5-triarylpyrazoles since benzoin is more accessible than 1,2,3-triarylpropane-1,3-diones<sup>2</sup> or aryl-substituted diazomethanes.<sup>3</sup>

#### EXPERIMENTAL

The 3,4,5-triarylpyrazoles (Table) were prepared by refluxing the appropriate benzoin (0.2 mol) with hydrazine hydrochloride (0.1 mol) in ethanol (ca. 400 ml) for ca. 5 h, removing the solvent under reduced pressure, extracting

acid and sulphonyl chlorides respectively in pyridine. The product was isolated by pouring on to crushed ice or evaporating the reaction mixture to dryness under reduced pressure and recrystallizing the precipitate or residue from ethanol.

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<sup>1</sup> A. M. Comrie, *J. Chem. Soc. (C)*, 1971, 2807.

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