

NOTE

One-Pot Synthesis of 7-*N,N*-dimethylamino-2-naphthol Using 2,7-Dihydroxynaphthalene: A Highly Selective Bucherer Reaction

N. WEN, X. PENG*, M. LIU, Y. MA and RUOYU BAI

Department of Chemistry, School of Chemical Engineering, Nanjing University of Science and Technology, Nanjing 210094, P.R. China

*Corresponding author: E-mail: xhpeng@mail.njust.edu.cn

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This work provides an efficient process for producing 7-*N,N*-dimethylamino-2-naphthol, which can be selectively prepared by one-pot amination of 2,7-dihydroxynaphthalene by employing the molar ratio of 1 : 1.1 : 1.07 of 2,7-dihydroxynaphthalene : sodium bisulfite : dimethylamine at 60 °C during 2.5 h.

Key Words: 7-*N,N*-Dimethylamino-2-naphthol, One-pot synthesis, Bucherer reaction, 2,7-Dihydroxynaphthalene.

7-*N,N*-Dimethylamino-2-naphthol is an useful intermediate for some antidepressants pharmaceuticals. The aromatic amino compounds can be synthesized usually by the reduction of nitro, nitroso and azo compounds¹⁻⁴. From the nitro compounds aromatic amine can be synthesized directly *via* Hofmann rearrangement and Bucherer reactions⁵⁻⁷. Here we reports a convenient preparation for the intermediates using a one-pot method.

Into a 1 L autoclave equipped with mechanical stirrer were charged with 160 g 2,7-dihydroxynaphthalene, 114 g sodium bisulfite and 160 g 30 % of dimethylamine methanol solution. The mixture was stirred at 60 °C for 3 h under 0.3 MPa nitrogen atmosphere. After reaction, to mixture was added 200 g 30 % sodium hydroxide solution with stirring for a period of 0.5 h under atmospheric pressure. Then the mixture solution was conducted under filtration, washing and recrystallization.

Influence of amount of sodium bisulfite is shown in Table-1, which indicates that the yield is steady with exceeding the 114 g sodium bisulfite when 160 g dimethylamine was used. In the case of the 1:1.1 molar ratio of 2,7-dihydroxynaphthalene : sodium bisulfite the reaction proceeded to a satisfactory yield. But the yield is lower using 240 g dimethylamine than 160 g dimethylamine.

Table-2 represented the experimental results of the reaction carried out employing a 0.50-2.00 fold amount of dimethylamine against 2,7-dihydroxynaphthalene. It can be seen from the results that a maximum yield of 66.10 % was obtained in the case of the 1:1.07 molar ratio of 2,7-dihydroxynaphthalene : dimethylamine.

TABLE-1
EFFECT OF USE LEVEL OF SODIUM BISULFITE ON THE YIELDS OF 7-*N,N*-DIMETHYLAMINO-2-NAPHTHOL

Sodium bisulfite (g)	Yield ^a (%)	Yield ^b (%)
0	1.40	1.50
52	30.40	27.10
83	50.80	42.10
104	65.90	63.20
114	66.10	62.97
125	65.98	64.32
156	66.06	64.21
208	66.32	63.97

^aAfforded by using 160 g dimethylamine, ^bAfforded by using 240 g dimethylamine

TABLE-2
EFFECT OF USE LEVEL OF DIMETHYLAMINE ON THE YIELDS OF 7-*N,N*-DIMETHYLAMINO-2-NAPHTHOL

Molar ratio ^a	0.50	0.80	0.90	1.00	1.07	1.33	1.60	2.00
Yield (%)	15.20	20.89	43.21	58.27	66.10	65.87	62.97	61.24

^aMolar ratio between dimethylamine and 2,7-dihydroxynaphthalene

As shown in Table-3, optimum reaction temperature is 60 °C, exhibited a maximum yield of 66.10 %. The reaction proceeded rapidly to a maximum yield of 66.70 % in 2.5 h as shown Table-4.

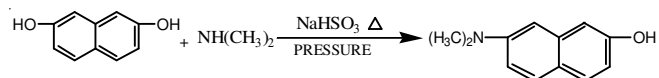
TABLE-3
EFFECT OF REACTION TEMPERATURE ON THE YIELDS OF 7-*N,N*-DIMETHYLAMINO-2-NAPHTHOL

Temp. (°C)	40	60	90	120	150
Yield (%)	43.20	66.10	58.21	43.08	42.10

TABLE-4
EFFECT OF REACTION TIME ON THE YIELDS OF
7-*N,N*-DIMETHYLAMINO-2-NAPHTHOL

Time (h)	1.0	2.0	2.5	3.0	5.0	10.0
Yield (%)	40.30	62.50	66.70	66.10	49.80	32.40

Compared to microwave method⁸ and Bucherer reaction with 2,7-dihydroxynaphthalene and dimethylamine under sulfur dioxide, the reaction of 2,7-dihydroxynaphthalene and dimethylamine under sodium bisulfite is available and practicable in a high yield, with elimination of hazardous and expensive reactants.



Scheme-I: Synthesis of 7-*N,N*-dimethylamino-2-naphthol

Conclusion

7-*N,N*-dimethylamino-2-naphthol was synthesized by one-pot amination of 2,7-dihydroxynaphthalene. The yield was

influenced by various reaction factors, such as catalyst, time, temperature and the molar ratio of reactants. The optimal reaction conditions were obtained with the molar ratio of 1:1.1:1.07 of 2,7-dihydroxynaphthalene: sodium sulfite: dimethylamine at 60 °C in 66.70 % yield in 2.5 h.

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