**INTRODUCTION**

4(3H)-Quinazolinone derivatives are the important class of heterocycles. They possess various biological activities such as antibacterial, antiinflammation, antihistaminic, etc., depend on the substituents at the ring system. On the other hand, some of pyridinium salts exhibit antibacterial activity. The pyridinium salts of phenacyl were obtained by the reaction of phenacyl halide in chloroform at room temperature for overnight at a dark place, while the pyridinium salts of alkyl were obtained by the reaction of corresponding alkyl halide and pyridines in appropriate solvents, heated at reflux for 6-50 h. Microwave (MW) and ultrasonic irradiation has attracted considerable attention for rapid synthesis of organic compounds. In this paper, we report the microwave assisted synthesis of 1-{[(6-nitroquinazolin-4-one-2-yl)methyl]pyridin-1-ium bromide and synthesis of its 6-amino analog under ultrasonic irradiation.

**EXPERIMENTAL**

All the solvents, reagents and chemicals are analytical grade and were used without purification. Microwave irradiation was performed using modified home microwave oven completed with reflux condenser. The purity of the products was tested using TLC method. Melting points were determined in capillary tube using melting point apparatus (Stuart Scientific) and are uncorrected. Infrared (IR) spectra were recorded on a FTIR spectrophotometer (8400S, Shimadzu) and $^1$H NMR and $^{13}$C NMR spectra were recorded on a NMR spectrometer (JEOL JNM 500) using TMS as the internal standard. Physical data and analytical data of the synthesized compounds are given in Tables 1 and 2, respectively.

**TABLE-1**

<table>
<thead>
<tr>
<th>Compound</th>
<th>Yield (%)</th>
<th>Form</th>
<th>m.p. (°C)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>44.0</td>
<td>White crystalline powder</td>
<td>240-242</td>
</tr>
<tr>
<td>2</td>
<td>54.0</td>
<td>White crystalline powder</td>
<td>235-236</td>
</tr>
<tr>
<td>3</td>
<td>82.5</td>
<td>Yellow powder</td>
<td>222-223</td>
</tr>
<tr>
<td>4</td>
<td>94.0</td>
<td>White crystalline powder</td>
<td>245-246</td>
</tr>
<tr>
<td>5</td>
<td>64.0</td>
<td>Pale yellow powder</td>
<td>224-225</td>
</tr>
</tbody>
</table>

**Synthesis of methyl-4(3H)-quinazolinone (1):** Compound 1 was synthesized under microwave irradiation according to reported method.

**Synthesis of 2-(bromomethyl)-4(3H)-quinazolinone (2):** Compound 2 was synthesized by treatment of solution of 1 in dimethylformamide (DMF) with N-bromosuccinimide (NBS).

**Synthesis of 2-(bromomethyl)-6-nitro-4(3H)-quinazolinone (3):** Compound 3 was synthesized by nitration of 2 according to reported method for nitro derivatives synthesis of quinazolin-4-one. To a solution of 2-(bromomethyl)-4(3H)-quinazolinone (2, 6.93 g, 30 mmol) in concentrated sulfuric acid 90 mL, fuming nitric acid (7.5 mL) was added dropwise at 0 °C. The reaction mixture was stirred at room temperature for 4 h and then poured into crushed ice (200 mL).
A precipitate was filtered, washed with water and dried in vacuum drying oven at 70 °C for 1 h.

1-{[6-Nitroquinazolin-4-one-2-yl]methyl}pyridin-1-ium bromide (4): Solution of 3 (690 mg, 2.5 mmol) and pyridine 2 mL in acetonitrile 150 mL was irradiated under microwave for 3 min at power level 30 %. The precipitate formed was filtered off, washed with cold acetonitrile and dried in vacuum drying oven at 70 °C for 1 h.

1-{[6-Aminooquinazolin-4-one-2-yl]methyl}pyridin-1-ium bromide (5): Compound 5 was synthesized by reduction of 4 using modified method of aryl nitro reduction reported by Gamble et al.\(^5\). To a suspension of 4 (182 mg, 0.5 mmol) in a mixture of glacial acetic acid (1 mL), ethanol (2 mL) and water (1 mL) was added reduced iron powder (0.140 g, 2.5 mmol). The resulting suspension was exposed to ultrasonic irradiation for 1 h at 30 °C with TLC analysis monitoring for the completion of the reaction. The reaction mixture was filtered to remove the iron residue and the filtrate obtained was diluted with ethanol and added concentrated ammonia solution to precipitate iron salts. The resulting mixture was filtered through celite and solvent of the filtrate was evaporated under reduced pressure. The crude residue was then recrystallized from methanol.

### RESULTS AND DISCUSSION

The titled compounds (4 and 5) were synthesized stepwise summarized in Fig. 1. In the first step, anthranilic acid was reacted with acetic anhydride (Ac₂O) under microwave irradiation for 10 min at power level 30 %. Ammonium acetate was added and the microwave irradiation at power level 30 % was continued for 10 min to provide 2-methylquinazolin-4-one (1). This compound was then treated with NBS in DMF to obtain 2-bromomethylquinazolin-4-one (2). Nitrification of 2 with fuming nitric acid in concentrated sulfuric acid at room temperature to obtain 2-bromomethyl-6-nitroquinazolin-4-one (3) and then microwave irradiation of solution of 3 and pyridine in acetonitrile at power level 30 % for 3 min to provide 1-{[6-nitroquinazolin-4-one-2-yl]methyl}pyridin-1-ium bromide (4). In the last step, suspension of 4 in mixture of ethanol, glacial acetic acid and water was reduced with iron under sonication at 30 °C for 1 h to get 1-{[6(6-aminoquinazolin-4-one-2-yl) methyl]pyridin-1-ium} bromide (5).

The IR spectrum of the title compound 4 showed absorption bands at 3,134 and 1,228 cm\(^{-1}\) due to the presence of N-H of pyridine ring were observed very downfield than that of CH\(_{3}\) of compound 3 and free pyridine\(^5\). These data indicated that compound 4 was quaternized (pyridinium) alkyl halide 6. The IR spectrum of compound 5 showed absorption band at 3,423, 3,298 and 794 cm\(^{-1}\) while the bands at 1,348 cm\(^{-1}\) disappeared. This data confirmed that nitro group of compound 4 was reduced to be primary amine group. In the 1H NMR spectrum, two proton of primary amine appeared as singlet at 6.04 ppm (2H, 2-CH\(_2\)). The chemical shifts of proton of CH\(_2\) and pyridine ring were observed very downfield than that of CH\(_3\) of compound 3 and free pyridine\(^5\). These data indicated that compound 4 was quaternized (pyridinium) alkyl halide 6. The IR spectrum of compound 5 showed absorption band at 3,423, 3,298 and 794 cm\(^{-1}\) while the bands at 1,348 cm\(^{-1}\) disappeared. This data confirmed that nitro group of compound 4 was reduced to be primary amine group. In the 1H NMR spectrum, two proton of primary amine appeared as singlet at...
5.69 ppm (2H, NH₂). ¹³C NMR spectra of compound 4 and 5 as indicated in Table-1 confirmed the proposed structures.

Conclusion

In conclusion, reactions of 2-(bromomethyl)-6-nitro-quinazolin-4-one and pyridine in acetonitrile under microwave irradiation at power level 30% for 3 min afforded 1-[(7-nitro-1-oxo-1,2-dihydroisoquinolin-3-yl)methyl]pyridin-1-um (4) and the reduction of 4 with iron powder in mixture of ethanol, glacial acetic acid and water under sonication irradiation for 1 h afforded 1-[(7-amino-1-oxo-1,2-dihydroisoquinolin-3-yl)methyl]pyridin-1-um (5).

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REFERENCES