Sintesis 2-Benzil-3-benzilidenisoindolinon melalui *One-pot Reaction*

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INTISARI

Telah dilakukan penelitian mengenai sintesis 2-benzil-3-benzilidenisoindolinon melalui *one-pot reaction*. Penelitian ini bertujuan untuk mensintesis senyawa 3-benzilidenftalida melalui reaksi Sonogashira, mensintesis 2-benzil-3-benzilidenisoindolinon melalui reaksi dua tahap yaitu reaksi adisi nukleofilik dan β-eliminasi. Selain itu, penelitian ini juga bertujuan untuk mensintesis 2-benzil-3-benzilidenisoindolinon melalui *one-pot reaction* yang menggabungkan reaksi adisi nukleofilik dan β-eliminasi.

Sintesis senyawa 3-benzilidenftalida dilakukan melalui reaksi Sonogashira dengan mereaksikan asam 2-iodobenzoat dan fenilasetilena dalam pelarut DMSO dengan adanya basa $NaHCO_3$ dan katalis CuI, pada temperatur ruang selama 24 jam. Reaksi adisi nukleofilik antara 3-benzilidenftalida dan benzilamina dilakukan dalam pelarut *i*-PrOH pada 50ºC selama 24 jam guna menghasilkan 2,3-dibenzil-3-hidroksiisoindolinon. Selanjutnya, reaksi β-eliminasi dilakukan dengan memanaskan 2,3-dibenzil-3-hidroksiisoindolinon dengan katalis HCl 6 M pada 50ºC selama 3 jam untuk menghasilkan 2-benzil-3-benzilidenisoindolinon. Sintesis 2-benzil-3-benzilidenisoindolinon melalui *one-pot reaction* dilakukan dengan mereaksikan 3-benzilidenftalida dan benzilamina pada 50ºC selama 17 jam, dilanjutkan dengan penambahan HCl 6 M dan pemanasan selama 5 jam. Karakterisasi masing-masing produk dilakukan dengan uji titik lebur, spektrometer FTIR, ^{1}H-NMR, dan ^{13}C-NMR.

Reaksi Sonogashira antara asam 2-iodobenzoat dan fenilasetilena menghasilkan 3-benzilidenftalida berupa padatan kuning dengan persen hasil 64%. Reaksi adisi nukleofilik antara 3-benzilidenftalida dan benzilamina menghasilkan 2,3-dibenzil-3-hidroksiisoindolinon berupa padatan coklat muda dengan persen hasil 76%. Reaksi β-eliminasi antara 2,3-dibenzil-3-hidroksiisoindolinon terkatalisis HCl menghasilkan 2-benzil-3-benzilidenisoindolinon berupa padatan putih dengan persen hasil 71%. Persen hasil total dalam sintesis 2-benzil-3-benzilidenisoindolinon melalui reaksi dua tahap yaitu sebesar 53%. *One-pot reaction* antara 3-benzilidenftalida dan benzilamina menghasilkan 2-benzil-3-benzilidenisoindolinon berupa padatan putih gading dengan persen hasil 77%. Berdasarkan perbandingan persen hasil antara reaksi dua tahap dan *one-pot reaction*, maka *one-pot reaction* lebih efektif, efisien dan ramah lingkungan.

Kata kunci: 2-benzil-3-benzilidenisoindolinon, *one-pot reaction*, β-eliminasi, adisi nukleofilik, Sonogashira

Synthesis of 2-Benzyl-3-benzylideneisoindolinone via One-pot Reaction

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ABSTRACT

Synthesis of 2-benzyl-3-benzylideneisoindolinone via one-pot reaction has been conducted. This research was aimed to synthesize 3-benzylidenephthalide via the Sonogashira reaction, to synthesize 2-benzyl-3-benzylinedeisoindolinone via a two-stage reaction, comprising nucleophilic addition and β-elimination reactions. In addition, this study was also aimed to synthesize 2-benzyl-3-benzylidenisoindolinone via one-pot reaction which combines nucleophilic addition and β-elimination reactions.

Synthesis of 3-benzylidenephthalide was carried out via the Sonogashira reaction by reacting 2-iodobenzoic acid and phenylacetylene in DMSO in the presence of $NaHCO_3$ and CuI as catalyst, at room temperature for 24 h. The nucleophilic addition reaction between 3-benzylidenephthalide and benzylamine was performed in *i*-PrOH at 50ºC for 24 h to produce 2,3-dibenzyl-3-hydroxyisoindolinone. Furthermore, the β-elimination reaction was carried out by heating 2,3-dibenzyl-3-hydroxyisoindolinone with a HCl 6 M as catalyst at 50ºC for 3 h. Synthesis of 2-benzyl-3-benzylideneisoindolinone via one-pot reaction was done by reacting 3-benzylidenephthalide and benzylamine at 50ºC for 17 h, followed by the addition of 6 M HCl and heating for 5 h. The characterization of the products was carried out by means of melting point tests, ^{1}H-NMR, ^{13}C-NMR, and FTIR spectrometers.

The Sonogashira reaction between 2-iodobenzoic acid and phenylacetylene produced 3-benzylidenephthalide as yellow solid in 64% yield. The nucleophilic addition reaction between 3-benzylidenephthalide and benzylamine generated 2,3-dibenzyl-3-hydroxyisoindolinone as light brown solid in 76% yield. The β-elimination reaction of 2,3-dibenzyl-3-hydroxyisoindolinone in the presence of HCl catalyst, gave 2-benzyl-3-benzylideneisoindolinone as white solid in 71% yield. The total yield of the synthesis of 2-benzyl-3-benzylidenisoindolinone via a two-stage reaction was 53%. The one-pot reaction between 3-benzylidenephthalide and benzylamine produced 2-benzyl-3-benzylideneisoindolinone as ivory white solids in 77% yield. By comparing the yield of reaction, the one-pot reaction is proven to be more effective, efficient and environmentally friendly.

Keywords: 2-benzyl-3-benzylidenisoindolinone, one-pot reaction, β-elimination, nucleophilic addition, Sonogashira