Straightforward and efficient synthesis of triazole derivatives catalyzed by [Cu_2 $(BDC)_2$ (DABCO)] in water

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Abstract:

1,2,3- triazoles can be prepared very fast and in excellent yields by the one pot reaction of acetylenic compound, organic halides and sodium azide by applying of [Cu_2 $(BDC)_2$ (dabco)] as heterogeneous catalyst in water as a green solvent.

Introduction:

1,2,3- triazoles are 5-membered heterocyclic compounds that are used in many drugs, dyes, corrosion inhibitors and organic synthesis intermediates [1-6]. Reach to straightforward procedure for synthesis of this important compounds is an attention grabbing issue among organic synthesis researchers.

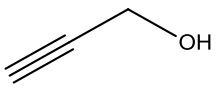
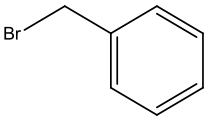
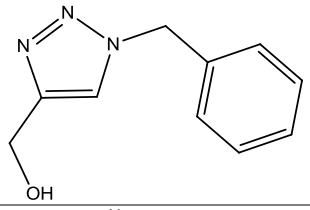
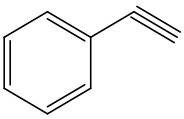
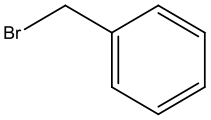
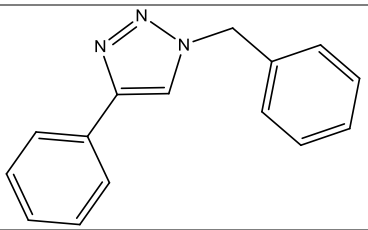
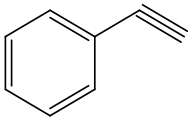
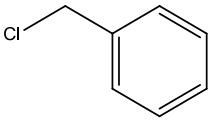
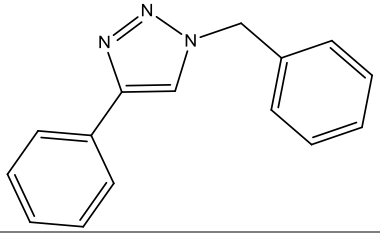
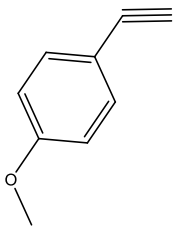
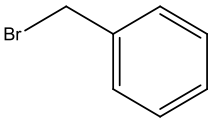
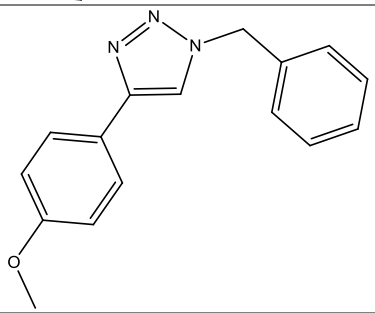
Many reported reactions have been done by employing homogeneous catalysts involving Copper [7]. Although in many case the desire products are obtained in good yield but many of these method suffer from some of the following disadvantages: Long reaction time, tedious work-up, use of homogeneous catalyst, reflux condition and use of harmful solvents.

Herein we wish to report applying of [Cu_2 $(BDC)_2$ (DABCO)] as a recyclable catalyst for synthesis of triazole derivatives in water as a green solvent. Low reaction time, mild and non-toxic reaction media and high yield of desire product is other aspects of mentioned procedure.

Result and Discussion

In a typical experiment a mixture of alkyne (1 mmol), halide (1 mmol), NaN3 (1.2 mmol), and 20 mg of catalyst was diluted with 2 ml deionized water as solvent in a 20 ml round-bottom flask. The reaction mixture heated up to 60 C and stirred for an appropriate time indicated in table 1. The reaction progress was monitored by TLC or GC. After reaction completion obtained colloids particle was filtered and dissolved in hot ethyl acetate. The crude was recrystallized from n-hexane:EtOH to afford the pure solid products.

Table 1: Preparation of 1,2,3- triazoles catalysed by Cu-MOF

Entry	Alkyne	Halide	Product	Time (h)	yield	Melting Point	Reference
1				2.5	93	73-75	74-75 [8a]
2				1.5	98	128-130	128-131 [8b]
3				2.5	95	128-130	128-131 [8b]
4				2	92	141-143	143-146 [8b]

Conclusion

In conclusion a mild, efficient and practical catalytic system has been developed for tree component reaction of terminal alkynes, benzyl or aryl halides and sodium azide in water as a green solvent. We found that various starting materials were able to produce exclusively 1,4-disubstituted-1,2,3-triazole regioisomers in high to excellent yield.

Acknowledgment

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