Materials Science Research india Vol. **4**(1), 145-146 (2007)

Recyclisable efficiency of different catalysts in organic reactions under microwave irradiations

RAVINDER SINGH*, MUKESH RANI, SUMITA RANI and SUMEDHA MALIK

Department of Chemistry, Government P.G. College, Bahadurgarh - 124 507 (India)

(Received: February 12, 2007; Accepted: May 03, 2007)

ABSTRACT

The different catalysts like Mont. K-10 clay, Mont. KSF clay, Yb $(OTf)_3$, $Sc(OTf)_3$, Dy $(OTf)_3$, Gd $(OTf)_3$, and $InCl_3$ can be recycled many times without loss of catalytic activity during the synthesis of tetrahydroporphyrin under microwave irradiation.

Key words: Mont. K-10, microwave, recyclisable.

INTRODUCTION

In recent year, one of the prime concerns of the chemists is search for alternate method or technologies to increase the product yield decrease the reaction times, increase the selectivity and use of environmentally benign reactants or catalyst. In view of this, we report our results on the application of MW-assisted reactions. Microwave technology in chemical reaction is Ist used in 1986. The microwave oven has been used increasingly by chemists to provide the activation energy for chemical reactions, especially in the field of organic chemistry[2-12].

We now demonstrate the recyclable efficiency of Mont. K-10 clay, Mont. KSF clay, Yb $(OTf)_3$, $Sc(OTf)_3$, Dy $(OTf)_3$, Gd $(OTf)_3$, and $InCl_3$ during the synthesis of tetraphenylporphyrin under microwave irradiations[13-16].

The work was initiated by investigating the reaction in between benzaldehyde and pyrrole in the presence of K-10 clay catalyst under microwave irradiation at 560wW to give 30% yield(TLC monitoring). The catalyst K-10 could be reused 5-times without any loss of catalytic activity. Similarly, the same reaction is carried out in the presence of different catalyst i.e. Mont. KSF Yb $(OTf)_3$, $Sc(OTf)_3$,

Table - 1: Recyclisable efficeincy of different catalysts using synthesis of tetraphenylporphyin

S No.	Catalyst	Yield at different times of usage of catalyst				
		1st	2nd	3rd	4th	5th
1.	Mont. K-10 clay	30	30	30	30	30
2.	Mont. KSF clay,	29	29	29	29	29
3.	Yb $(OTf)_3$,	26	26	26	26	26
4.	$Sc(OTf)_3$,	23	23	23	23	23
5.	Dy $(OTf)_3$,	20	20	20	20	20
6.	Gd $(OTf)_3$,	16	16	16	16	16
7.	$InCl_3$	28	28	28	28	28

$Dy(OTf)_3$, $Gd(OTf)_3$, and $InCl_3$ and the yield remains same even when these catalyst could be reused 5-times. This clearly indicates that these catalysts are quite stable upon microwave ir-radition (Table -1).

EXPERIMENTAL

In a typical procedure, benzaldehyde (1m mole), pyrrole (5m mole) and catalysts (1g) was taken in an Erlenmeyer flask (100ml) and ir-radiated at 560W power level in an unmodified domestic microwave oven operating at 2450 MHz. After cooling to room temperature, the crude product was extracted and recrystallised with ethanol to yield pure TPP. The product was identified on the basis of their IR, ^{1}H-NMR and by comparison of their Rf values with those of authentic samples prepared by standard routes.

CONCLUSION

We have shown that the catalytic activity of the different catalysts like Mont K-10. Mont. KSF remains same during their recycling even for 5 times under microwave ir-radition.

ACKNOWLEDGEMENT

We thank Dr. R. Sharma (Dayton) for gifts of Mont. K-10 and Mont. KSF clay.

REFERENCES

1. R.J. Gigues, T.L. Bray, M. Duncan and G. Majetich; *Tetrahedron Lett.* **27**, 4945 (1986).
2. S. Caddick; *Tetrahedron*; **51**, 10403 (1995).
3. R. Gedye. F. Smith, K. Westaway, H. Ali, L. Laberge and J. Roussel; *Tetrahedron Lett.,* **27**, 279 (1986).
4. R. Abrambovith, *Org. Prep. Proced. Int.* **23**, 683 (1991).
5. R. Gedye, W.Rank, K.C. Westaway, can. *J. Chem.* **69**, 706 (1991).
6. A. Loupy. *Topic in current chemistry;* **206**, 155 (1999).
7. Sharawan K. Dewan, Ravinder Singh and Anil Kumar; *Arkivoc;* **11**,41 (2006).
8. S.K.Dewan and Ravinder Singh, *Synth Commun.* **33**(17), 3081 (2003).
9. S.K.Dewan and Ravinder Singh, *Synth Commun.* **33**(17), 3085 (2003).
10. S.K.Dewan and Ravinder Singh, *J. Indian Council Chem.* **20**(1) (2003).
11. S.K.Dewan and Ravinder Singh, *J. Heter. Chem.* **12,** 287 (2003).
12. S.K.Dewan and Ravinder Singh, *J. Heter. Chem.* **12,** 173 (2002).
13. T. Welton, *Chem. Rev.* **99**, 2071 (1999).
14. M. J. Kabachnik and T. Medved *Izv. Akad. Nauk SSSR;* 1126 (1954).
15. E.K.Firldsss, *J. Am. Chem. Soc.* **74** (2003), 1528 (1952).
16. C.E.Song, C.O. oh, E.J. Poh, D.J.Choo. *J. Chem. Commun.,* 1743 (2000).