



AN ENVIRONMENTALLY BENIGN ROUTE TO CHEMICAL SYNTHESIS THROUGH MCM-41 BASED CATALYSTS

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OBJECTIVE

To demonstrate the application of surface functionalized MCM-41 as solid acid catalysts for environmentally benign organic transformations.

INTRODUCTION

Heterogeneous catalysis is an important organic synthesis approach, which is vital for the advancement of green chemistry-based research. Heterogeneous catalysts are favoured over homologous equivalents for a variety of organic transformations because of their:

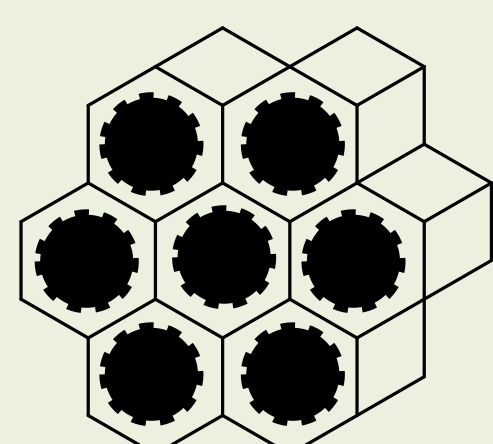
- better stability
- product selectivity, recyclability and reusability,
- ease of separation from the reaction medium,

Crystalline porous materials such as mesoporous silicas, metal-organic frameworks (MOFs), and zeolites are some examples of heterogeneous catalysts

Use of solid acid catalysts minimize the production of acidic waste, reactor and plant corrosion, production of toxic effluents and can be safely disposed of.

RESULTS & DISCUSSION

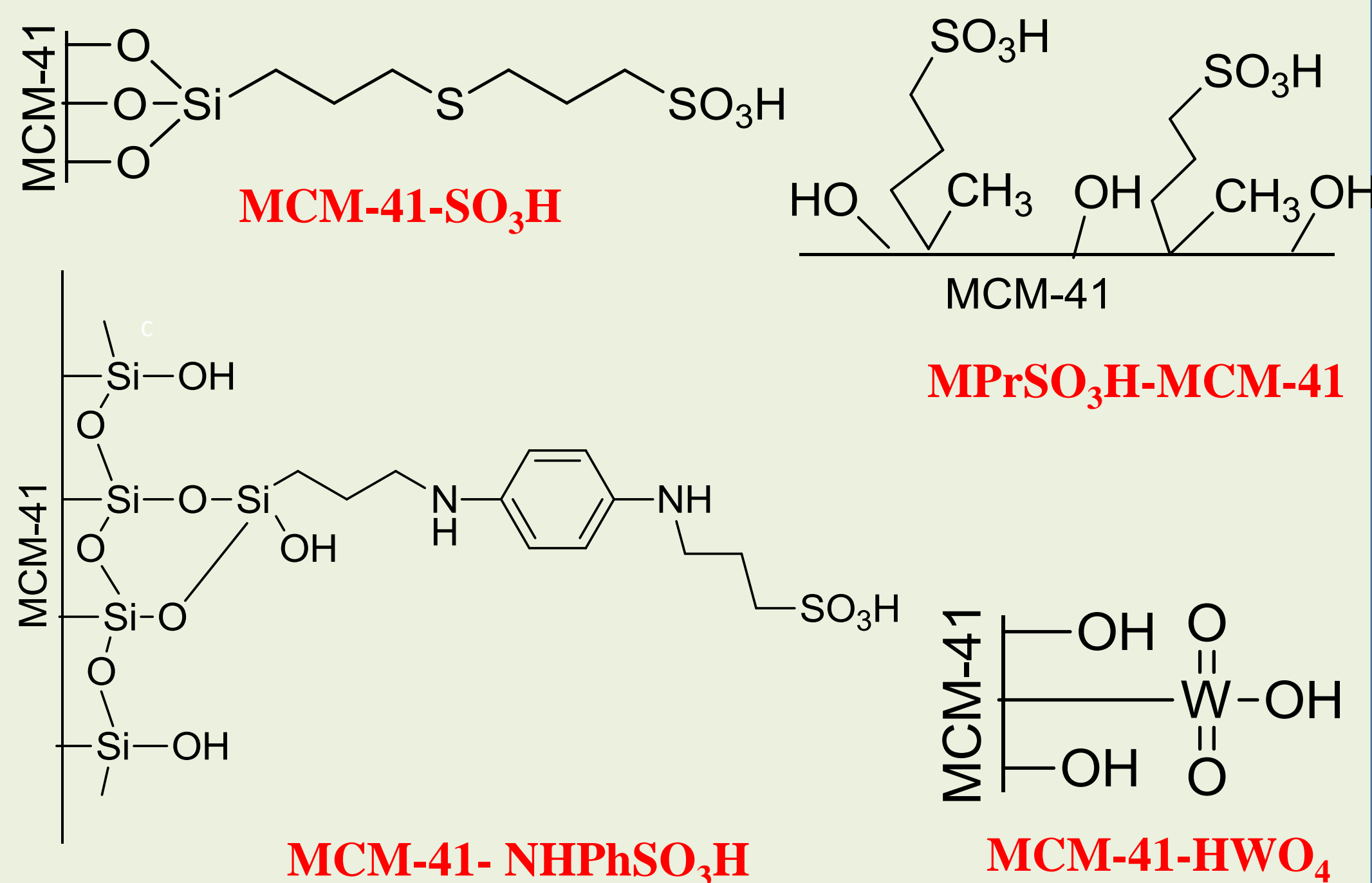
It is proved through this study that surface functionalized MCM-41 leads to a variety of novel and need-based catalyst systems that can be used to catalyze reactions like Pechmann condensation, dehydration, esterification, transesterification, Friedel Craft reaction and multicomponent synthesis of heterocycles.



- FUNCTIONALISED MCM-41**
- INC. PRODUCT YIELD
 - INC. CHEMO SELECTIVITY
 - BETTER RECYCLABILITY
 - REDUCED AGGLOMERATION

TABLE: COMPARATIVE STUDIES OF CATALYSTS

S. No.	Catalyst	Reaction Catalyzed	Time of Reaction (hr)	Yield (%)	Recyclability (runs)	Ref.
1	MCM-41-SO ₃ H	➤MCR (synthesis of 3-aminoimidazo[1,2a]pyridines or pyrazines ;synthesis of 1- & 5-substituted 1H-tetrazole); ➤ Esterification of long chain alcohol with oleic acid	0.33-1 hr 6 hr	80-93% >90%mol	4 runs -	1 2
2	Sulfate-ZrO ₂ immobilized on MCM-41(SZ/MCM41)	Pechmann condensation	2 hr	99.3%	4 runs	3
4	MCM-41-NHPhSO ₃ H	Friedel Craft Reaction		95%(TBP E)	several	4
5	MPrSO ₃ H-MCM-41	➤Transesterification reaction ➤cyclodehydration	2 hr 2 hr	96.6%	4 times	5 6
6	MCM-41-HWO ₄	Preparation of pyrrolo[2,1-a]isoquinoline derivatives	3-8 hr	65-87%	-	7
7	CA/MCM	one pot synthesis of xanthenes	0.5 hr	94.6%	4 runs	8.



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