

SUPPLEMENTARY MATERIAL

Alkali Metal Ion-Exchanged Zeolite X from Bamboo Leaf Biomass as Base Catalysts in Cyanoethylation of Methanol Enhanced by Non-Microwave Instant Heating

Eng-Poh Ng,^{A,G} Jack-Hao Chow,^A Siew-Fang Wong,^A Rino R. Mukti,^{B,C} Oki Muraza,^D Tau Chuan Ling,^E and Ka-Lun Wong^{F,G}

^ASchool of Chemical Sciences, Universiti Sains Malaysia, Penang, Malaysia.

^BDivision of Inorganic and Physical Chemistry, Institut Teknologi Bandung, Indonesia.

^CResearch Center for Nanosciences and Nanotechnology, Institut Teknologi Bandung, Jl. Ganesha No. 10, Bandung, 40132, Indonesia.

^DCenter of Research Excellence in Nanotechnology and Chemical Engineering Department, King Fahd University of Petroleum & Minerals, Dhahran 31261, Saudi Arabia.

^EInstitute of Biological Sciences, Faculty of Science, University of Malaya, 50603 Kuala Lumpur, Malaysia.

^FNatural Sciences and Science Education, NIE, Nanyang Technological University, Singapore.

^GCorresponding authors. Email: epng@usm.my; kalun.wong@nie.edu.sg

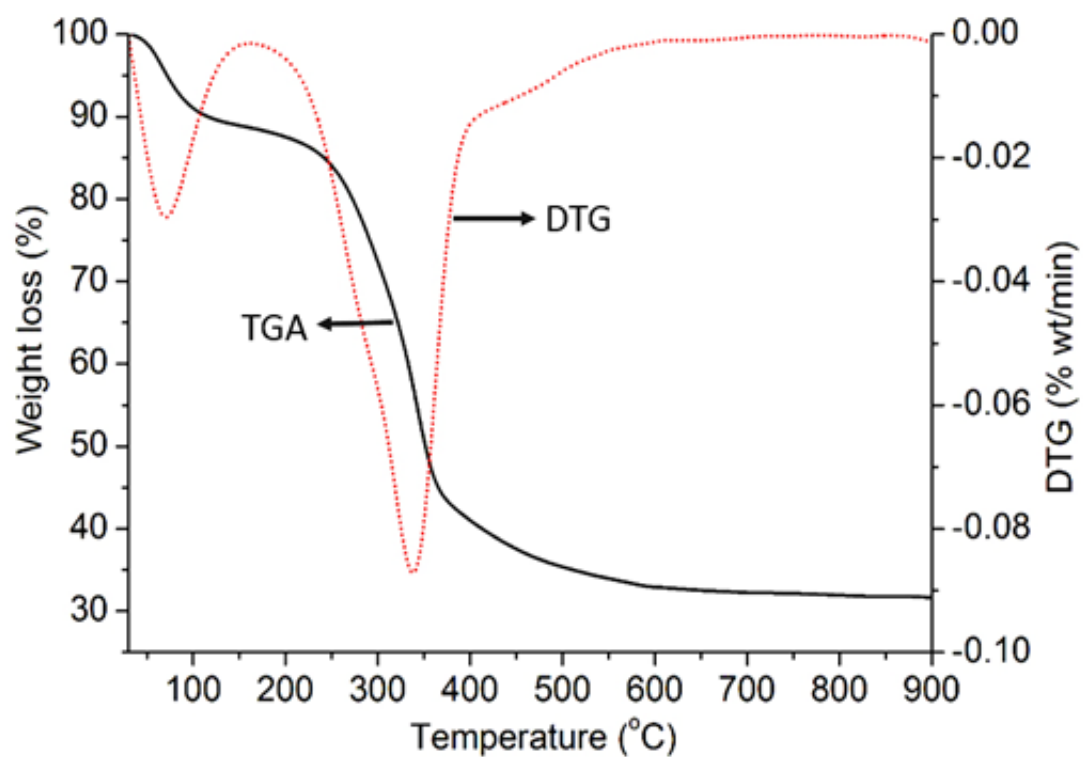


Fig. S1. TG/DTG plots of bamboo leaves.

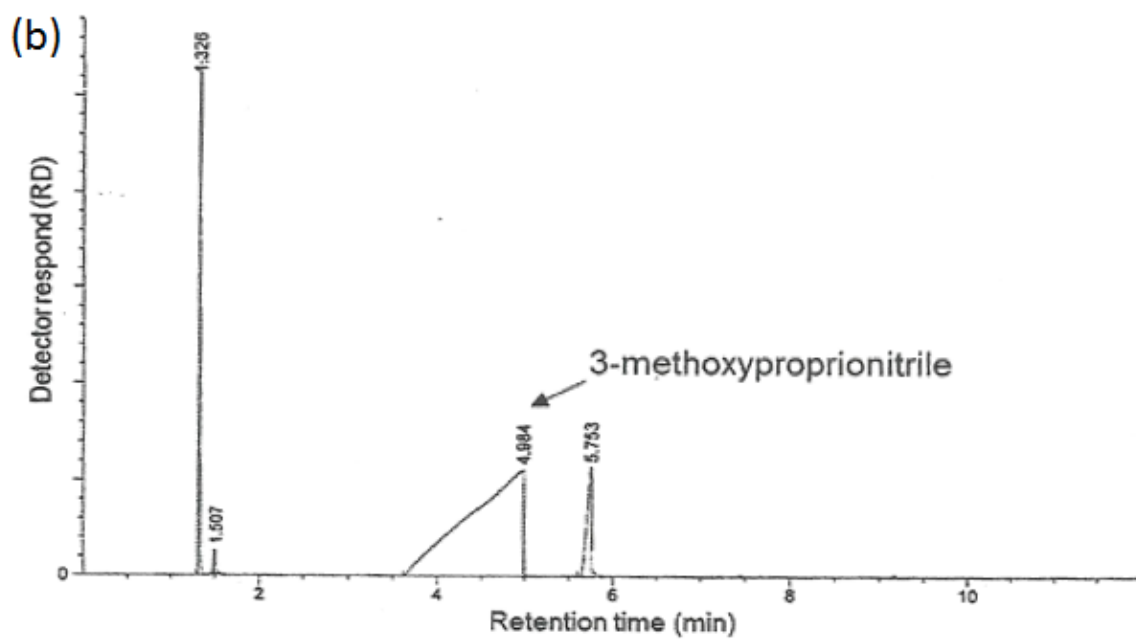
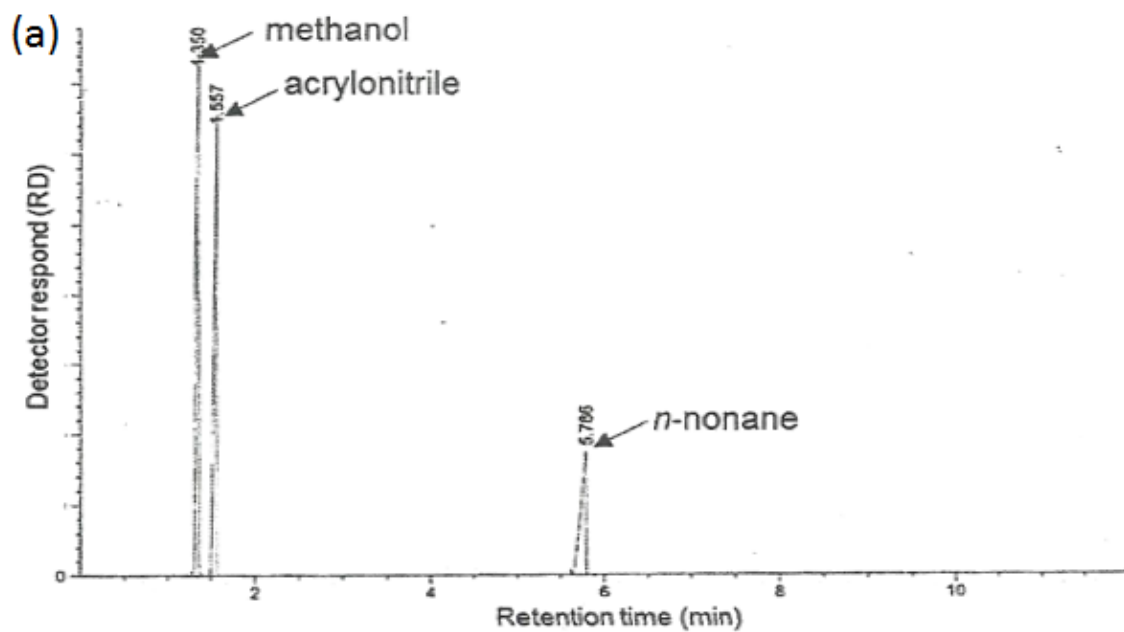


Fig. S2. GC chromatographs (a) before and (b) after cyanoethylation of methanol.

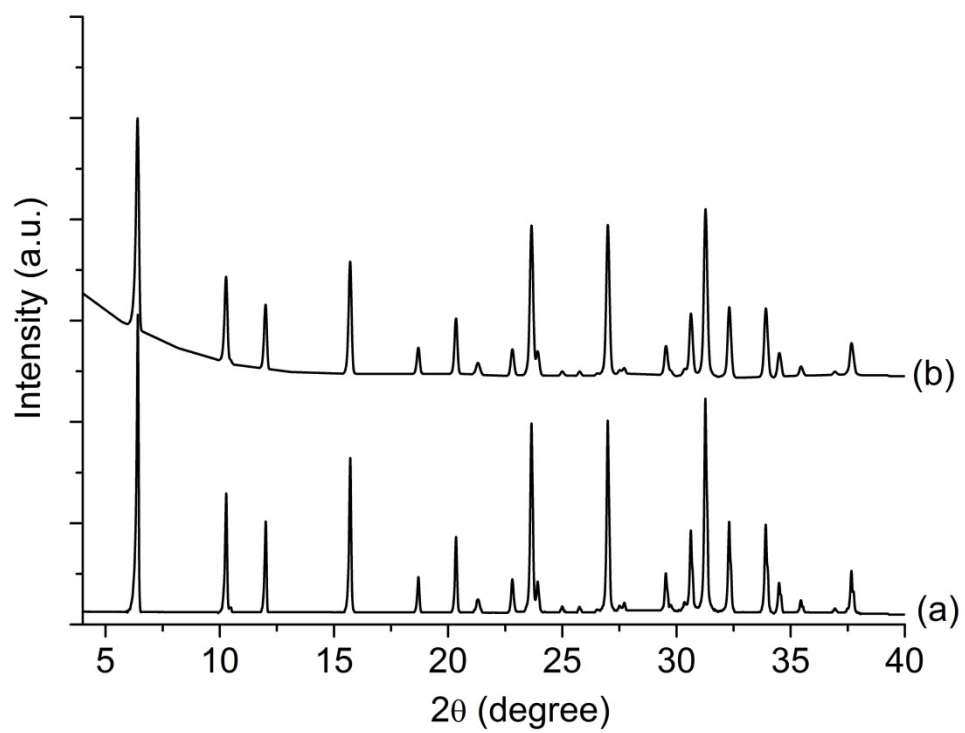


Fig. S3. XRD pattern of CsX zeolite (a) before and (b) after 5 consecutive cycles of catalytic reaction.

Table S1. ICP-OES data of NaX, KX, CsX and CaX samples.

Zeolites	Chemical concentration (mmol/L)						Estimated unit cell composition from ICP-OES
	Si	Al	Na	K*	Cs	Ca	
NaX	6.0834	5.2222	5.2261	0.1381	0	0	$\text{Na}_{88.00}\text{Al}_{87.93}\text{Si}_{102.43}$
KX	6.3542	5.5001	0.2131	6.005	0	0.1105	$\text{K}_{96.08}\text{Na}_{3.41}\text{Al}_{88.01}\text{Si}_{101.67}$
CsX	6.2115	5.616	0.2582	0.1421	4.968	0	$\text{Cs}_{77.35}\text{Na}_{4.02}\text{Al}_{87.44}\text{Si}_{96.71}$
CaX	6.0121	5.5777	0.247	0.1354	0	2.8225	$\text{Ca}_{44.58}\text{Na}_{3.90}\text{Al}_{88.1}\text{Si}_{94.96}$

*The detection of around 0.13 mmol/L of K was due to the presence of K in the initial Al source.