

### **Supplementary material to:**

B. Khalili, A. Atashrazm and M. Rasoulian,

2,4-Dioxo-1,3-diazaspiro[4,5]decane-3-sulfonic Acid as a Novel Solid Phase Halogen-free Acid Catalyst: Preparation, Characterization and Evaluation,

*S. Afr. J. Chem.*, 2019, **72**, 195–200.

# Supporting Information

for

## **2,4-dioxo-1,3-diazaspiro[4,5]decane-3-sulfonic acid as a novel solid phase halogen free acid catalyst: preparation, characterization and evaluation**

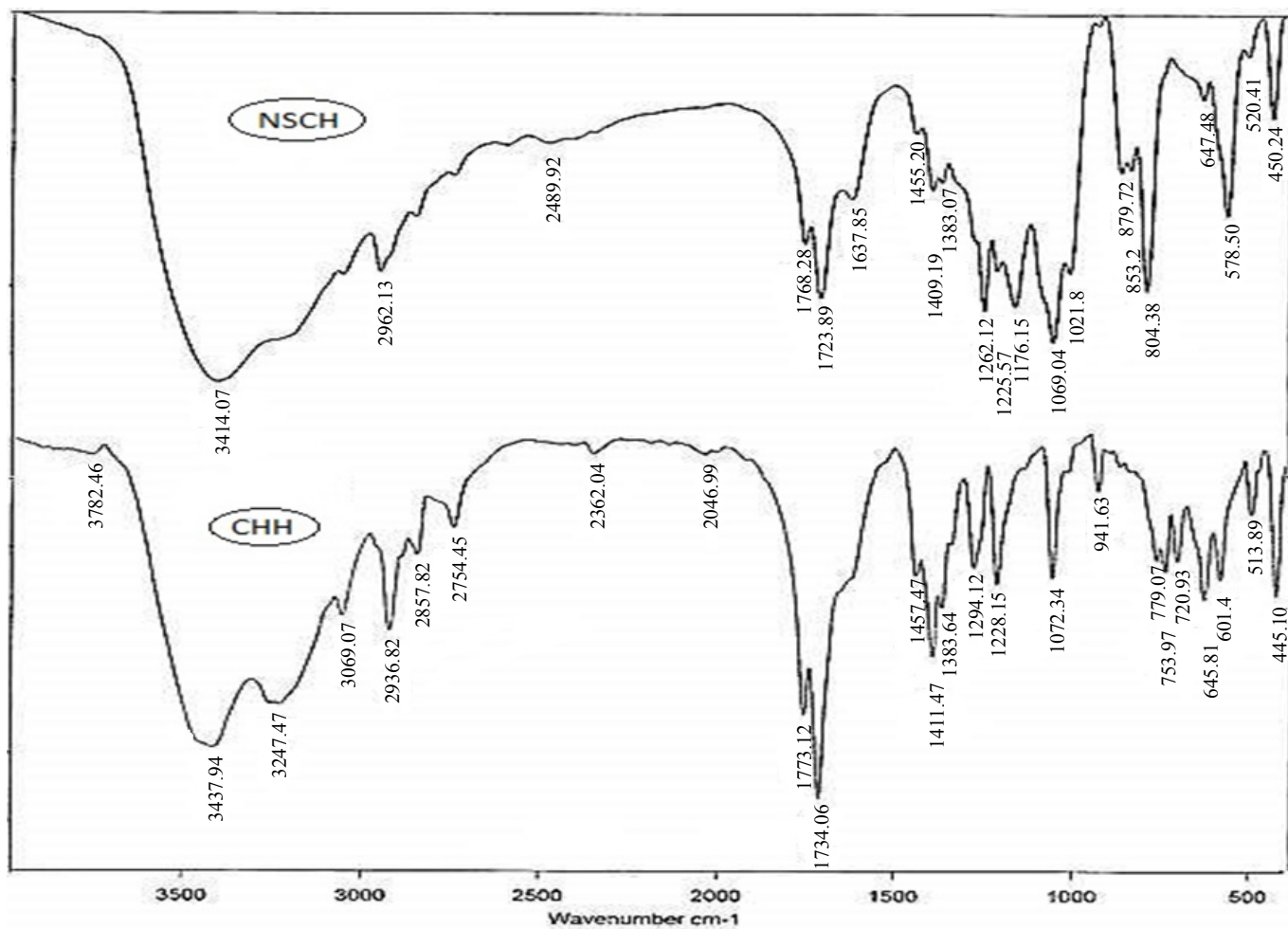
Behzad khalili\*, Aref Atashrazm and Mona Rasoulian

\* *Corresponding author's E-mail: b.khalili@guilan.ac.ir*

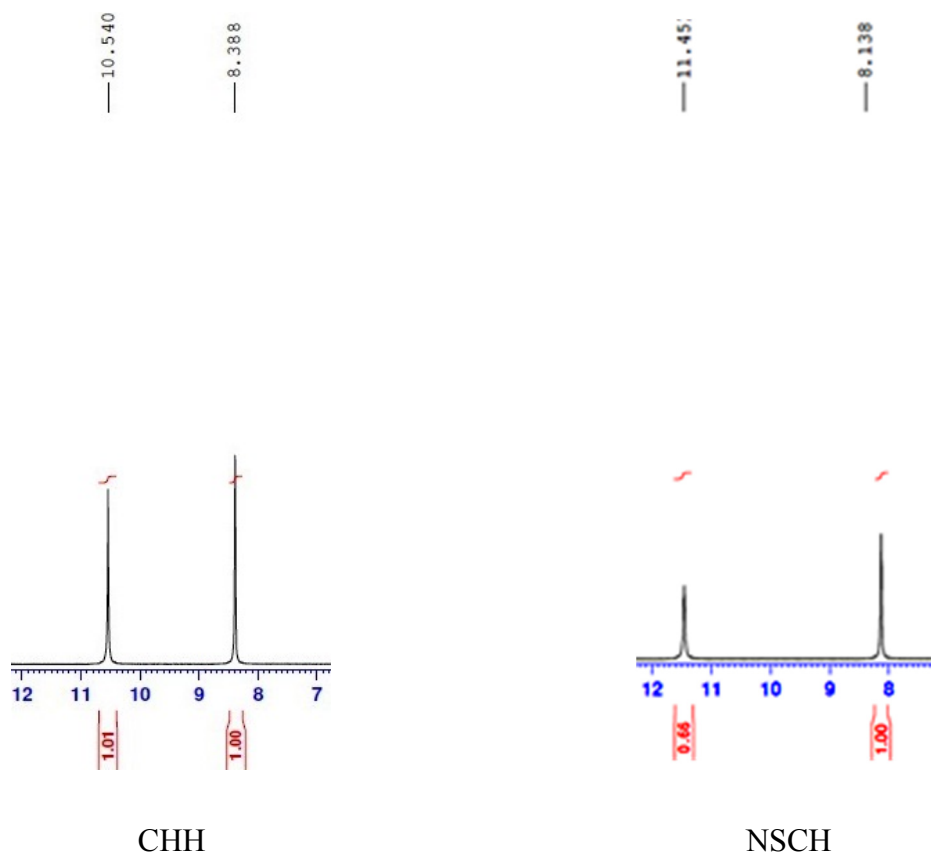
*Department of Chemistry, Faculty of Sciences, University of Guilan, P.O. Box 41335-1914,*

*Rasht, Iran.*

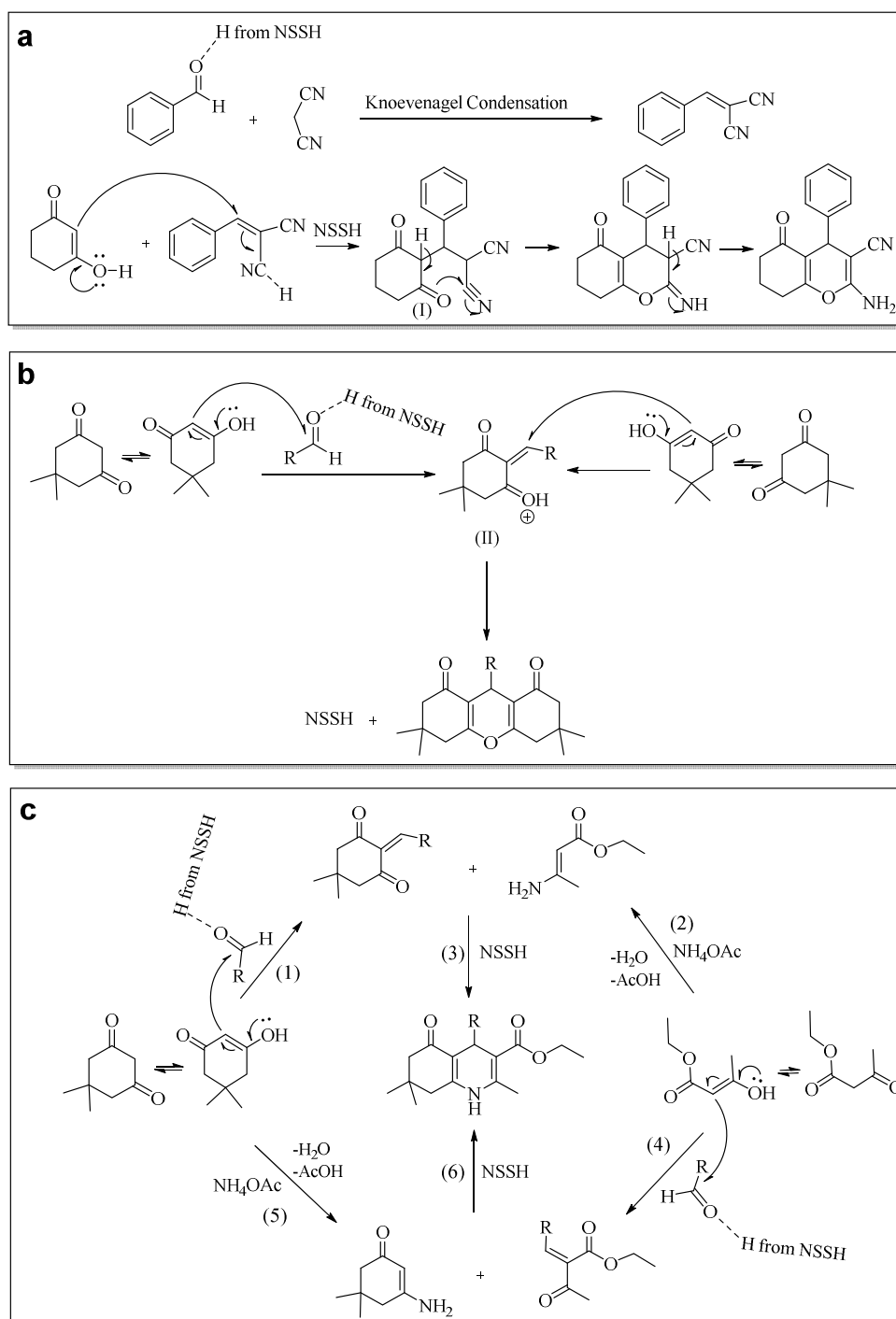
*Tel.: +981333367262 and fax: +981333367262*



**Figure S11** FT-IR spectra of CHH and NSCH.



**Figure S12**  $^1\text{H}$  NMR spectra of CHH and NSCH (from 7-12 ppm only).



**Figure SI3** Proposed mechanisms for the synthesis of tetrahydrochromene (**a**), 1,8-dioxooctahydroxanthene (**b**) and hydroquinoline (**c**) derivatives in the presence of NSCH.