Supporting File

Efficient utilization of potash alum as a green catalyst for production of furfural, 5-hydroxymethylfurfural and levulinic acid from mono-sugars
Dinesh Gupta\textsuperscript{a,b}, Ejaz Ahmad\textsuperscript{a}, Kamal K. Pant\textsuperscript{*a}, Basudeb Saha\textsuperscript{*b,c}
\textsuperscript{a}Department of Chemical Engineering, Indian Institute of Technology Delhi, New Delhi 110 016, India
\textsuperscript{b}Department of Chemistry, University of Delhi, 110007, India
\textsuperscript{c}Catalysis Centre for Energy Innovation, University of Delaware, Newark, DE 19716, USA
Corresponding Author: email: kkpant@chemical.iitd.ac.in, basudeb_s@hotmail.com

Figure S1: \textsuperscript{1}H-NMR of HMF from glucose in CDCl\textsubscript{3}. Reaction condition: Glucose =10 mmol, PA =1.2 mmol, solvent =10 mL (Water +MIBK 1:4) at 140 \textdegree C
Figure S2: $^1$H NMR of one-pot synthesis of HMF and LA from glucose, close view, show two triplets and one singlet characteristic pick of LA in CDCl$_3$. Other reaction condition: Glucose =10 mmol, PA =1.2 mmol, t=6 h, solvents= 10 mL, (1:4 Water + MIBK). 180 °C
Figure S3: $^1$H NMR of one-pot synthesis of HMF and LA from glucose, close view, show two triplets and one singlet characteristic pick of LA in CDCl$_3$ and formylation of HMF in presence of formic acid as by product. Other reaction condition: Glucose =10 mmol, PA =1.2 mmol, t=6 h, solvents= 10 mL, (1:4 Water +MIBK). 180 °C
Figure: S4. $^1$H-NMR spectra of furfural in CDCl₃, synthesis from furfural. Reaction condition

Figure: S5 UV-visible spectrum of phenol-sulphonic acid experiment, calculating total reducing sugar.
**Figure S6**: Four point calibration plot of standard Glucose

**Figure S7**: Blank experiment, $^1$H NMR (CDCl$_3$), Glucose = 10 mmol, T = 140 °C, t= 6 h.
Figure S8: Time dependent dehydration of Glucose to HMF, change of product color show as time of reaction increase, other reaction condition: Glucose = 10 mmol, PA = 1.2 mmol, solvent = 10 mL (water + MIBK, 1:4), Temperature = 140 °C.