In the glass reactor the speed of agitation was studied between 600-900 rpm (Fig. S1). It was observed that with the increase in speed of agitation from 600 rpm to 800 rpm the conversion of furfuryl alcohol increased remaining almost the same between 800 and 900 rpm. The increased agitation speed beyond 800 rpm did not reveal any significant effect on the conversion of furfuryl alcohol and all further experiments were conducted at 800 rpm where there was no external mass transfer limitation.

In our earlier reports we have provided the proof of absence of external mass transfer resistance and intra-particle resistance for DTP encapsulated ZIF-8\(^{18}\). The calculations given reveals that the reaction is kinetically controlled and free from intra particle diffusion resistance.

![Fig. S1 Effect of speed of agitation](image)

**Fig. S1 Effect of speed of agitation** Catalyst FeDTP@ZIF-8, Furfuryl alcohol 0.053 mol, acetic acid 0.271 mol, temperature 90 °C, catalyst loading 0.005 g/cm\(^3\), total volume 21 ml, time 6 h.

**Proof of absence of external mass transfer resistance**

For better understanding of solid-liquid or heterogeneous catalytic reactions, different controlling mechanism are available. The liquid phase diffusivity of furfuryl alcohol (A) at 100 °C was estimated using Wilke-Chang equation as \(1.1633 \times 10^{-4} \text{ cm}^2/\text{s}\). Considering the limiting value of Sherwood number \(Sh_a = k_{el_a}d_{liq}/D_{el_a}\) as 2, mass transfer coefficient was evaluated as 2.326 cm/s. The particle surface per liquid volume was calculated as,

\[
\alpha_p = \frac{6w}{\rho_d a_p} = 1601.70 \text{ Cm}^2/\text{cm}^3
\]

\[ (1) \]

The observed initial rates for furfuryl alcohol was calculated as,\n
\( 3.16 \times 10^2 \text{ mol.cm}^{-3} \cdot \text{s}^{-1} \), while the mass transfer rate for furfuryl alcohol was evaluated as \(0.004954 \times 10^4 \text{ mol.cm}^{-3} \cdot \text{s}^{-1} \). As, 

\( i.e. 3.15 \times 10^4 \gg 0.004954 \times 10^4 \)

Thus the comparison of relevant resistances shows that
Hence it gets prove that there is no external mass transfer resistance in the reaction. The only resistance could be because of intra-particle diffusion, surface reaction, chemisorption or desorption.

**Proof of absence of intra-particle resistance**

Considering the average particle size of FeDTP@ZIF-8 as 1 µm, a theoretical calculations were carried out to compute Weisz-Prater criterion \( C_{wp} \). It is observed to be 5.5*10^{-7} which is far less than unity confirming that there is absence of intra particle diffusion resistance. Hence the reaction is kinetically controlled which is further confirmed from the calculated activation energy in section 3.7.6.

Fig. S2 XPS analysis of Zn 2p, O 1s, N 1s, C 1s, W 4f and Fe 2p for Fe-DTP@ZIF-8

\[
\frac{1}{r_{obs}} \gg \frac{1}{k_{SLA} - a_p (A_0)}
\]