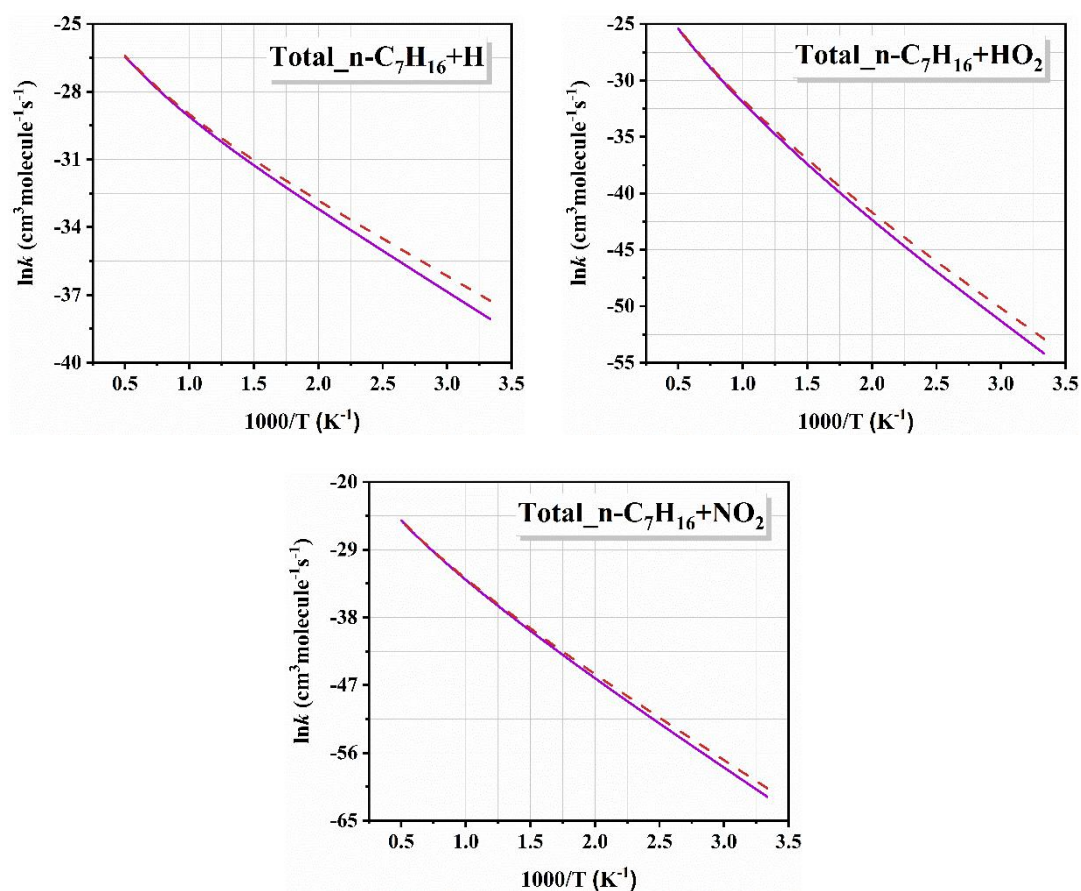


- **Supplementary Fig. S2** illustrates the effect of tunneling effects on the total rate constants. The dashed line shows the total rate constants for $\text{n-C}_7\text{H}_{16} + \text{H}/\text{HO}_2/\text{NO}_2$ considering the tunneling effect. The tunnelling effect is more pronounced at low temperatures. As the temperature increases, the tunneling effect diminishes and the coefficient is closer to 1.



Supplementary Fig. S2. Effects of the tunneling effects on the rate constants.