

Figure S1: Relationship between hydrogen addition and radical concentrations under different equivalence ratios. (a) Max (H), (b) Max (O), (c) Max (OH).

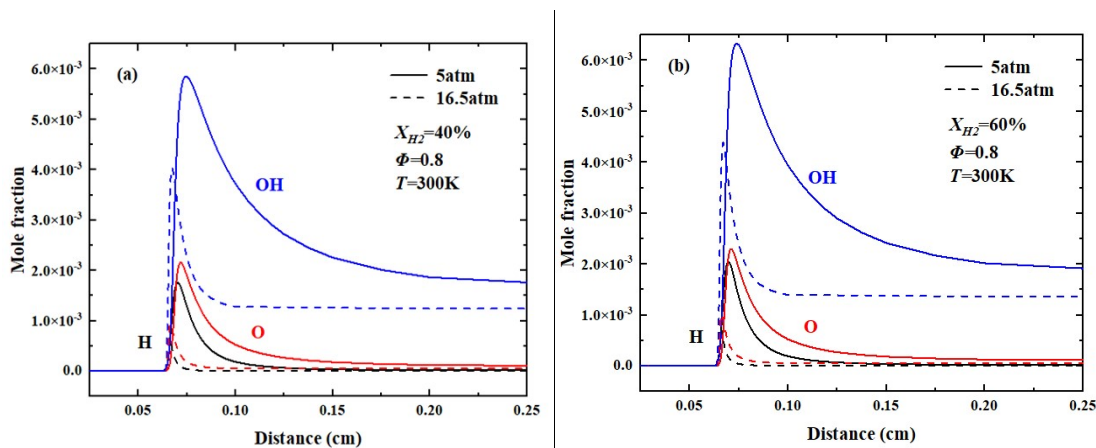


Figure S2: When the pressure is 5 atm and 16.5 atm, the free radical concentration changes with the flame propagation distance. (a)  $X_{H_2}=40\%$ ; (b)  $X_{H_2}=60\%$ .

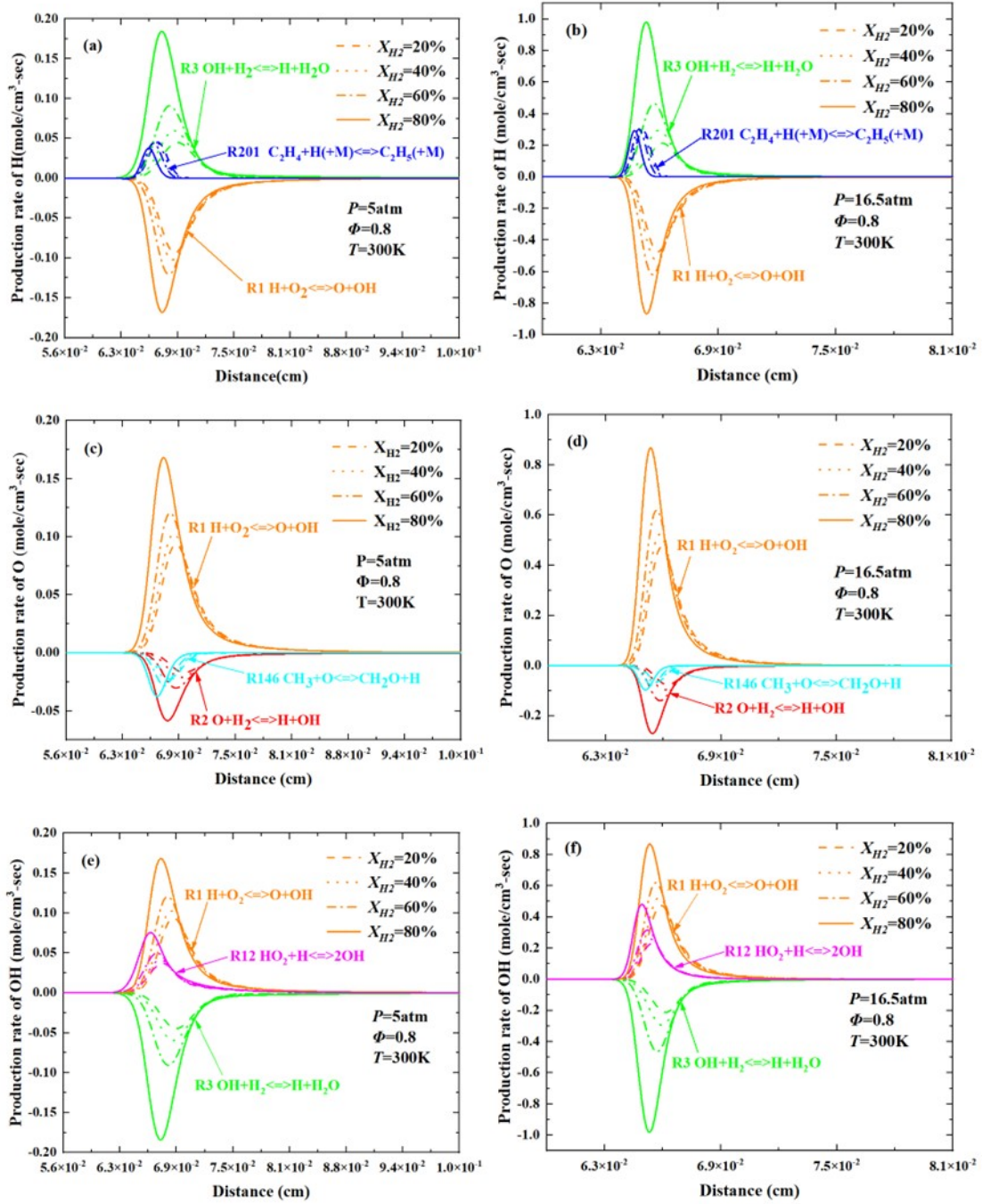


Figure S3: Analysis of the yield of H, O and OH free radicals with the change of hydrogen content ( $X_{H_2}=20\%/40\%/60\%/80\%$ ,  $\Phi=0.8$ ,  $T=300\text{ K}$ ) under different pressure conditions: (a) (c) (e) 5atm; (b) (d) (f) 16.5atm.

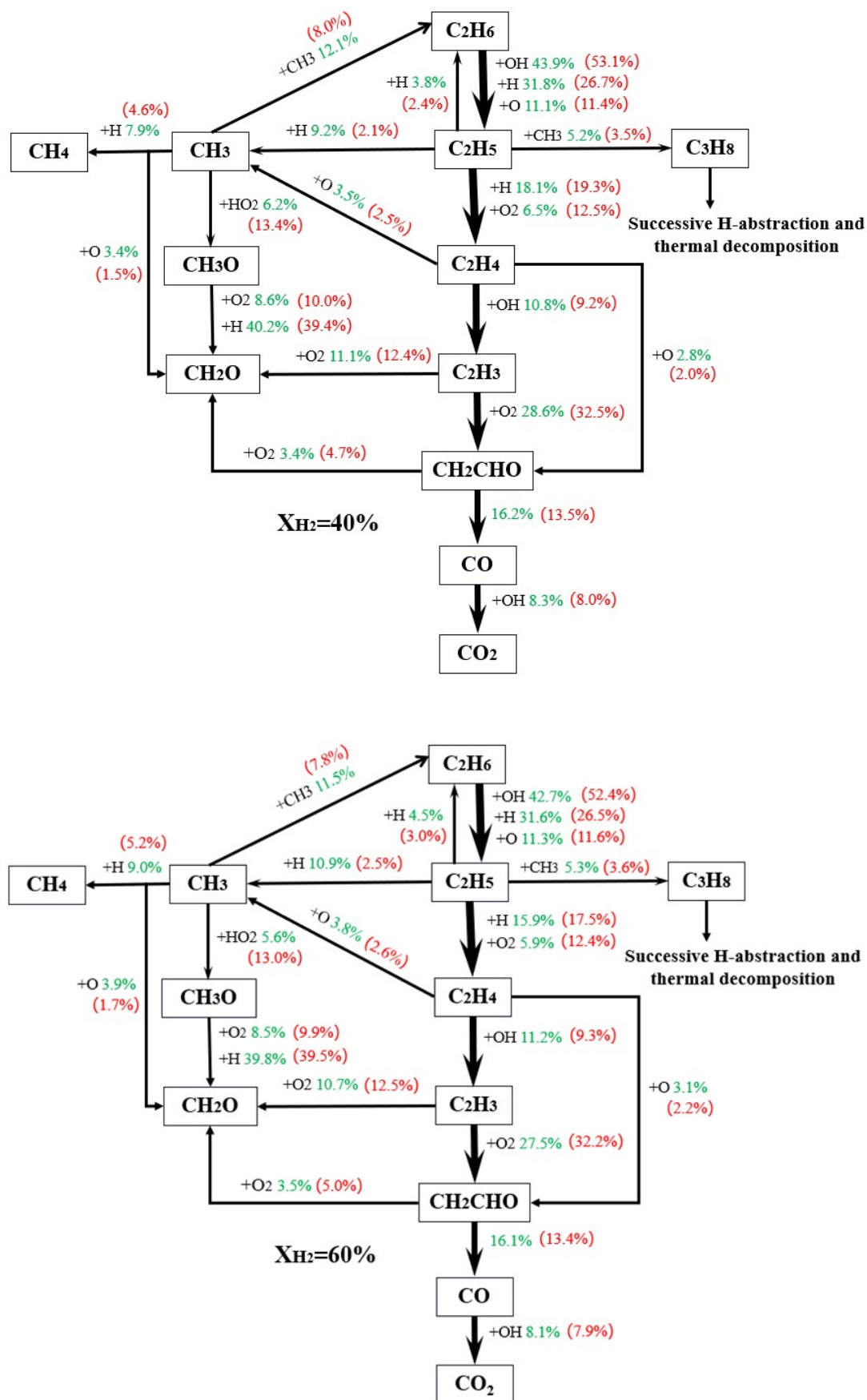


Figure S4: At  $\phi=0.8$  and  $T=300K$ , the ethane oxidation reaction pathway under medium and high

**pressure conditions (the percentages given in brackets correspond to the result of  $P=16.5\text{atm}$ )  
with hydrogen additions of 40% and 60%.**