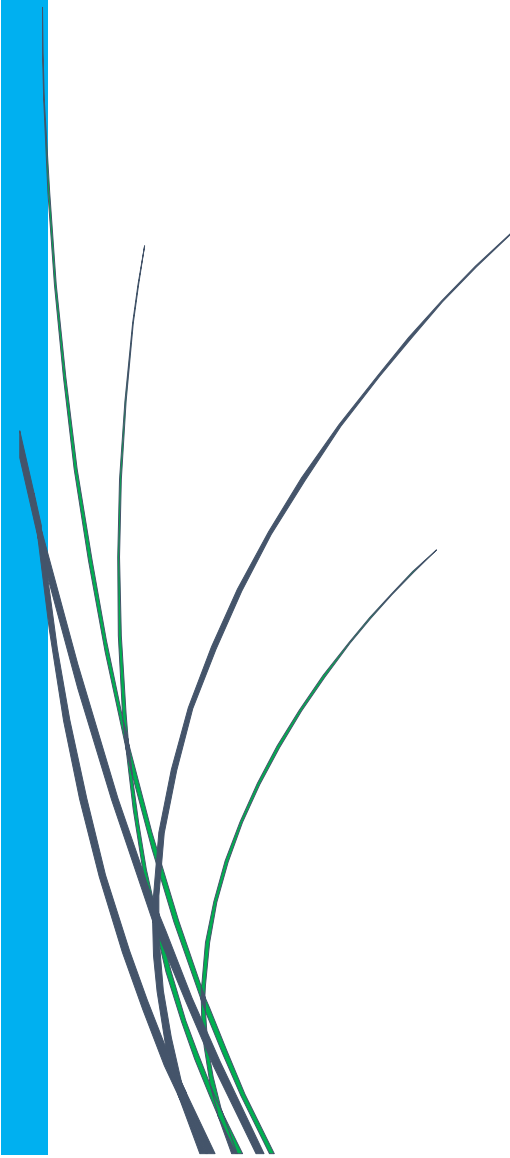


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Appendix A

Gas chromatograph calibration for product gas evaluation



The certified calibrated gas mixture and certified liquid component were used to find out the standard area of different product components during ESR. The air tight GC syringe was used for injection of 50 μl and 0.5 μl of sample for gas and liquid respectively. To reduce the error data were repeated 10 times and the mean value was further used for the analysis of gaseous or liquid components during ESR performance. Table D1 depicts the area of different components of gas present in certified gaseous mixture with their concentration. Table D2 represents the area of standard liquid components with their respective concentration.

Table D1 Composition, concentration and area of certified calibrated gas mixture.

Gas mixture components	Concentration (mg/l)	Area from Gas Chromatogram
H ₂	1010	47369
CO ₂	1026	289693
CO	1056	183069
CH ₄	2813	475870
C ₂ H ₆	1695	547207
C ₃ H ₈	1156	456799
C ₄ H ₁₀	1072	550628
C ₂ H ₄	1825	503183
N ₂	Balance	-

Table D2 Composition, concentration and area of standard liquid mixture.

Liquid mixture components	Concentration (mg/l)	Area from Gas Chromatogram
Ethanol	37939	6312090
Acetaldehyde	1560	18790100
Acetone	79100	3676351
Ethyl acetate	4485	61773250

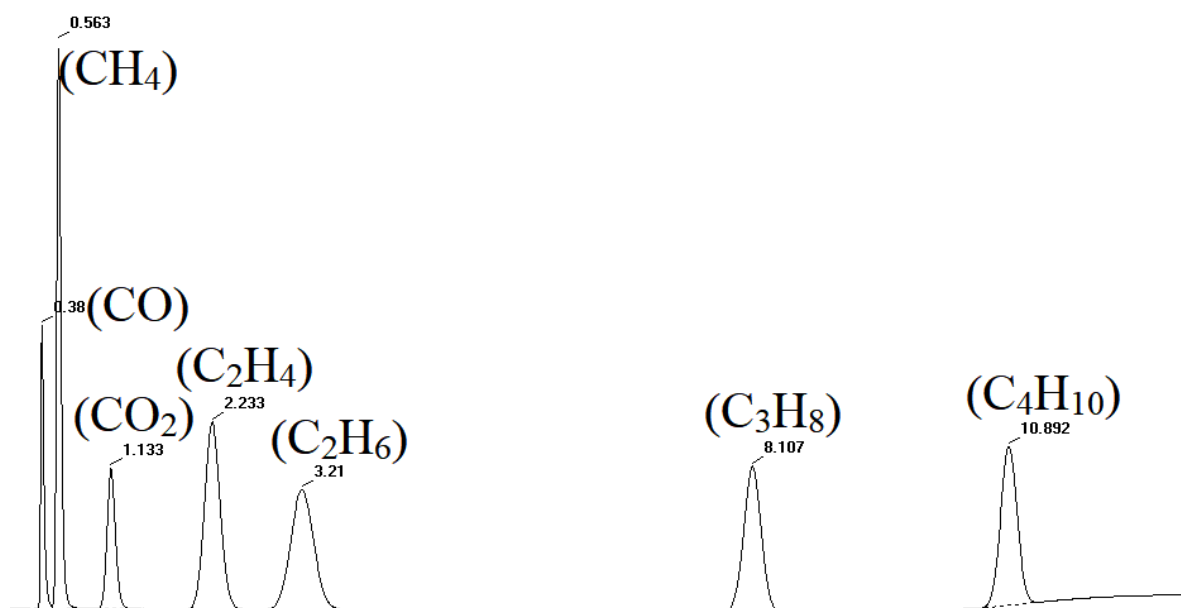


Figure D1: FID chromatogram of calibrated gas mixture.

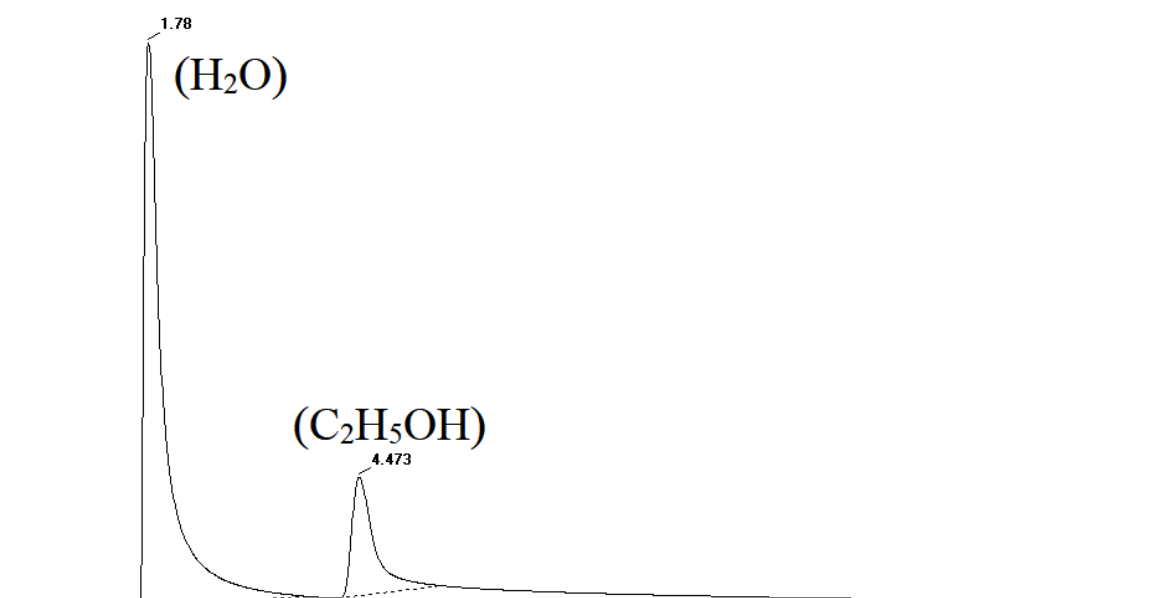


Figure D2: TCD chromatogram of prepared Water: Ethanol (1:3 molar ratio).

Figure D2 represents the FID signal at different retention time obtained on injecting 50 μ l of certified calibrated gas mixture into GC. It showed that the molecule with larger size comes later and smaller size molecules comes earlier. The area of prepared ethanol: water (3:1) was also calibrated in TCD to find out the conversion of reactants.