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Hydrogen sulfide dissociation in nanosecond dielectric barrier discharge KIRILL GUTSOL, ALEXANDER RABINOVICH, Drexel University, ALEXANDER GUTSOL, Chevron Energy Technology Company, ALEXANDER FRIDMAN, Drexel University — Hydrogen sulfide (H_2S) is a byproduct of oil refinement, and it comprises a large portion of natural gas deposits. The minimum dissociation energy of hydrogen sulfide is only 0.2 eV/molec, and it is very important commercially. The process of hydrogen sulfide dissociation was investigated in nanosecond dielectric barrier discharge (ns-DBD). Experiments on dissociation of H_2S in ns-DBD allows for effective separation of ion-molecular and thermal effects, which is necessary for understanding the potential and limitations of plasma dissociation of hydrogen sulfide. The study was performed in a reactor, in which there is no contact between any metal parts (including electrodes) and H_2S. It is well known that many common metals and alloys either react or catalyze H_2S dissociation (especially at elevated temperature); our reactor design eliminates this problem. This study was performed in a moderately low pressure reactor (50 - 200 Torr) with 100% pure hydrogen sulfide. The minimum dissociation energy cost was found to be less than 5 eV/molec at room temperature, which is significantly better than results obtained in earlier studies using discharges with high E/n and low gas temperature.

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