

Plasmachemistry synthesis of carbon disulfide

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Carbon disulfide is a valuable chemical product. It is used as a highly effective solvent and intermediate product of chemical synthesis. In industry it is obtained by catalytic synthesis from sulfur and methane at high temperature. Similarly, direct production of carbon disulfide from methane from methane and hydrogen sulfide is possible. An electric arc can be used as an energy source. The report discusses the thermodynamic calculation of the proposed process. A estimate was made for optimum temperatures and specific flow rate of methane. As a result, the following process parameters were obtained: flow rate of methane 0.17 kg/kg hydrogen sulfide; temperature 2000 K, specific energy consumption 6.03 MJ/kg of mixture (10.37 MJ/kg of carbon disulfide). Because at high temperatures, hydrogen sulfide and methane form solid products; their direct supply to the near-electrode zone is unacceptable. Therefore, an inert gas (for example, argon) must be supplied to the near-electrode zone. Based on the operating experience of high-voltage AC plasma torch, for stable operation the required inert gas/mixture ratio is at least 1/1. Thus, the specific flow rate of argon will be 1 kg/kg of the reaction mixture. And the plasma enthalpy will be about 3.5 MJ/kg.