THERMAL STEAM PLASMA DECOMPOSITION OF ORGANOCHLORINE COMPOUNDS

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The report considers the decomposition of carbon tetrachloride and chlorobenzene by the plasma obtained in an AC plasma torch with separate supply of shielding gas and reaction components.

A large group of organochlorine compounds is prohibited for use and requires careful processing. The thermal plasma can be used for their processing. Under high temperature, organic compounds decompose to form simpler ones. Thus most of the researches is concerned with air-plasma processing [1]. This process is a high-temperature oxidation.

The steam plasma has significant advantages: a high concentration of active particles, the presence of hydrogen to form hydrogen chloride. However, the use of steam complicates the design of the plasma torch. For this purpose, the IEE RAS has developed an steam AC plasma torch with separate supply of shielding gas and main plasma-forming media [2]. Plasma torch tested during methane reforming [3].

The work deals with the decomposition of carbon tetrachloride and chlorobenzene under the plasma obtained in the AC plasma torch. Carbon dioxide is supplied into the near-electrode zone, but steam, vapor of organochlorine compound and methane are fed into the arc zone. Component flow rates are selected by the equations:

$$CCl_4 + 2\ H_2O + 0.8\ CO_2 + 1.8\ CH_4 \rightarrow 3.6\ CO + 3.6\ H_2 + 4{\cdot}HCl$$
$$C_6H_5Cl + 5\ H_2O + 2\ CO_2 + CH_4 \rightarrow 9\ CO + 9\ H_2 + HCl$$

In the course of the experiment it was found that the initial organochlorine compounds completely decompose, however, chlorobenzene is partially converted to soot. The yield of soot was 0.84% wt. of raw materials, the content of chlorine in the soot was 2.08% by wt.

REFERENCES

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