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### On the Existence of $\text{H}_2\text{P-SH}$ and $\text{H-P (SH)}_2$ in the GAS Phase

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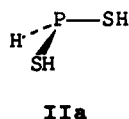
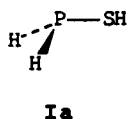
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# ON THE EXISTENCE OF $\text{H}_2\text{P-SH}$ AND $\text{H-P(SH)}_2$ IN THE GAS PHASE

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It is well known that ternary HPS-compounds are unstable and decompose with loss of  $\text{H}_2\text{S}$  and formation of various phosphorus sulfides. We now report that **Ia** and **IIa** can be generated and characterized by the novel technique of neutralization reionization mass spectrometry (NRMS).



Electron impact ionization of diethylphosphine sulfide  $\text{Et}_2\text{HP(S)}$  yields fragments of composition  $[\text{H}_3\text{PS}]^+\cdot$ , the structure of which has been determined as  $[\text{H}_2\text{P-SH}]^+\cdot$  **I** ( $\text{C}_5$ ). NRMS experiments show that by neutralization of **I** compound  $\text{H}_2\text{P-SH}$  **Ia** is obtained, which is stable in the dilute gas phase.

Abundant signals for radical cations of composition  $[\text{H}_3\text{PS}_2]^+\cdot$  can be detected in mass spectra of dialkyldithiophosphinic acids  $\text{R}_2\text{P(S)SH}$  ( $\text{R:Et,nPr,nBu}$ ). It is found that these ions exist as mixture of structures  $[\text{H-P(SH)}_2]^+\cdot$  **II** ( $\text{C}_5$ ) and  $[\text{HS-P-SH}_2]^+\cdot$  **III** ( $\text{C}_1$ ). From NR-mass spectra it can be gathered that only component **II** can be reduced to  $\text{H-P(SH)}_2$  **IIa**, which is proved to be stable in the gas phase.

Determination of the ion structures is based on collisional activation mass spectra as well as on thermochemical data, the structures being in accordance with the results of semiempirical MO-calculations (MNDO). Further investigations are in progress.