The ground-state of protonated carbonyl sulfide, $HOCS^+$ or $OCSH^+$?

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Ab initio calculation by Scarlett and Taylor predicted that S-protonated OCS is more stable than the O-protonated isomer. Experimental evidence appears to contradict this finding. Nakanaga and Amano observed a band of protonated OCS at 3435 cm^{-1} and assigned it to the O-H stretching vibration. Although they also searched near 2500 cm^{-1}, they didn't observe any spectrum which could be attributed to an S-protonated isomer.

We have carried out *ab initio* calculation at the MP2/6-311G++(2df,2pd) and QCISD levels and have confirmed the conclusions of Scarlett and Taylor. The S-protonated form is predicted to be more than 4 kcal/mol more stable than the O-protonated isomer. This calculation and the results of our experimental search for the S-protonated will be reported.