

Referee Report

I appreciate the good willing of the authors but unfortunately their new paragraph contains inaccuracies. Mousis et al. (2016) find that CO is essentially trapped in clathrate form in 67P/Churyumov-Gerasimenko, contrary to N₂ which has not been incorporated in the comet. This implies that 67P/Churyumov-Gerasimenko should be formed between the CO-clathrate and N₂ snowlines. Note that the CO-clathrate snowline is at ~45 K while that of CO is in the 20-25K range. This then makes an important difference in the locations of the two snowlines, contrary to the authors' statements. On the other hand, Luspay Kuti et al. (2016) focused on the case of CH₄ and C₂H₆. There are absolutely no inconsistencies between the two works who considered different molecules from different observational data. I recommend to the authors to simply state that they did not consider the clathrate case suggested by the recent literature about 67P/Churyumov-Gerasimenko. In this case, the snowlines would be located at different locations.

We appreciate the referee's comments and have modified the paragraph accordingly: "In our simple model, we ignore the effects of CO and N₂ entrapment in water ice through clathrate formation or other processes. Theoretical models aimed at explaining the composition of comet 67P/Churyumov-Gerasimenko suggest that a small fraction of the total CO and N₂ reservoir may be trapped in clathrates, and only released upon water sublimation (Lectez et al. 2015, Mousis et al. 2016). In this case, the CO and N₂ snowlines would be closer to the star than in the pure ice case."