

Bio-Collection V1.0 (© 2018 BioRxiv 01/11/2018)			
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Tsai et al. (2017, ApJS, 228, 20)

The diagram illustrates the oxidation and chain formation of sulfur species. It is divided into two main sections: **Oxidation** (top) and **Chain formation** (bottom).

Oxidation Section: This section shows the interconversion of sulfur species. SO_2 is oxidized to SO by OH and SO , and SO is reduced back to SO_2 by UV and H . SO is oxidized to S by OH , and S is reduced back to SO by UV and H . S is oxidized to CS by OH , and CS is reduced back to S by UV and H . S is oxidized to SH by OH , and SH is reduced back to S by UV and H . SH is oxidized to S_2 by OH , and S_2 is reduced back to SH by UV and H . The species SO_2 , SO , S , CS , SH , and S_2 are shown in boxes, while HSO and S_2O are in circles. A dashed box encloses SO_2 , SO , HSO , and S_2O .

Chain formation Section: This section shows the linear sequence of sulfur species: S_2 , S_4 , and S_8 . S_2 is oxidized to S_4 by S_2 , and S_4 is reduced back to S_2 by UV and H . S_4 is oxidized to S_8 by S_4 , and S_8 is reduced back to S_4 by UV and H . The species S_2 , S_4 , and S_8 are shown in boxes.

Lower atmosphere Section: This section shows the oxidation of DCS and H_2S to SH . DCS is oxidized to SH by OH , and H_2S is oxidized to SH by OH . SH is then oxidized to S_2 by OH , and S_2 is reduced back to SH by UV and H . The species DCS and H_2S are in boxes, while SH and NS are in circles.

Oxidation state scale for S: A color-coded scale at the bottom indicates the oxidation state of S, ranging from -2 (red) to +4 (blue). The scale is: -2 (red), -1 (orange), 0 (yellow), +1 (light blue), +2 (blue), +3 (dark blue), +4 (purple).

Tsai et al. (2023, *Nature*, 617, 7961)

$$\begin{aligned} n_{X_1} &= 2\mathcal{A}_3 e^{-t} - \mathcal{A}_4 e^{-(\mathcal{A}_1+1)t}, \\ n_{Z_1} &= \mathcal{A}_4 e^{-(\mathcal{A}_1+1)t} - \mathcal{A}_3 e^{-t}, \end{aligned}$$

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Heng & Lyons (2016, *ApJ*, 817, 149)Heng & Lyons (2016, *ApJ*, 817, 149)

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