

Supplementary Materials for:

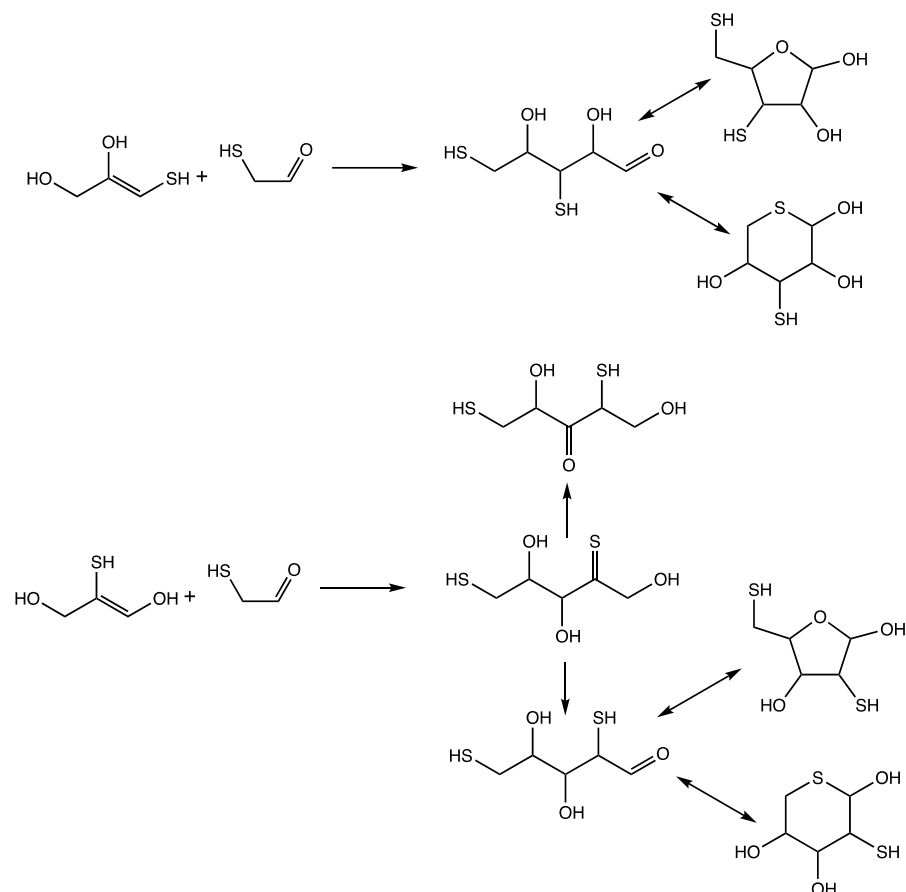
**Preliminary Free Energy Map of Prebiotic Compounds formed from CO<sub>2</sub>, H<sub>2</sub> and H<sub>2</sub>S**

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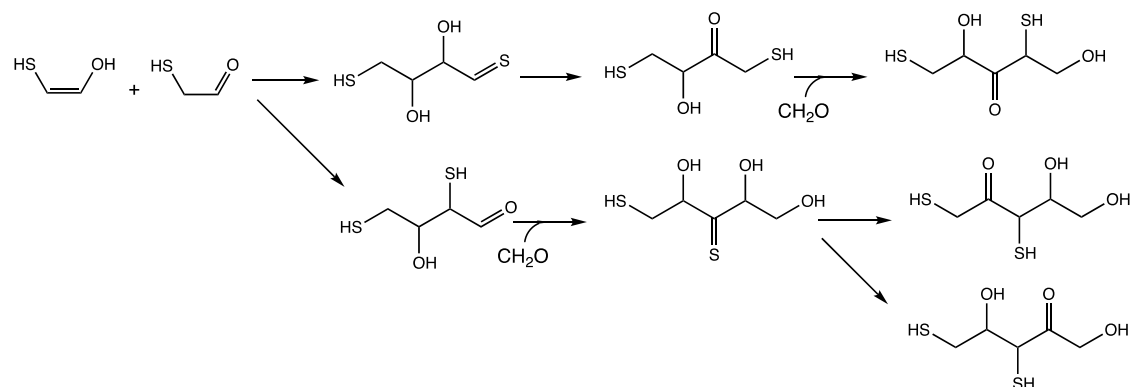
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Part 1: Reaction schemes to form other dithiopentoses

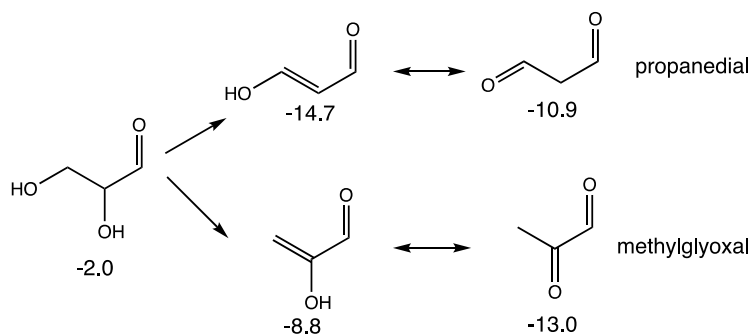


**Figure S1a.** C<sub>3</sub> enol + C<sub>2</sub> aldehyde aldol additions to form dithiopentoses

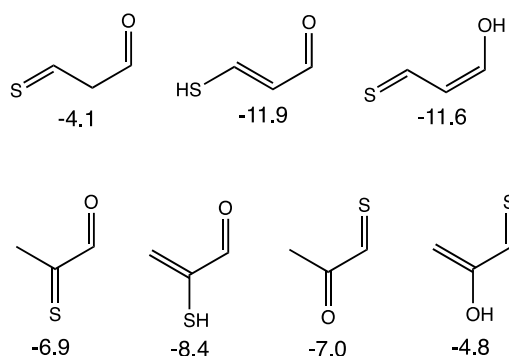


**Figure S1b.** Mercaptoaldehyde aldol dimerization followed by addition of CH<sub>2</sub>O to form dithiopentoses

Part 2:  $G_{r0}$  values for zero-oxidation dehydrated  $C_3$  compounds and its analogs.

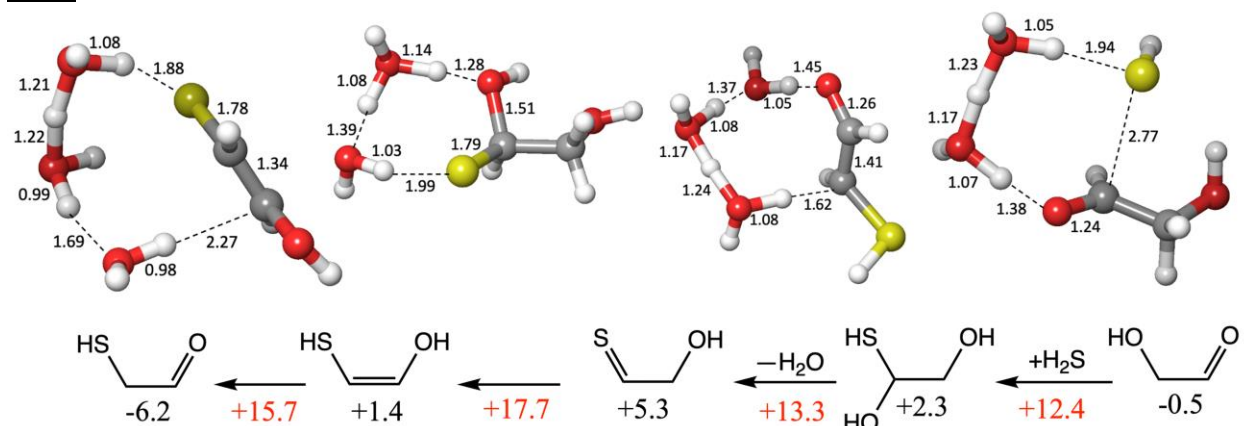


**Figure S2a.** Dehydration of glyceraldehyde to propanedial and methylglyoxal ( $G_{r0}$  in kcal/mol)



**Figure S2b.** Sulfur analogs of the dehydrated  $C_3$  compounds ( $G_{r0}$  in kcal/mol)

Part 3: Additional Transition State Structures



**Figure S3.** Transition State structures for conversion of glycolaldehyde to mercaptoacetaldehyde