Electronic Supplementary Material (ESI) for Physical Chemistry Chemical Physics.

Electronic Supplementary Information : Computational Modeling of the Catalytic Mechanism of Hydroxymethylbilane Synthase

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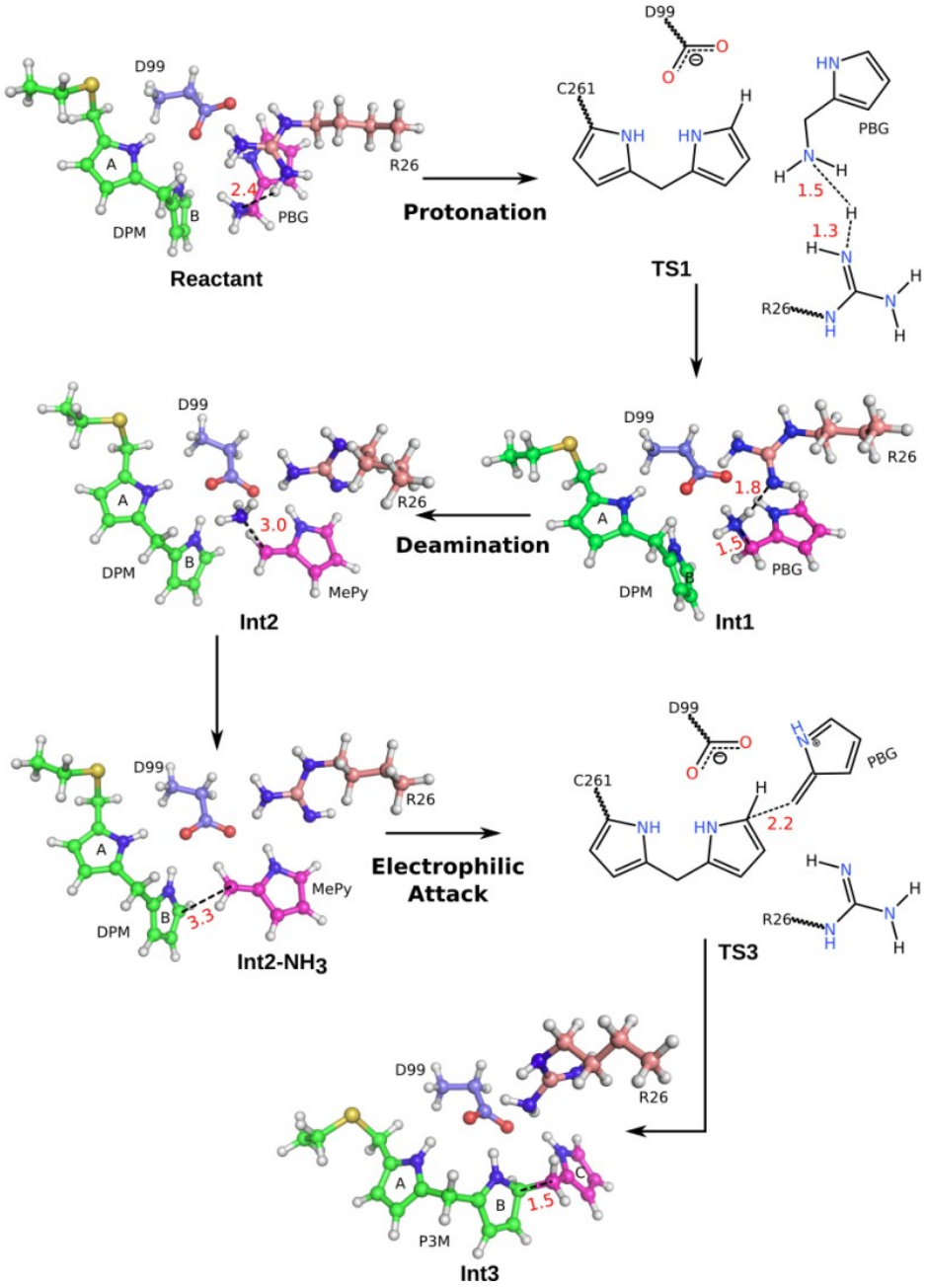

Figure S1: Optimized structures of reactant, transition states and intermediates for protonation, deamination and nucleophilic attack steps obtained from QM calculations on the cluster model 1. The cofactor, substrate, and residues R26 and D99 are shown in green, magenta, pink and blue sticks respectively. The transition states for the protonation and deamination steps are shown as a 2D-representation. All the measurements are in Angstroms (Å).

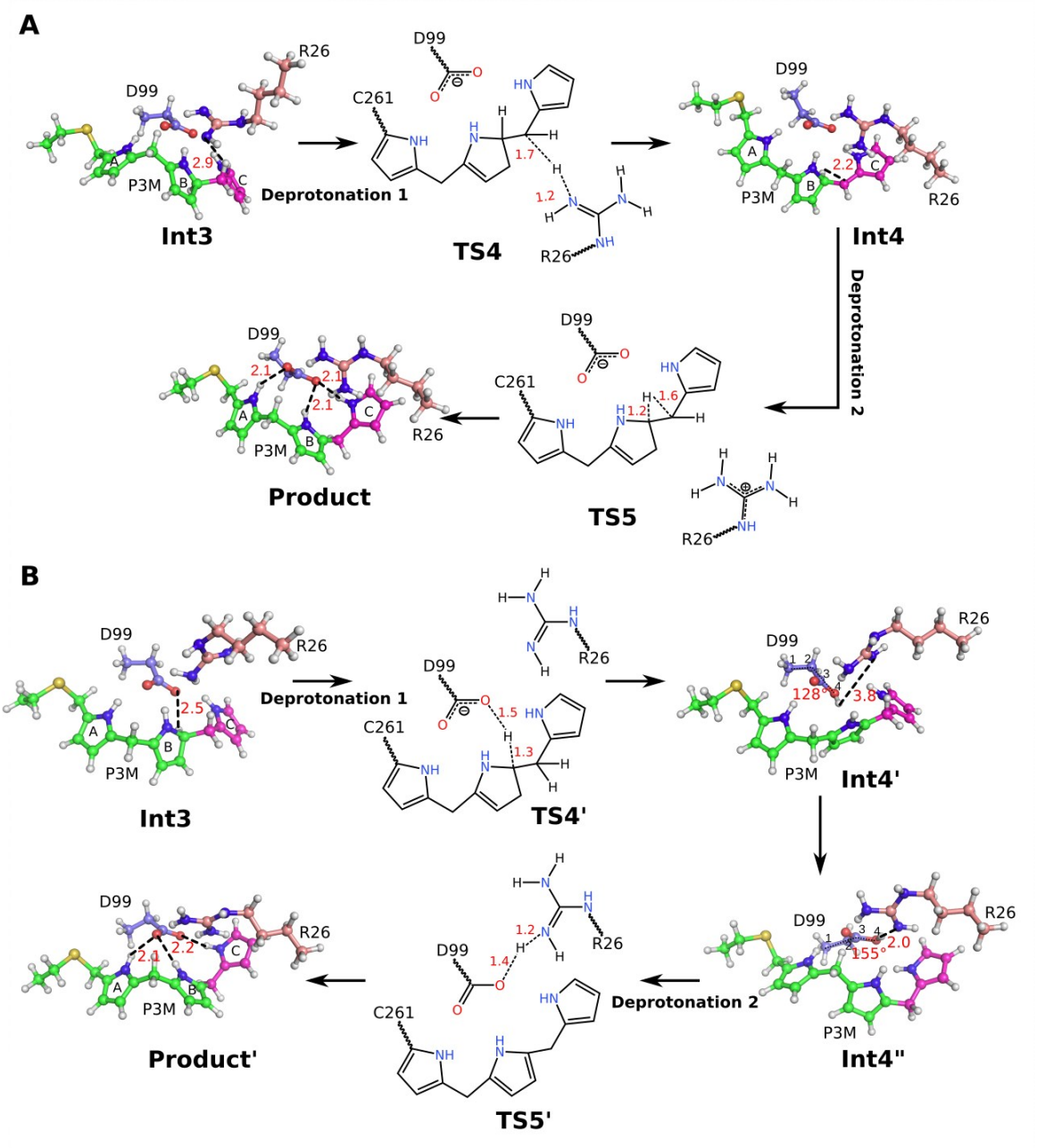

Figure S2: The two possible mechanisms for the deprotonation step of catalysis. A) Deprotonation through the bridging carbon atom between rings B and C. B) Deprotonation through the carboxylate side chain of D99. The cofactor, substrate, residues R26 and D99 are shown in green, magenta, pink and blue sticks respectively. All the measurements are in Angstroms (Å).

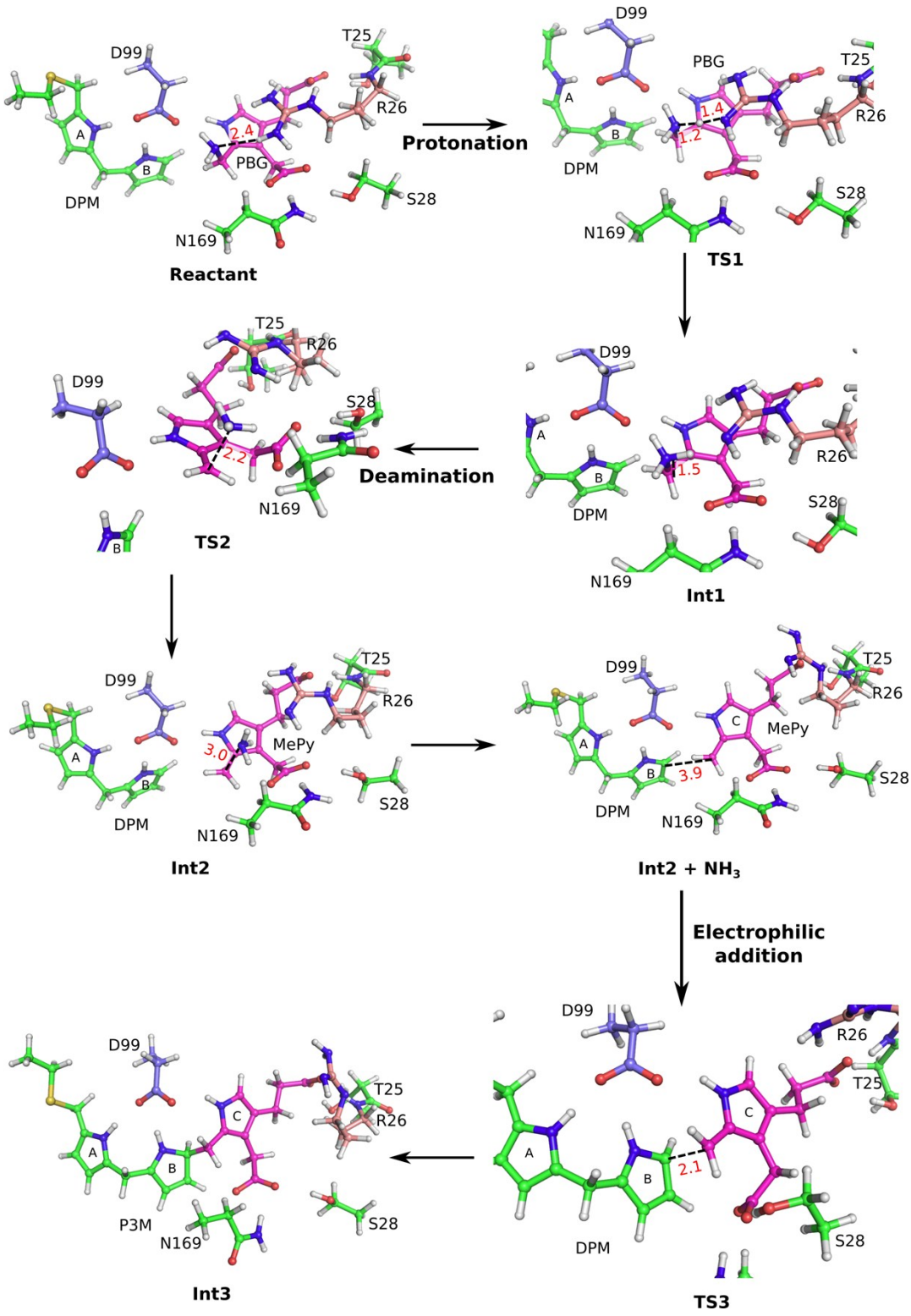

Figure S3: Optimized structures of reactant, transition states and intermediates for protonation, deamination and nucleophilic attack steps obtained from QM calculations on the cluster model 21. The cofactor, substrate, and residues T25, R26 S28, N169 and D99 are shown in green sticks while the cofactor, residues R26 and D99 are shown in, magenta, pink and blue sticks respectively. All the measurements are in Angstroms (Å).

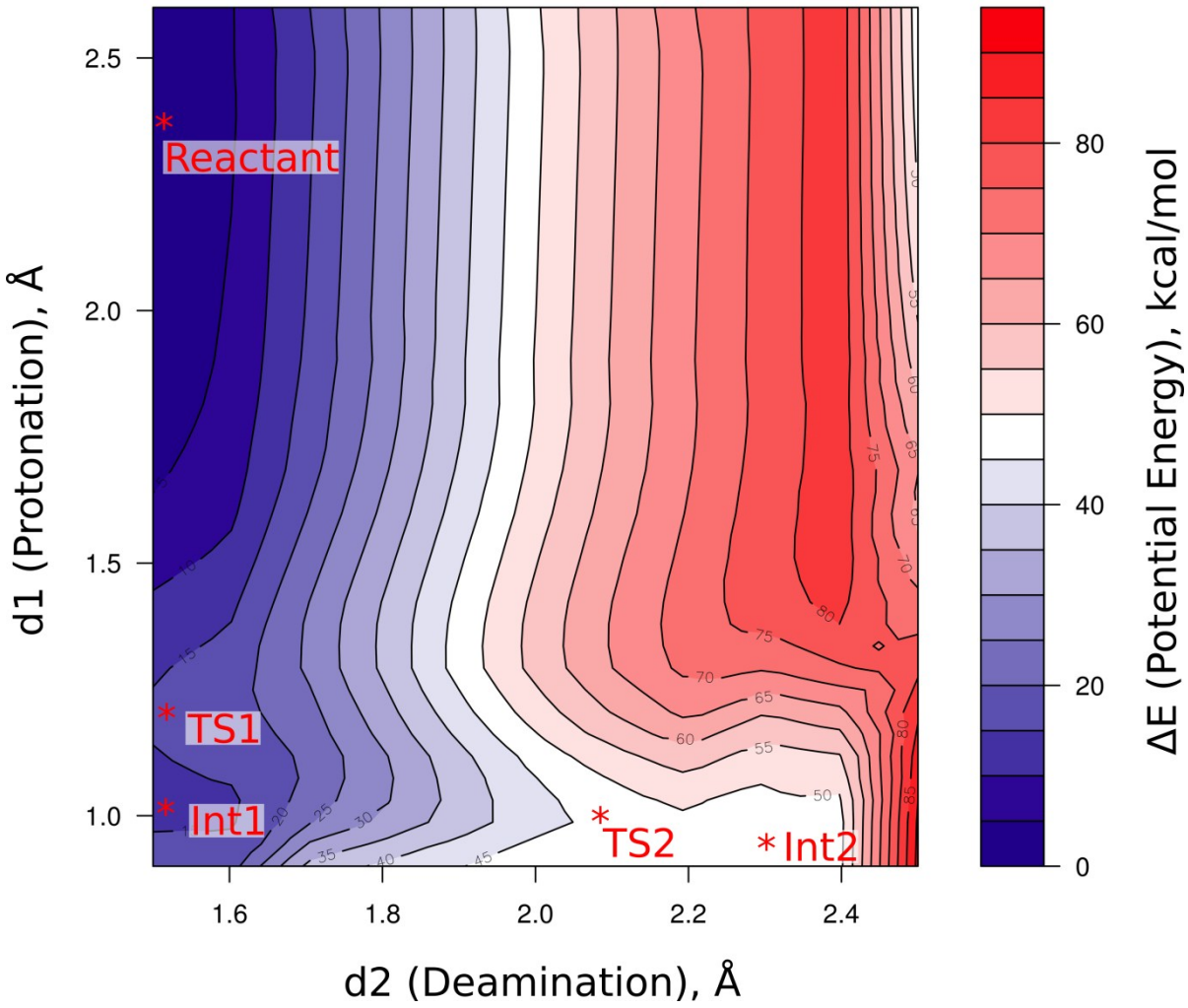

Figure S4: 2D-scan for the protonation and deamination steps of the HMBS catalytic mechanism. In the protonation step, the distance between the proton on arginine and nitrogen atom of PBG decreases from 2.4 to 0.9 Å (Y co-ordinate), while for the deamination the distance between the carbon and the nitrogen of PBG increases from 1.5 to 2.5 Å (X co-ordinate).

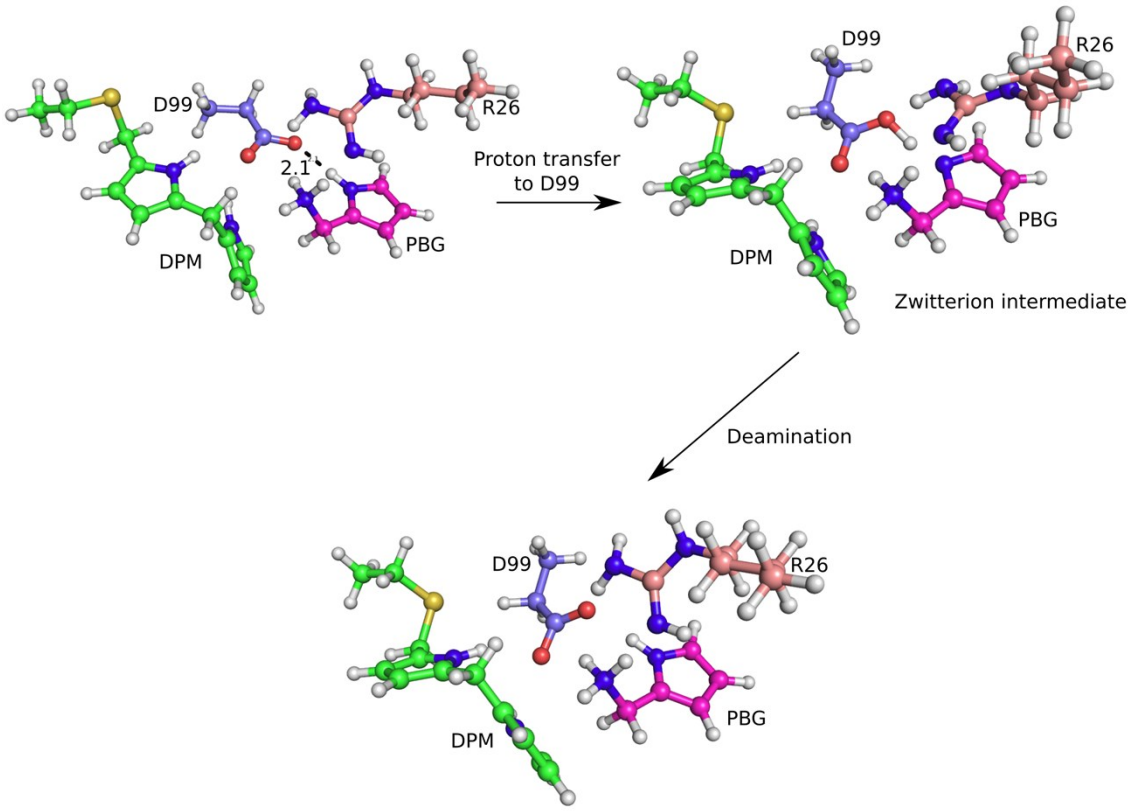

Figure S5: Deamination of PBG via E1cb mechanism. In the first step of E1cb mechanism, the proton on pyrrole nitrogen of PBG is abstracted by a base which is followed by the deamination process.

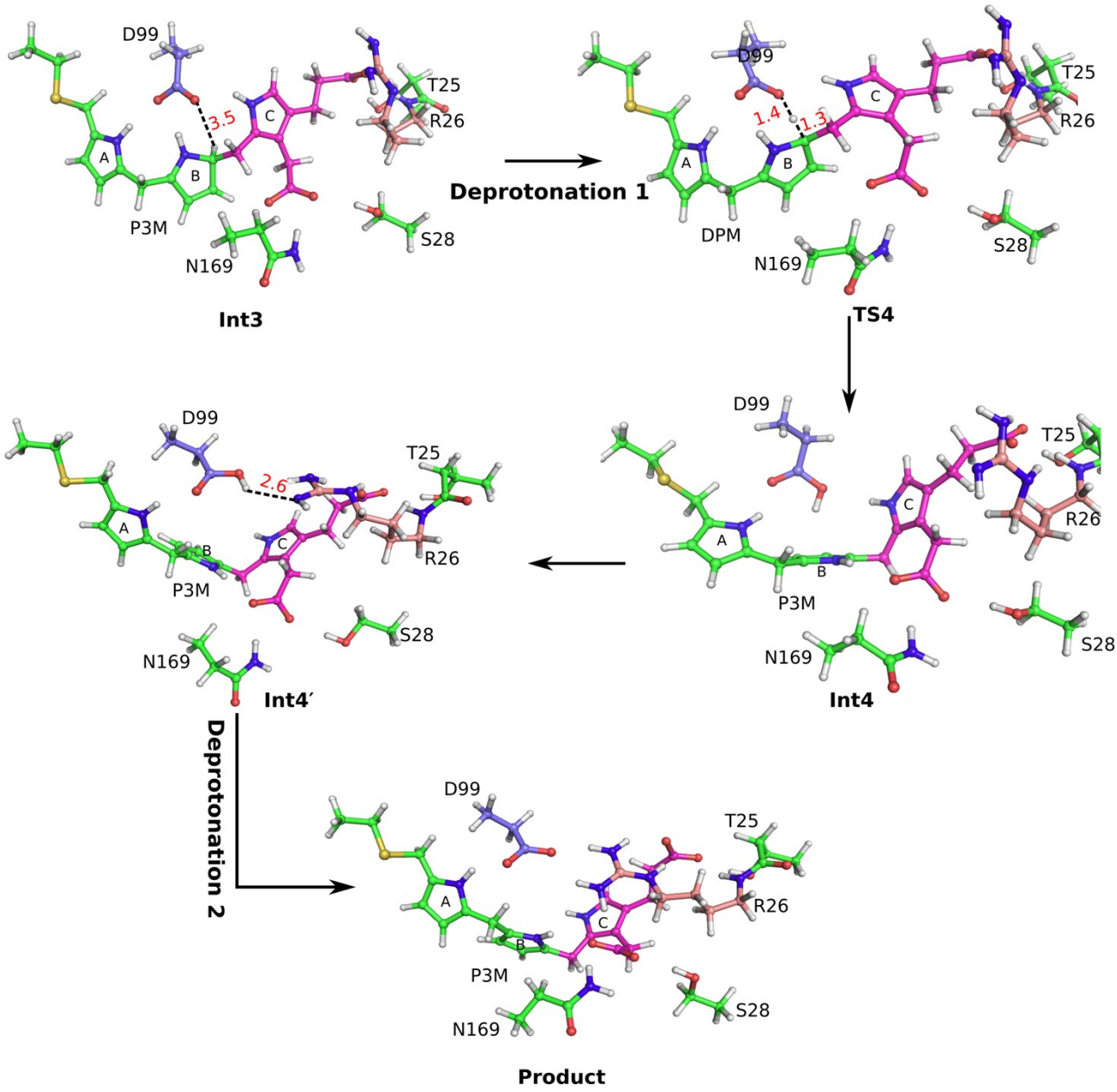

Figure S6: Optimized structures of intermediates and transition state for deprotonation 1 and 2 steps. The cofactor, residues T25, S28, N169 are shown in green sticks while the cofactor, residues R26 and D99 are shown in, magenta, pink and blue sticks respectively. All the measurements are in Angstroms (Å).