

Correction to “Chemical markers of possible hot spots on Mars”

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[1] In our paper “Chemical markers of possible hot spots on Mars,” published in the *Journal of Geophysical Research*, 108(E4), 5026, doi:10.1029/2002JE002003, 2003 (WAE, hereafter), there is an error in one of the reactants of Reaction R34 in Table 2. Sulfur monoxide (SO) instead of sulfur dioxide (SO₂) was used. The correct reaction is:



The rate coefficient, k , of the reaction is, however, the same as for R34 of WAE, i.e., $k = 3.6 \times 10^{-12} \text{ cm}^3 \text{ s}^{-1}$. The above correction in R34 impacts the SO₂ abundance and lifetime somewhat, as discussed below.

[2] Once in the atmosphere, SO₂ is photodissociated to produce SO, which is further photodissociated to form sulfur atoms. The reaction of SO with O₂ or OH recycles sulfur atoms back to SO₂ (R33, R35 in Table 2 of WAE). On the other hand, SO₂ reacts with ozone (O₃) to form

sulfur trioxide (SO₃, R34), which quickly combines with water vapor to form sulfuric acid (H₂SO₄, R39). H₂SO₄ undergoes condensation in the atmosphere. The revised reaction pathway is shown in Figure 1.

[3] After applying the correction, for Model B in the original paper (WAE) where the assumed mixing ratio of the outgassed SO₂ is 10^{-5} at the surface, the column abundance of SO₂ above 10 km is found to be 3.8×10^{17} molecules cm⁻². The new abundance is 40% smaller compared with WAE because the additional loss of SO₂ with O₃ (R34) is now properly included. The abundance of SO₃ and SO are also reduced but only slightly. The photochemical lifetime of SO₂ is now 40 days, smaller than in WAE. Other species and their abundances, as well as the overall conclusions, are not affected.

[4] For Model G of the original paper (WAE), where both SO₂ and H₂S are outgassed, each with a mixing ratio of 100 ppm at the surface, the resulting mixing ratios at 10 km are calculated to be 1.6×10^{-4} , 1.7×10^{-5} , and 1.9×10^{-7} , respectively, for SO₂, H₂S, and SO. The corresponding column abundances above 10 km are, in molecules cm⁻², 1.5×10^{19} , 6.2×10^{17} , and 5.4×10^{16} . The maximum difference is in the SO₂ abundance, with approximately 40% reduction compared to WAE. The number densities and mixing ratios of important sulfur species for this case are shown in Figure 2. For the case with current global upper limit of 0.1 ppm each for SO₂ and H₂S, the change due to above correction in R34 is imperceptible.

[5] **Acknowledgments.** We thank Mao-Chang Liang for pointing out the error in the paper. SKA acknowledges research support from NASA's Mars Program Office at JPL for U.S. participation in the Mars Express Project and by NASA's Planetary Atmospheres Program.

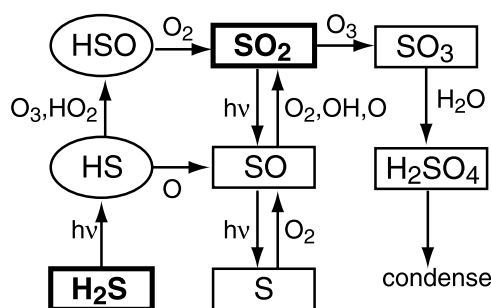


Figure 1. The revised reaction pathway.

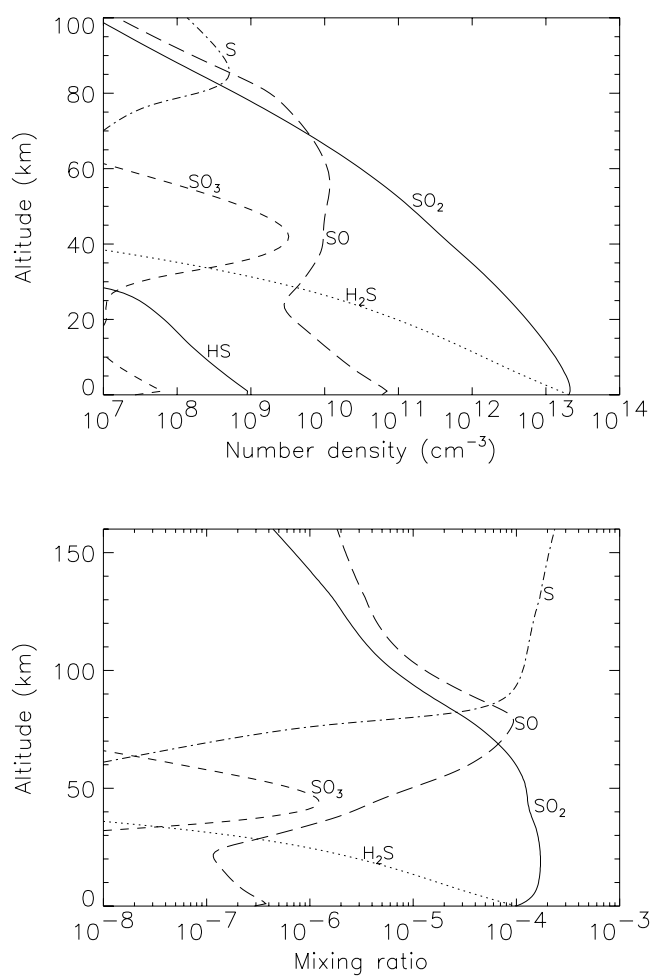


Figure 2. The number densities and mixing ratios versus altitude for important sulfur species calculated with 100 ppm each of H_2S and SO_2 at the surface of Mars (Model G).