

TABLE 23—Sulfur-isotope fractionation in oxidation–reduction reactions.

Reaction	Range $\sigma^{34}\text{S}\%$	Mean $\sigma^{34}\text{S}\%$	Bacteria	Reference and remarks
Castile Fm. (SO_4^{2-})	—	+10.3	—	Holser & Kaplan (1966)
(A) $\text{SO}_4^{2-} \rightarrow \text{SO}_3^{2-}$	-10 to -15	-12.5	<i>Desulfovibrio desulfuricans</i>	Chambers & Trudinger (1979), Kemp & Thode (1968)
(B) $\text{SO}_3^{2-} \rightarrow \text{H}_2\text{S}$	-14 to -20	-17.0	<i>Desulfovibrio desulfuricans</i>	Holser & Kaplan (1966), Kemp & Thode (1968)
(C) $\text{H}_2\text{S} \rightarrow \text{S}$	-3 to -6	-4.5	<i>Thiobacillus thiooxidans</i>	Chambers & Trudinger (1979). May also occur spontaneously without biological interference in the presence of oxygen.
(D) $\text{S} \rightarrow \text{SO}_4^{2-}$	-6 to -9	-7.5	<i>Thiobacillus thiooxidans</i>	Chambers & Trudinger (1979), Kirkland & Evans (1976)
Total reaction, 25°C	—	-31.2	—	
At 12–15°C, cave temperature, ~1/2 of the fractionation as at 25°C	—	-15.6	—	Kaplan & Rittenberg (1964)
Average of cave-gypsum blocks	—	-15.1	—	Average of 10 gypsum blocks from various Guadalupe caves; see Table 22.