Checking Oxygen in a Sulfite Conversion Model

Base your answers on the information provided and your knowledge of chemistry. Use the 2025 Chemistry Reference Tables as needed.

A class models dissolved sulfite, SO_3^{2-}, changing to sulfate, SO_4^{2-}, when oxygen is present. It uses the balanced model equation and assigns oxygen an oxidation number of -2 in both ions. In O_2 the oxidation number is 0.

$2SO_3^{2-}(aq) + O_2(g) \rightarrow 2SO_4^{2-}(aq)$

1 Calculate sulfur's oxidation number in each ion. Show how the ion charge enters the calculation. [1]

Answer and work

2 Which description follows from the sulfur change?

(1) Sulfur is oxidized because its oxidation number increases.

(2) Sulfur is reduced because its oxidation number increases.

(3) Sulfur is oxidized because its oxidation number decreases.

(4) Sulfur has no change in oxidation number.

A student claims oxygen cannot be reduced in this reaction because the sulfate ion has the same overall charge as sulfite.

3 Use the oxidation numbers of oxygen in O_2 and in sulfate to evaluate the claim. [1]

Answer and work

4 How many electrons are accounted for by the oxidation of the two sulfur atoms in the equation? Explain why the two oxygen atoms from O_2 can account for the same total. [1]

Answer and work