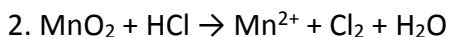
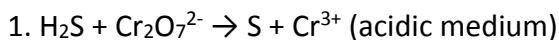


Answer on Question #44141 - Chemistry - Inorganic Chemistry

Question:

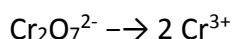
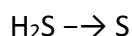
Balance the following redox equations:



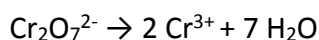
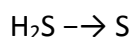
Solution:



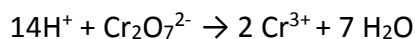
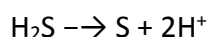
Step 1: Separate the half-reactions and balance elements other than O and H.



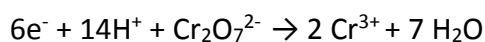
Step 2: Add H₂O to balance oxygen. The chromium reaction needs to be balanced by adding 7 H₂O molecules. This yields:



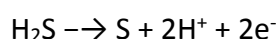
Step 3: Balance hydrogen by adding protons (H⁺). 14 protons need to be added to the left side of the chromium reaction to balance the 14 (2 per water molecule * 7 water molecules) hydrogens. 2 protons need to be added to the right side of the other reaction.



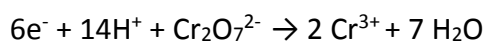
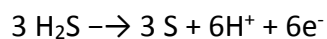
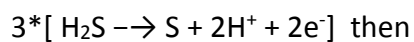
Step 4: Balance the charge of each equation with electrons. The chromium reaction has (14+) + (2-) = 12+ on the left side and (2 * 3+) = 6+ on the right side. To balance, add 6 electrons (each with a charge of -1) to the left side:



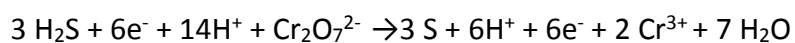
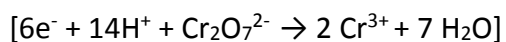
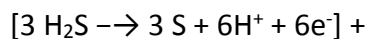
For the other reaction, there is no charge on the left and 2+ charge on the right. So add 2 electrons to the right side:



Step 5: Scale the reactions so that the electrons are equal. The chromium reaction has 6e⁻ and the other reaction has 2e⁻, so it should be multiplied by 3. This gives:

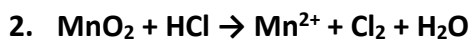
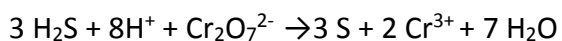


Step 6: Add the reactions and cancel out common terms.



The electrons cancel out as well as 6 protons. This leaves the balanced reaction of:

Answer:



Answer:

