Answer on Question #53520 – Chemistry – Organic Chemistry

Question:

How to balance this equation? Cr2O72-+C2H4O-->Cr3++C2H4O2

Answer:

$Cr_2O_7^{2-}+C_2H_4O \rightarrow Cr^{3+}+C_2H_4O_2$

First of all, an electronic balance should be calculated:

$Cr_2O_7^{2-} + 6e^- + 14H^+ \rightarrow 2Cr^{3+} + 7H_2O$ (reduction)

$C_2H_4O - 2e^- + H_2O \rightarrow C_2H_4O_2 + 2H^+$ (oxidation)

Thus, the ratio between $Cr_2O_7^{2-}$ and C_2H_4O must be of 1:3 that to balance the equation.

$Cr_2O_7^{2-} + 6e^- + 14H^+ \rightarrow 2Cr^{3+} + 7H_2O$ (reduction)

$3C_2H_4O - 6e^- + 3H_2O \rightarrow 3C_2H_4O_2 + 6H^+$ (oxidation)

All substances from the half-reactions should be included in the equation:

$Cr_2O_7^{2-} + 3C_2H_4O + 3H_2O + 14H^+ \rightarrow 2Cr^{3+} + 3C_2H_4O_2 + 7H_2O + 6H^+$

The next step involves a subtraction of water and H^+ from the left and right part, respectively:

$Cr_2O_7^{2-} + 3C_2H_4O + 8H^+ \rightarrow 2Cr^{3+} + 3C_2H_4O_2 + 4H_2O$

As result the equation has been balanced.