Question 4

For the redox reaction, $MnO_4^- + C_2O_4^{2-} + H^+ \rightarrow Mn^{2+} + CO_2 + H_2O$ Correct stoichiometric coefficients of MnO_4^-, $C_2O_4^{2-}$ & H^+ are

Answer: (option 1) 2,5,16

1. Reduction half reaction: $MnO_4^- \rightarrow Mn_2^+$

2. Oxidation half reaction : $C_2O_4^{2-} \rightarrow CO_2$

3. Balance all atoms other than O and H.

$MnO_4^- \rightarrow Mn^{2+}$

$C_2O_4^{2-} \rightarrow 2CO_2$

4. Now balance the oxygen atoms by adding H_2O molecules.

$MnO_4^- \rightarrow Mn^{2+} + 4H_2O$

$C_2O_4^{2-} \rightarrow 2CO_2$

5. Now balance hydrogen atoms by adding H^+ ions.

$MnO_4^- + 8H^+ \rightarrow Mn^{2+} + 4H_2O$

$C_2O_4^{2-} \rightarrow 2CO_2$

6. To balance the charge, add electrons to a more positive side to equal the less positive side of the half-reaction.

$MnO_4^- + 8H^+ + 5e^- \rightarrow Mn^{2+} + 4H_2O$

$C_2O_4^{2-} \rightarrow 2CO_2 + 2e^-$

7. Now multiply oxidation half-reaction by 5 and reduction half-reaction by2, Add both the reactions we will get

$2MnO_4^- + 5C_2O_4^{2-} + 16H^+ \rightarrow 2Mn^{2+} + 10CO_2 + 8H_2O$