

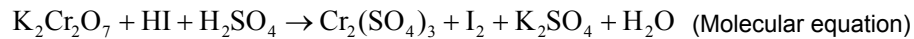
Acidic solution

- 1) Write the equation in ionic form.
- 2) Write the half-reactions for oxidation and for reduction.
- 3) Balance oxygen atoms adding H_2O molecules.
- 4) Balance hydrogen atoms adding H^+ ions.
- 5) Balance charge adding electrons e^- .
- 6) Multiply each half-reaction by a number that will equalize the number of electrons transferred.
- 7) Add the resulting half-reactions equations to obtain the balanced net ionic equation.
- 8) Add spectator ions to obtain the balanced net molecular equation.

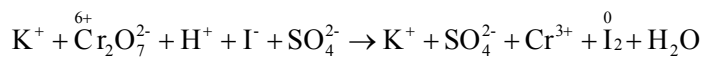
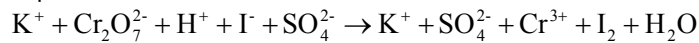
Basic solution

- 1) Write the equation in ionic form.
- 2) Write the half-reactions for oxidation and for reduction.
- 3) Balance oxygen atoms adding H_2O molecules.
- 4) Balance hydrogen atoms adding H^+ ions.
- 5) Eliminate H^+ ions adding OH^- ions to each side of the half-reaction to obtain H_2O molecules
- 6) Balance charge adding electrons e^-
- 7) Multiply each half-reaction by a number that will equalize the number of electrons transferred.
- 8) Add the resulting half-reactions equations to obtain the balanced net ionic equation.
- 9) Add spectator ions to obtain the balanced net molecular equation.

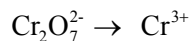
Example 1. Acidic solution



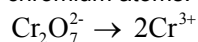
Write the equation in ionic form:



Half-reaction for dichromate reduction:



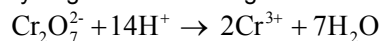
Balance chromium atoms:



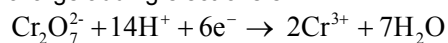
Balance oxygen atoms adding H₂O molecules:



Balance hydrogen atoms adding H⁺ ions:



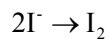
Balance charge adding electrons e⁻:



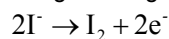
Half-reaction for iodide oxidation:



Balance iodine atoms:

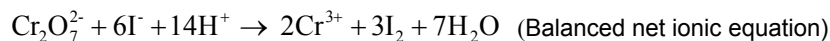
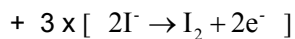
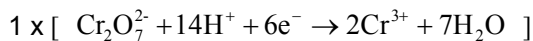


Balance charge adding electrons e⁻:

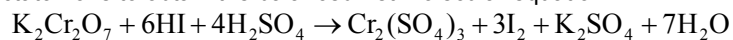


Multiply each half-reaction by a number that will equalize the number of electrons transferred.

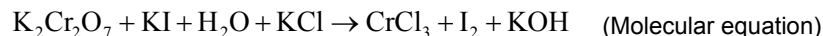
Add the resulting half-reactions equations to obtain the balanced net ionic equation:



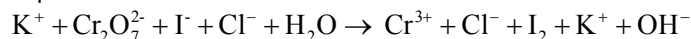
Add spectator ions to obtain the balanced net molecular equation:



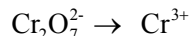
Example 2. Basic solution



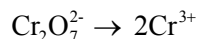
Write the equation in ionic form:



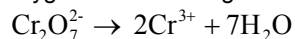
Half-reaction for dichromate reduction:



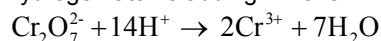
Balance chromium atoms:



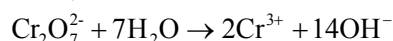
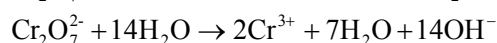
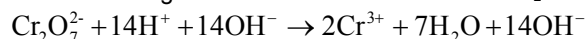
Balance oxygen atoms adding H_2O molecules:



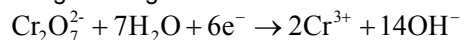
Balance hydrogen atoms adding H^+ ions:



Eliminate H^+ ions adding OH^- ions to each side to obtain H_2O molecules:



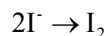
Balance charge adding electrons e^- :



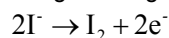
Half-reaction for iodide oxidation:



Balance iodine atoms:

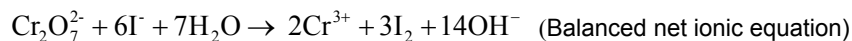
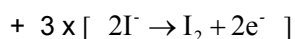
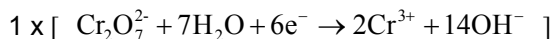


Balance charge adding electrons e^- :



Multiply each half-reaction by a number that will equalize the number of electrons transferred.

Add the resulting half-reactions equations to obtain the balanced net ionic equation:



Add spectator ions to obtain the balanced net molecular equation:

