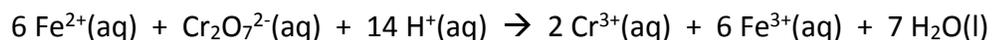


Balancing Redox Equations

- 1) $\text{Cr}(s) + \text{Sn}^{4+}(\text{aq}) \rightarrow \text{Cr}^{3+}(\text{aq}) + \text{Sn}^{2+}(\text{aq})$
- 2) $\text{Al}(s) + \text{H}^+(\text{aq}) \rightarrow \text{Al}^{3+}(\text{aq}) + \text{H}_2(\text{g})$
- 3) $\text{MnO}_4^-(\text{aq}) + \text{S}^{2-}(\text{aq}) + \text{H}^+(\text{aq}) \rightarrow \text{Mn}^{2+}(\text{aq}) + \text{S}(s) + \text{H}_2\text{O}(l)$
- 4) $\text{Cu}(s) + \text{SO}_4^{2-}(\text{aq}) + \text{H}^+(\text{aq}) \rightarrow \text{Cu}^{2+}(\text{aq}) + \text{SO}_2(\text{g}) + \text{H}_2\text{O}(l)$
- 5) $\text{Zn}(s) + \text{Ag}^+(\text{aq}) \rightarrow \text{Zn}^{2+}(\text{aq}) + \text{Ag}(s)$

Solution Stoichiometry

- 6) What volume of a 2.31 M iron(II) nitrate solution is needed to titrate 50.0 mL of a 0.200 M potassium dichromate solution?



- 7) 15.0 g of copper solid requires 50.0 mL of sodium nitrate solution to react completely. What is the molarity of the sodium nitrate solution?



- 8) What volume of a 0.100 M HCl solution is needed to neutralize 25.0 mL of 0.350 M NaOH?
- 9) 32.55 mL of 0.255 M HCl is needed to titrate 10.0 mL of NaOH. What is the concentration of the NaOH solution?
- 10) A 0.3518 g sample is composed of carbon tetrachloride, CCl_4 , and benzoic acid ($\text{HC}_7\text{H}_5\text{O}_2$). Benzoic acid is a monoprotic weak acid. The 0.3518 g sample was dissolved in water and the resulting solution was titrated with 0.1546 M NaOH. If the sample was neutralized with exactly 10.59 mL of the NaOH solution, then what is mass percent of $\text{HC}_7\text{H}_5\text{O}_2$ in the original sample?
- 11) Potassium hydrogen phthalate is a solid, monoprotic acid frequently used in the laboratory to standardize strong base solutions. It has the formula of $\text{KHC}_8\text{H}_4\text{O}_4$, which is often referred to as KHP. KHP has a molar mass of 204.22 g/mol. How many grams of KHP are needed to neutralize 24.0 mL of a 0.371 M NaOH solution?
- 12) What volume of a 0.293 M calcium hydroxide solution is needed to neutralize 5.12 g of KHP?

- 13) If 1.3009 g KHP are needed to exactly neutralize 41.20 mL of sodium hydroxide, what is the concentration of the sodium hydroxide solution?
- 14) What volume of a 0.328 M KOH solution is needed to titrate 12.5 mL of 0.501 M HNO₂ solution?
- 15) A 4.91 g sample of an aqueous solution of hydroiodic acid contains an unknown amount of the acid. If 14.2 mL of 1.35 M lithium hydroxide are required to neutralize the hydroiodic acid, what is the percent by weight of the hydroiodic acid mixture?

ANSWERS

- 6) 26.0 mL Fe(NO₃)₂
- 7) 3.15 M NaNO₃
- 8) 87.5 mL HCl
- 9) 0.830 M NaOH
- 10) 56.82%
- 11) 1.82 g KHP
- 12) 42.8 mL Ca(OH)₂
- 13) 0.1546 M NaOH
- 14) 19.1 mL KOH
- 15) 49.9%