

5 • Reactions in Aqueous Solution

Oxidation Numbers & RedOx

EVEN ANSWERS A-66

54. Determine the oxidation number of each element in the following ions or compounds:

- a) BrO_3^- d) CaH_2
 b) $\text{C}_2\text{O}_4^{2-}$ e) H_2SiO_4
 c) F_2 f) SO_4^{2-}

55. Determine the oxidation number of each element in the following ions or compounds:

- a) SF_6 *S = +6 F = -1* d) N_2O_4 *N = +4 O = -2*
 b) H_2AsO_4^- *H = +1 As = +6 O = -2* e) PCl_4^+ *P = +5 Cl = -1*
 c) UO_2^+ *U = +5 O = -2* f) XeO_4^{2-} *Xe = +6 O = -2*

56. Which of the following reactions is (are) oxidation-reduction reactions? Explain your answer briefly. classify the remaining reactions.

- a) $\text{Zn(s)} + 2 \text{NO}_3^-(\text{aq}) + 4 \text{H}^+(\text{aq}) \rightarrow \text{Zn}^{2+}(\text{aq}) + 2 \text{NO}_2(\text{g}) + 2 \text{H}_2\text{O(l)}$
 b) $\text{Zn(OH)}_2(\text{s}) + \text{H}_2\text{SO}_4(\text{aq}) \rightarrow \text{ZnSO}_4(\text{aq}) + 2 \text{H}_2\text{O(l)}$
 c) $\text{Ca(s)} + 2 \text{H}_2\text{O(l)} \rightarrow \text{Ca(OH)}_2(\text{s}) + \text{H}_2(\text{g})$

57. Which of the following reactions is (are) oxidation-reduction reactions? Explain your answer briefly. classify the remaining reactions.

- a) $\text{CdCl}_2(\text{aq}) + \text{Na}_2\text{S}(\text{aq}) \rightarrow \text{CdS(s)} + 2 \text{NaCl(aq)}$ *NOT REDOX... DOUBLE REPLACEMENT*
 b) $2 \text{Ca(s)} + \text{O}_2(\text{g}) \rightarrow 2 \text{CaO(s)}$ *REDOX Ca → Ca²⁺ + 2e⁻ / 1/2 O₂ → 2O²⁻*
 c) $\text{Ca(OH)}_2(\text{s}) + 2 \text{HCl(aq)} \rightarrow \text{CaCl}_2(\text{aq}) + 2 \text{H}_2\text{O(l)}$ *NOT REDOX... DOUBLE REPL.*

58. In each of the following reactions, decide which reactant is oxidized and which is reduced. Designate the oxidizing agent and reducing agent.

- a) $2 \text{Mg(s)} + \text{O}_2(\text{g}) \rightarrow 2 \text{MgO(s)}$
 b) $\text{C}_2\text{H}_4(\text{g}) + 3 \text{O}_2(\text{g}) \rightarrow 2 \text{CO}_2(\text{g}) + 2 \text{H}_2\text{O(g)}$
 c) $\text{Si(s)} + 2 \text{Cl}_2(\text{g}) \rightarrow \text{SiCl}_4(\text{l})$

59. In each of the following reactions, decide which reactant is oxidized and which is reduced. Designate the oxidizing agent and reducing agent.

- a) $\text{Ca(s)} + 2 \text{HCl(aq)} \rightarrow \text{CaCl}_2(\text{aq}) + \text{H}_2(\text{g})$
 b) $\text{Cr}_2\text{O}_7^{2-}(\text{aq}) + 3 \text{Sn}^{2+}(\text{aq}) + 14 \text{H}^+(\text{aq}) \rightarrow 2 \text{Cr}^{3+}(\text{aq}) + 3 \text{Sn}^{4+}(\text{aq}) + 7 \text{H}_2\text{O(l)}$
 c) $\text{FeS(s)} + 3 \text{NO}_3^-(\text{aq}) + 4 \text{H}^+(\text{aq}) \rightarrow 3 \text{NO(g)} + \text{SO}_4^{2-}(\text{aq}) + \text{Fe}^{3+}(\text{aq}) + 2 \text{H}_2\text{O(l)}$

