

Worksheet 14.1: Solutions

Oxidation numbers and redox equations

No.	Answer
1	Examples: a NF ₃ b N ₂ O ₅ c N ₂ d NH ₃
2	a +6 b +6 c +4 d -1
3	a Not redox b Oxidant = I ₂ O ₅ , reductant = CO c Not redox d Oxidant = Hg ²⁺ , reductant = N ₂ H ₄ e Oxidant = NO ₃ ⁻ , reductant = H ₂ S f Oxidant = NO ₂ , reductant = NO ₂
4	a +5 b +2 c +7
5	C = 0 H = +1 O = -2
6	a Oxidation: CH ₃ CH ₂ OH(aq) + H ₂ O(l) → CH ₃ COOH(aq) + 4H ⁺ (aq) + 4e ⁻ Reduction: Cr ₂ O ₇ ²⁻ (aq) + 14H ⁺ (aq) + 6e ⁻ → 2Cr ³⁺ (aq) + 7H ₂ O(l) Redox: 3CH ₃ CH ₂ OH(aq) + 2Cr ₂ O ₇ ²⁻ (aq) + 16H ⁺ (aq) → 3CH ₃ COOH(aq) + 4Cr ³⁺ (aq) + 11H ₂ O(l) b Oxidation: 2I ⁻ (aq) → I ₂ (aq) + 2e ⁻ Reduction: BrO ₃ ⁻ (aq) + 6H ⁺ (aq) + 6e ⁻ → Br ⁻ (aq) + 3H ₂ O(l) Redox: 6I ⁻ (aq) + BrO ₃ ⁻ (aq) + 6H ⁺ (aq) → 3I ₂ (aq) + Br ⁻ (aq) + 3H ₂ O(l) c Oxidation: Fe ²⁺ (aq) → Fe ³⁺ (aq) + e ⁻ Reduction: MnO ₄ ⁻ (aq) + 8H ⁺ (aq) + 5e ⁻ → Mn ²⁺ (aq) + 4H ₂ O(l) Redox: 5Fe ²⁺ (aq) + MnO ₄ ⁻ (aq) + 8H ⁺ (aq) → 5Fe ³⁺ (aq) + Mn ²⁺ (aq) + 4H ₂ O(l) d Oxidation: H ₂ O ₂ (aq) → O ₂ (g) + 2H ⁺ (aq) + 2e ⁻ Reduction: MnO ₄ ⁻ (aq) + 8H ⁺ (aq) + 5e ⁻ → Mn ²⁺ (aq) + 4H ₂ O(l) Redox: 5H ₂ O ₂ (aq) + 2MnO ₄ ⁻ (aq) + 6H ⁺ (aq) → 5O ₂ (g) + 2Mn ²⁺ (aq) + 8H ₂ O(l) e Oxidation: H ₂ S(g) → S(s) + 2H ⁺ (aq) + 2e ⁻ Reduction: Cr ₂ O ₇ ²⁻ (aq) + 14H ⁺ (aq) + 6e ⁻ → 2Cr ³⁺ (aq) + 7H ₂ O(l) Redox: 3H ₂ S(g) + Cr ₂ O ₇ ²⁻ (aq) + 8H ⁺ (aq) → 3S(s) + 2Cr ³⁺ (aq) + 7H ₂ O(l)