**Dougherty Valley HS AP Chemistry**

**WORKSHEET #1**

**Electrochemistry – Oxidation and Reduction**

**Name: Date: Period: Seat #:**

Show all work

**Assigning oxidation numbers**:

Determine the oxidation number of the underlined element.

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| 1. | BeCl2 | 2. | NO | 3. | Na2SO3 | 4. | H2O2 |
| 5. | AgBr | 6. | AuCl3 | 7. | HNO3 | 8. | H2SnO3 |
| 9. | SO3 | 10. | UF6 | 11. | BaCrO4 | 12. | CaSeO4 |
| 13. | HI | 14. | H2Se | 15. | K2PtCl6 | 16. | NiSO4 |
| 17. | NH3 | 18. | HClO | 19. | NH4Cl | 20. | (NH4)2Te |

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| 1. |  | 2. |  | 3. |  | 4. |  |
| 5. |  | 6. |  | 7. |  | 8. |  |
| 9. |  | 10. |  | 11. |  | 12. |  |
| 13. |  | 14. |  | 15. |  | 16. |  |
| 17. |  | 18. |  | 19. |  | 20. |  |

**The Half-Reaction Method**:

1. Write the equation as two half-reactions. Include the particles (atoms, ions, molecules) that are involved in change of oxidation state.

2. Balance each half-reaction with respect to atoms and charges; first atoms other than H and O, then O with H2O and H with H+, and ionic charges with electrons (e−).

3. Equalize the number of electrons lost in the oxidation half-reaction with the number of electrons gained in the reduction half-reaction.

4. Add the two half-reactions to form a balanced net ionic equation.

|  |  |
| --- | --- |
| [a]  HCl + K2Cr2O7 → KCl + CrCl3 + Cl2  14, 1, 2, 2, 3, 7H2O | |
| Reduction half-reaction | Oxidation half-reaction |
|  |  |
| Overall: | |

|  |  |
| --- | --- |
| [b]  FeCl2 + KMnO4 + HCl → FeCl3 + KCl + MnCl2 + H2O  5, 1, 8, 5, 1, 1, 4H2O | |
| Reduction half-reaction | Oxidation half-reaction |
|  |  |
| Overall: | |

|  |  |
| --- | --- |
| [c]  CuS + NO3− → Cu2+ + S + NO  3, 2, 8H+, 3, 3, 2, 4H2O | |
| Reduction half-reaction | Oxidation half-reaction |
|  |  |
| Overall: | |

**Balance the following redox reactions in acidic solutions**:

|  |
| --- |
| [d] HNO3 + S → NO2 + H2SO4 + H2O |
| [e] KMnO4 + HCl + H2S → KCl + MnCl2 + S |
| [f] FeCl3 + H2S → FeCl2 + HCl + S |
| [g] Cu + HNO3 → Cu(NO3)2 + NO2 |