Chemistry 12

“Electrochemistry” Worksheet - Oxidation Numbers

1. For each of the following determine the oxidation number of the atom in **bold** type:
2. **S**8 e) K**Mn**O4 i) **Al**(OH)4- m) **N**2H5+
3. **N**O2- f) **N**3- j) **S**2F10 n) Li2**O**2
4. **Cr**O42- g) **C**2H6 k) **N**2O3 o) H**C**O3-
5. **Cr**2O72- h) KH**S**O3 l) Na2**Mn**O4 p) K2**U**O4
6. For each of the following unbalanced equations, assign oxidation numbers to the **bold** species and then determine which species undergoes oxidation in each reaction.
7. **Cl**O2 + **C** → **Cl**O2- + **C**O32-
8. **Sn**2+ + Cl- + **Br**O3- → **Sn**Cl62- + **Br**-
9. **Mn**O4- + **C**2O42- → **Mn**O2 + **C**O2
10. **N**O3- + H2**Te** → **N**O + **Te**O42-
11. Which of the following are redox reactions ?
12. I2 + 5HOBr + H2O → 2IO3- + 5Br- + 7H+
13. 4Ag+ + Cr2O72- + H2O → 2Ag2CrO4 + 2H+
14. KHCO3 + HI → KI + CO2 + H2O
15. 2H2O → 2H2 + O2
16. H2SO4 + BaCl2 → BaSO4 + 2HCl
17. Fe + H2SO4 → FeSO4 + H2
18. In the each following reactions, indicate which are the oxidizing agents and reducing agents:
19. 2Na(s) + O2(g) → Na2O(s)
20. Fe(s) + Cu2+(aq) → Fe2+(aq) + Cu(s)
21. Sn4+(aq) + Fe2+(aq) → Sn2+ (aq) + Fe3+(aq)

1. When cesium metal is exposed to chlorine gas, a bright flash (say cheese) occurs as the elements react. The product, cesium chloride, is a white solid composed of cesium ions and chloride ions.
2. Write the balanced overall reaction which occurs between chlorine and cesium
3. Write the half-reactions which occur and identify which half-reaction is the reduction and which is the oxidation
4. Identify the reducing and oxidizing agents

**The Answers**

1. a) 0 b) +3 c) +6 d) +6 e) +7 f) -1/3 g) -3 h) +4 i) +3 j) +5
2. +3 l) +6 m) -2 n) -1 o) +4 p) +6
3. a) +4, 0, +3, +4 ; C is oxidized
4. +2, +5, +4, -1 ; Sn is oxidized
5. +7, +3, +4, +4; C is oxidized
6. +5, -2, +2, +6; Te is oxidzed
7. Equations a, d, and f
8. a) Na = oxidizing agent; O2 = reducing agent
9. Cu2+ = oxidizing agent; Fe = reducing agent
10. Sn4+ = oxidizing agent; Fe2+ = reducing agent
11. a) 2Cs + Cl2 → 2CsCl
12. Cs → Cs+ + e- (oxidation) Cl2 + 2e- → 2Cl- (reduction)
13. Cs = reducing agent; Cl2 = oxidizing agent