For 1 – 5:
a. 0
b. -1
c. +1
d. -2
e. +2

1. The oxidation number of Na in NaCl

2. The oxidation number of Cl in Cl_2

3. The oxidation number of S in Na_2S

4. The charge of calcium in $CaCl_2$

5. The charge of chlorine in KCl

For 6 – 8:
a. Zn(s)
b. $Cu^{2+}(aq)$
c. $Zn^{2+}(aq)$
d. Cu(s)
e. H_2O

6. Acts as the anode

7. Acts as the cathode

8. Is reduced

For 9 – 13:
a. group IA
b. group IIA
c. group IIIA
d. group VIA
e. group VIIA

9. _____$_3(PO_4)_2$

10. _____$_2O_2$ (oxidation state of oxygen is -1)

11. Cu_____$_2$

12. Good reducing agents

13. Group represented by the Lewis dot structure below

For 14 – 15:
a. 1
b. 2
c. 3
d. 4
e. 5

14. When the following equation $HMnO_4 + H_2SO_3 \rightarrow MnSO_4 + H_2O + H_2SO_4$ is balanced, the coefficient, in the lowest whole number, of H_2SO_3 is

15. When the following equation $Br_2 + SO_2 + H_2O \rightarrow H_2SO_4 + HBr$ is balanced, the coefficient, in the lowest whole number, of HBr is

Q	Statement I	Because	Statement II
16.	Cu^{2+} ion needs to be oxidized to form Cu metal	Because	Oxidation is the gain of electrons
17.	The anions migrate to the cathode in an electrochemical reaction	Because	Positively charged ions are attracted to the negatively charged electrode
18.	The alkali metals are strong oxidizing agents	Because	The one electron in their valence shell is easily lost
19.	The standard reduction potential for $Ag^+ + e^- \rightarrow Ag$ is half that of $2Ag^+ + 2e^- \rightarrow 2Ag$	Because	Standard potential is dependent on the number of electrons transferred
20.	Chloride ions, Cl^-, can be oxidized to produce chlorine gas	Because	Two chloride ions gives up an electron to form Cl_2
21.	The oxidation state of Cr in $Al_2(Cr_2O_7)_3$ is +3	Because	As a neutral compound, the sum of the oxidation numbers of all the atoms must equal zero
22.	The electrolysis of potassium iodide, KI, produces electrical energy	Because	Electrolytic cells convert chemical energy into electrical energy
23.	An ionic solid is a good conductor of electricity	Because	An ionic solid is composed of positive and negative ions joined together by electrostatic forces
24.	Elemental sodium is a good reducing agent	Because	An atom of elemental sodium gives up its valence electron readily

25. What's the potential of the reaction below given the half-reaction potentials:
$2Fe^{2+} + Cl_2 \rightarrow 2Fe^{3+} + 2Cl^-$
$Fe^{3+} + e^- \rightarrow Fe^{2+}$; E = 0.77 V
$Cl_2 + 2e^- \rightarrow 2Cl^-$; E = 1.36 V
a. 0.18 V
b. 0.59 V
c. 1.05 V
d. 2.13 V
e. 2.90 V

26. For $Cu(s) + NO_3^-(aq) + H^+(aq) \rightarrow Cu^{2+}(aq) + NO_2(g) + H_2O(l)$, when the equation is balanced what is the coefficient of H^+?
a. 1
b. 2
c. 3
d. 4
e. 5

27. For $Cu(s) + NO_3^-(aq) + H^+(aq) \rightarrow Cu^{2+}(aq) + NO_2(g) + H_2O(l)$, which of the following takes place?
a. Cu(s) is oxidized
b. $H^+(aq)$ is oxidized
c. Cu(s) is reduced
d. $H^+(aq)$ is reduced
e. NO_3^- is oxidized

28. The standard reduction potential of $Cu^{2+}(aq)$ is +0.34 V. What is the oxidation potential of Cu(s)?
a. +0.68 V
b. +0.34 V
c. -0.34 V
d. -0.68 V

29. If the following reactions are used to make a galvanic cell, which species will be reduced and which species will be oxidized?
$F_2 + 2e^- \rightarrow 2F^-(aq)$; E = +2.87 V
$Ca^+ + 2e^- \rightarrow Ca(s)$; E = -2.76 V
a. F^- will be oxidized and Ca^{2+} will be reduced
b. Ca^{2+} will be oxidized and F_2 will be reduced
c. Ca(s) will be oxidized and F_2 will be reduced
d. F_2 will be oxidized and Ca(s) will be reduced

30. What is the oxidation number of Mn in $KMnO_4$?
a. -7
b. -3
c. 0
d. +3
e. +7

31. Which of the following is true of an electrolytic cell?
a. An electric current causes an otherwise non-spontaneous chemical reaction to occur.
b. Reduction occurs at the anode
c. A spontaneous electrochemical reaction produces an electric current
d. The electrode to which the electrons flow is where oxidation occurs
e. None of the above

32. What is the sum of the coefficients of the products for the following reaction?
$K_2Cr_2O_7 + HCl \rightarrow KCl + CrCl_3 + H_2O + Cl_2$
a. 10
b. 12
c. 13
d. 14
e. 15

33. The oxidation number of sulfur in $NaHSO_4$?
a. 0
b. +2
c. -2
d. +4
e. +6

34. How many moles of electrons are required to reduce 103.6 g of lead from Pb^{2+} to the metal?
a. 0.5 mole
b. 1 mole
c. 2 moles
d. 4 moles
e. 8 moles

35. The order of decreasing strength as reducing agents is:
a. Na, Mg, Fe, Ag, Cu
b. Mg, Na, Fe, Cu, Ag
c. Ag, Cu, Fe, Mg, Na
d. Na, Fe, Mg, Cu, Ag
e. Na, Mg, Fe, Cu, Ag

36. Electrolysis of a dilute solution of aqueous sodium chloride results in the cathode product
a. Sodium
b. Hydrogen
c. Chlorine
d. Oxygen
e. peroxide

37. For the following reactions:
$Zn \rightarrow Zn^{2+} + 2e^-$; E = +0.76 V
$Au \rightarrow Au^{3+} + 3e^-$; E= -1.42 V
If gold foil is placed in a solution containing Zn^{2+}, the reaction potential would be:
a. -1.34 V
b. -2.18 V
c. -0.66 V
d. +2.18 V
e. +1.34 V

38. In the electrolysis of molten copper chloride, the substance liberated at the anode is
a. Copper
b. Chlorine
c. Hydrogen
d. Copper chloride
e. None of the above

ANSWERS:

1. C
2. A
3. D
4. E
5. B
6. A
7. D
8. B
9. B
10. A
11. E
12. A
13. C
14. E
15. B
16. F F
17. F T
18. F T
19. F F
20. T T CE
21. F T
22. F T
23. F T
24. T T CE
25. B
26. D
27. A
28. C
29. C
30. E
31. A
32. D
33. E
34. B
35. E
36. B
37. B
38. B