**Define the following terms:**

1. Precipitate –

2. Spectator ion -

3. Balanced Chemical Equation -

4. Total Ionic Equation -

5. Net Ionic Equation -

6. Coefficients -

7. Oxidation -

8. Reduction -

9. Redox Reaction -

10. Reduction Potential -

11. Electrochemical Cell -

12. Salt Bridge -

13. Wire -

14. Battery -

15. Electrical Potential -

16. Half-cell -

17. Cathode -

18. Anode -

**Define the following reactions and give their general formula (the first one is done for you)**

19. Synthesis – *when 2 or more elements/compounds become a single compound A + X 🡪 AX*

20. Decomposition

21. Single Replacement

22. Double Replacement

23. Combustion

24. How can you tell whether or not a single replacement reaction will occur?

25. What are the standard conditions for an electrochemical cell?

26. In a redox reaction when one substance is reduced, another substance must be \_\_\_\_\_\_\_\_\_\_\_\_\_\_

27. Redox reactions involve which of the following; ions, molecules or neutral atoms?

28. Write the following redox reaction in cell notation. H2(g) + Zn2+ 🡪 2H+ + Zn(s)

29. Write the balanced equation for when a solution of potassium hydroxide reacts with carbonic acid.

Molecular Equation =\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

Total Ionic = \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

Net Ionic = \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

30. Write the oxidation numbers of every element in the equation. Identify what is oxidized and what is reduced.

Zn(s) + FeSO4(aq) 🡪 ZnSO4(aq) + Cu(s)

31. Will the previous reaction occur as written, why or why not?

32. Write the balanced spontaneous chemical equation from these half-reactions. Calculate the cell potential. Show all work.

 Cs+ + 1e- 🡪 Cs

 Cr2+ + 2e- 🡪 Cr

33. Label the following voltaic cell with the terms, anode, cathode, salt bridge, wire. Identify what is being oxidized and what is being reduced. Also indicate which direction electrons are flowing. Write the balanced reaction and the cell notation. Calculate the electrical potential of the cell.

**Define the following terms:**

1. Precipitate – a solid formed from a solution (usually from a double replacement reaction)

2. Spectator ion – an ion present in solution, but not actually involved in a reaction

3. Balanced Chemical Equation – an expression showing how chemicals change from one form to another with correct coefficients.

4. Total Ionic Equation – same as above, but aqueous compounds are broken up into their ions

5. Net Ionic Equation – same as above, except all spectator ions are removed

6. Coefficients – numbers placed in front of chemical formulas to balance equations

7. Oxidation – loss of electrons, increase in charge

8. Reduction – gain of electrons, reduction of charge

9. Redox Reaction – reaction where one substance is oxidized while another is reduced. Electrons are **transferred**

10. Reduction Potential – the tendency of atoms to gain electrons

11. Electrochemical Cell – uses redox reactions to generate electricity

12. Salt Bridge – allows for charge neutrality by adding negative ions or positive ions

13. Wire – connects the cathode to the anode, allows electrons to flow

14. Battery – makes use of one or more voltaic cell to produce electricity

15. Electrical Potential – a measure of the amount of voltage that can be generated from an electrochemical cell to do work

16. Half-cell – one of the two parts of an electrochemical cell where oxidation or reduction occurs

17. Cathode – an electrode where reduction occurs

18. Anode - an electrode where oxidation occurs

**Define the following reactions and give their general formula (the first one is done for you)**

19. Synthesis – *when 2 or more elements/compounds become a single compound A + X 🡪 AX*

20. Decomposition – when one compounds becomes two or more compounds AX 🡪 A + X

21. Single Replacement – one element replaces another in a compound A + BX 🡪 AX + B

22. Double Replacement – elements switch partners AY + BX 🡪 AX + BY

23. Combustion – reacting any substance with oxygen. Hydrocarbons produce CO2 + H2O

24. How can you tell whether or not a single replacement reaction will occur?

 Check the reactivity chart, the element attempting the replacement must be more reactive

25. What are the standard conditions for an electrochemical cell?

 1 M ion concentration, 25oC, and 1 atm of pressure

26. In a redox reaction when one substance is reduced, another substance must be \_\_Oxidized\_\_

27. Redox reactions involve which of the following; ions, molecules or neutral atoms? **All three!**

28. Write the following redox reaction in cell notation. H2(g) + Zn2+ 🡪 2H+ + Zn(s)

 H2 **|** H+ **||** Zn2+ **|** Zn(s)

29. Write the balanced equation for when a solution of potassium hydroxide reacts with carbonic acid.

Molecular Equation =\_\_\_\_\_\_\_\_\_\_\_2KOH(aq) + H2CO3(aq) 🡪 K2CO3(aq) + 2H2O(l)\_\_\_\_\_\_\_\_\_\_\_\_\_

Total Ionic = \_\_\_\_\_2K+ + 2OH- + 2H++ CO32- 🡪 2K+ + CO32- + 2H2O(l)\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

Net Ionic = \_\_\_\_\_\_\_\_\_2OH- + 2H+ 🡪 2H2O(l)\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

30. Write the oxidation numbers of every element in the equation. Identify what is oxidized and what is reduced.

Zn(s) + FeSO4(aq) 🡪 ZnSO4(aq) + Cu(s)

0 +2 +6 -2 +2 +6 -2 0 Zn = oxidized, Cu = reduced

31. Will the previous reaction occur as written, why or why not? Yes, zinc is more reactive than iron

32. Write the balanced spontaneous chemical equation from these half-reactions. Calculate the cell potential. Show all work.

 Cs+ + 1e- 🡪 Cs *E°red* = -3.026 V ox *E°cell* = *E°red* - *E°ox* =

 Cr2+ + 2e- 🡪 Cr *E°red* = -0.913V red -0.913 V – (-3.026 V) = **2.113 V**

 **Cr2+ + 2Cs → Cr + 2Cs+ its cell potential is 2.113 V**

33. Label the following voltaic cell with the terms, anode, cathode, salt bridge, wire. Identify what is being oxidized and what is being reduced. Also indicate which direction electrons are flowing. Write the balanced reaction and the cell notation. Calculate the electrical potential of the cell.

e- flow →

Wire

Mg2+ + 2e- → Mg E°red = -2.372V (ox)

Pt2+ + 2e- → Pt E°red = 1.180 V (red)

**Mg + Pt2+ → Mg2+ + Pt**

**Mg|Mg2+||Pt2+|Pt**

E°cell = E°red - E°ox = 1.180 V - -2.372 V = **3.552 V**

Salt bridge

Oxidized

Anode

Reduced

Cathode