REDOX class notes

Redox is the part of chemistry that explains the chemistry behind

1. _____ 2. _____

3. _____

4. The reactions are always _____ (one is RED and one is OX)
5. In the old days, Oxidation meant _____

   and Reduction meant: _____

6. Now we understand that Oxidation means _____

   and Reduction means: _____

7. To remember this we will say OUT LOUD: _____ goes _____
8. Magnesium and sulfur make magnesium sulfide. Write the balanced chemical equation below

   _____ → _____

9. What do those little circles mean that you drew next the reactants above? _____

10. The product, magnesium sulfide is neutral, but what are the ion charges that SUM to zero? _____

11. In this reaction 2 different things happened:

    A. _____

    B. _____

12. Redox is _____

    _____

    _____

14. _____

15. Neutral atoms form a neutral ionic compounds, but the _____ numbers change.

16. Word equation: Silver nitrate and copper metal yields _____

17. Balanced chemical equation silver nitrate solution and copper yields copper (I) nitrate and silver metal.

_____

18. Add in the oxidation numbers (ionic charges) for the reaction above.

19. The Silver Ions _____ electrons, the Ag^{+1} are _____

20. The Copper atoms _____ electrons, the Cu° are _____

21. The nitrate ions are still swimming around in the beaker. They are the _____ ions.

22. $Li_{(S)} + NaCl_{(AQ)} \rightarrow LiCl_{(AQ)} + Na_{(S)}$ is a single replacement/redox reaction. Write the 2 half reactions

½OX: _____

½OX: _____

NET: _____

23. _____

_____. The spectator ion is _____

24. $Mg_{(S)} + 2HCl_{(AQ)} \rightarrow MgCl_{2(AQ)} + H_{2(G)}$ is a SR/ redox reaction. Write it below as 2 half reactions

½OX: _____

½OX: _____

NET: _____

25. Here, the Mg atoms are oxidized into _____. The H^{+1} cations are reduced to _____

26. In this case, ____ electrons are oxidized, so ____ electrons must be reduced. The electron transfer MUST be in balance!

27. Write the balanced chemical reaction for this word equation:
Sodium atoms + chlorine molecules synthesize into table salt

_____

is a synthesis/redox reaction. Write it below as 2 half reactions

½OX: _____

½OX: _____

NET: _____

---

28. Oxidation numbers for ions are easy; they are just the _____

29. The oxidation number for the sodium cation is _____, For the chloride anion it is _____,

for the sulfate anion (table E), it's _____, for magnesium cation it is _____.

30. For all atoms (+ the HONClBrIF twins) the oxidation number is _____, because they have no charge.

31. Inside molecules, like carbon dioxide (no ions) there are still oxidation numbers.
What are the individual oxidation numbers for all of these species? (they better sum to zero!)

CO_2 _____ CO _____

$CaCl_2$ _____ NO_2 _____

PCl_3 _____ PCl_5 _____

H_2SO_4 _____ $Cr_2O_7^{-2}$ _____ (special)

$NbBr_5$ _____

32. Write a balanced chemical equation for:
Silver nitrate solution + copper forms copper (II) nitrate solution and silver

_____

33. What species is oxidized? _____ 34. What species is reduced? _____

35. Name the spectator ion_____

36. Write it below as 2 half reactions, plus the NET IONIC EQUATION

½OX: _____

½OX: _____

NET: _____

37. _____

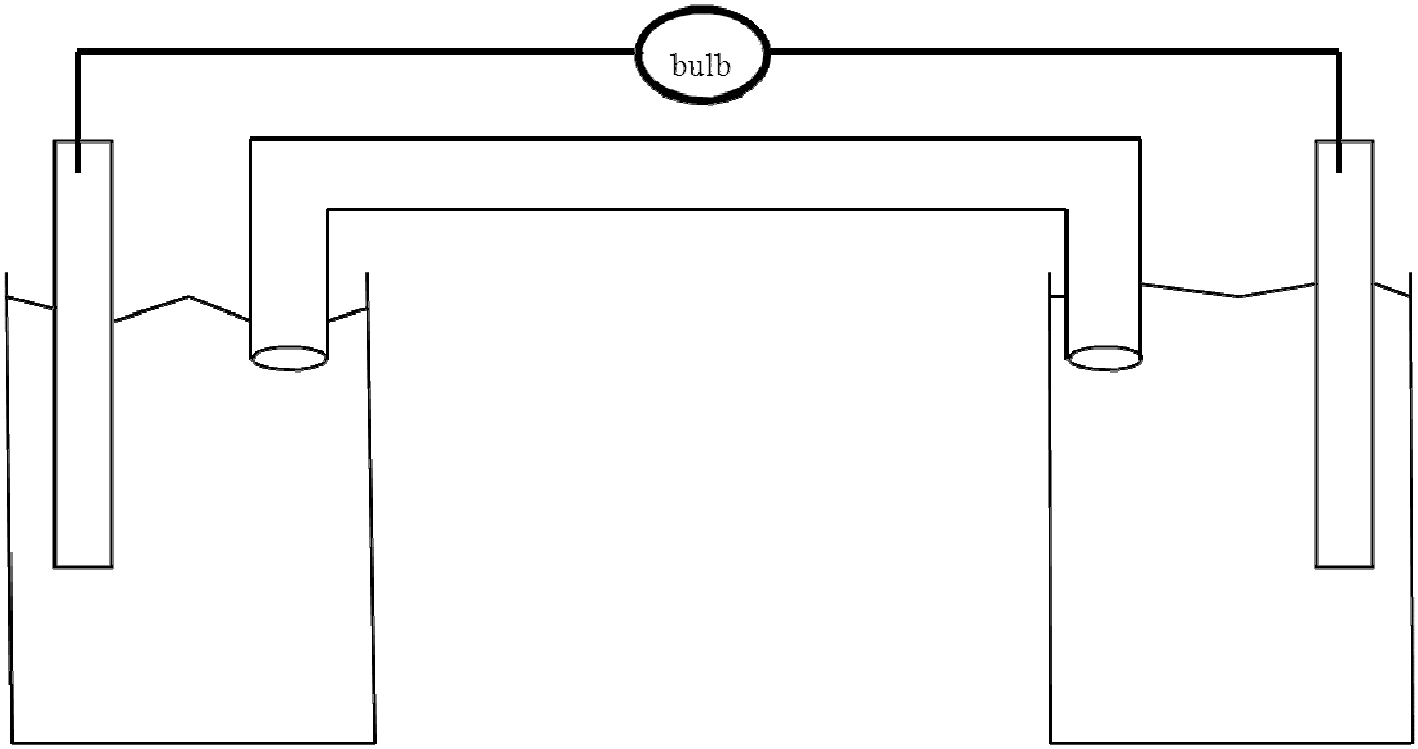
38. _____

_____

On the next page we will "take a battery apart, and slowly show you what is going on, how it works, etc. It's going to be complicated at first, really complicated. Pay attention now. Do things in order, don't doze off.

We're going to label this now. It shows two beakers of solution, with a piece of metal in each one, connected by a wire. There's also a glass tube with a solution in it, and cotton balls (not drawn) connecting the two solutions. At top is a bulb, which would light up if electricity goes through the wire.

TAKE OUT TABLE J, for Janet, please.



½OX: _____

½RED: _____

NET: _____

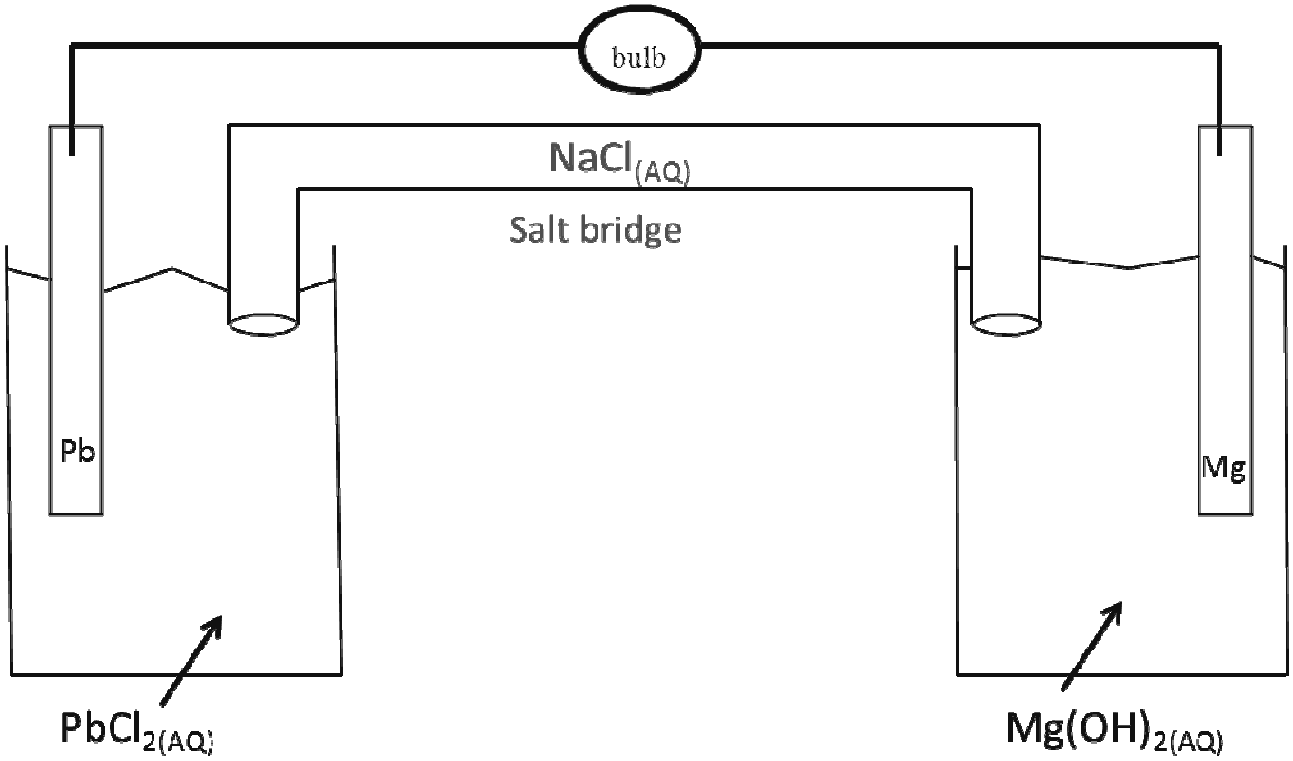
40. How do we decide which of the metals here will oxidize using table J?

41. Oxidation releases electrons, creating cations that jump into solution. Cations are positively charged. These cations jump into a neutral solution, making the solution become _____ charged.

42. This solution, now positively charged, will attract ions from the salt bridge, which will neutralize the solution. A positive solution attracts _____ ions.

43. In the opposite beaker, where cations are forming into atoms on the cathode, the neutral solution is losing the positive cations, making that solution become negatively charged. This negative solution will attract the _____ salt ions to neutralize the solution.

46



½OX:

½RED:

NET:

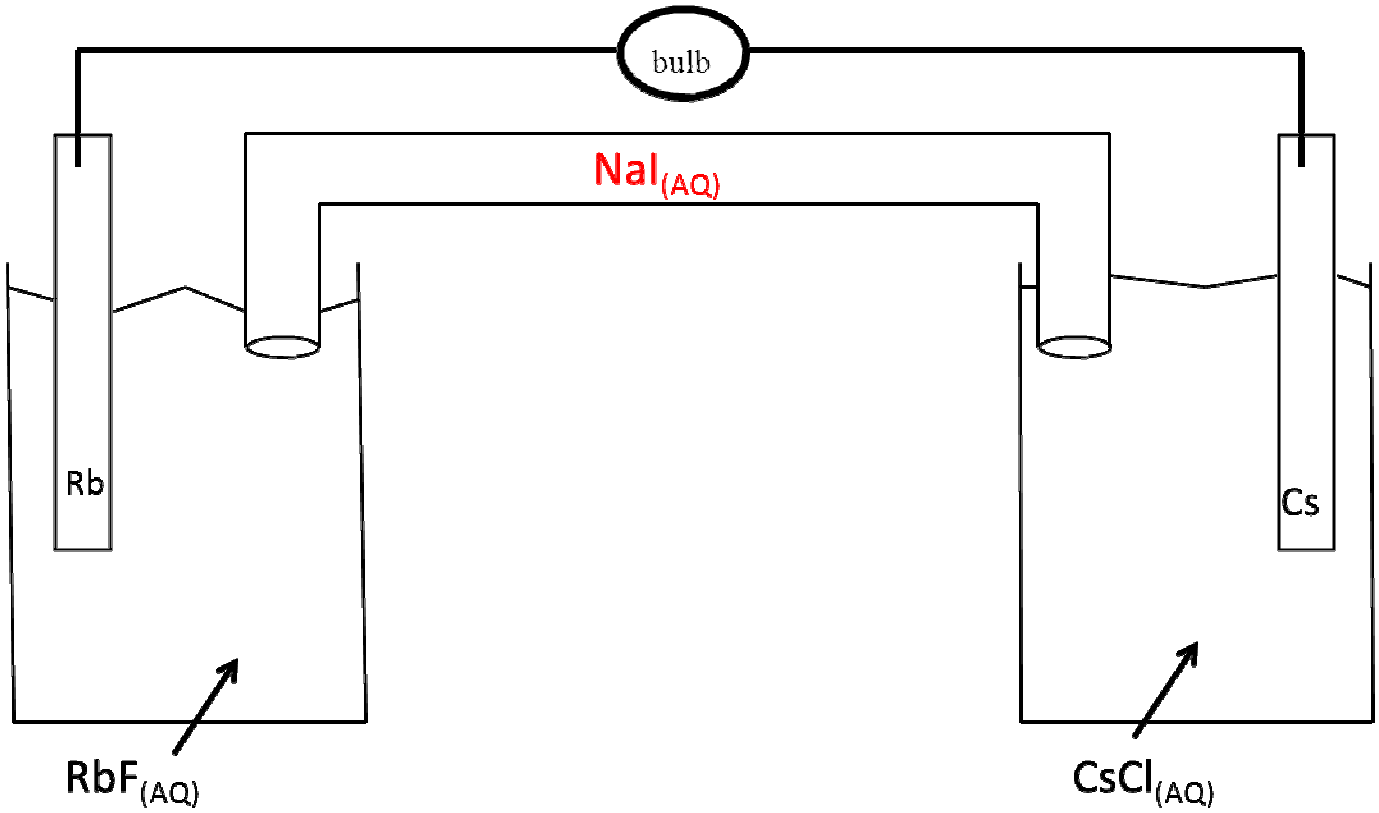
47. What are the 3 reasons that EVERY SINGLE battery dies, including this one?

A.

B.

C.

48. Completely Label this voltaic cell

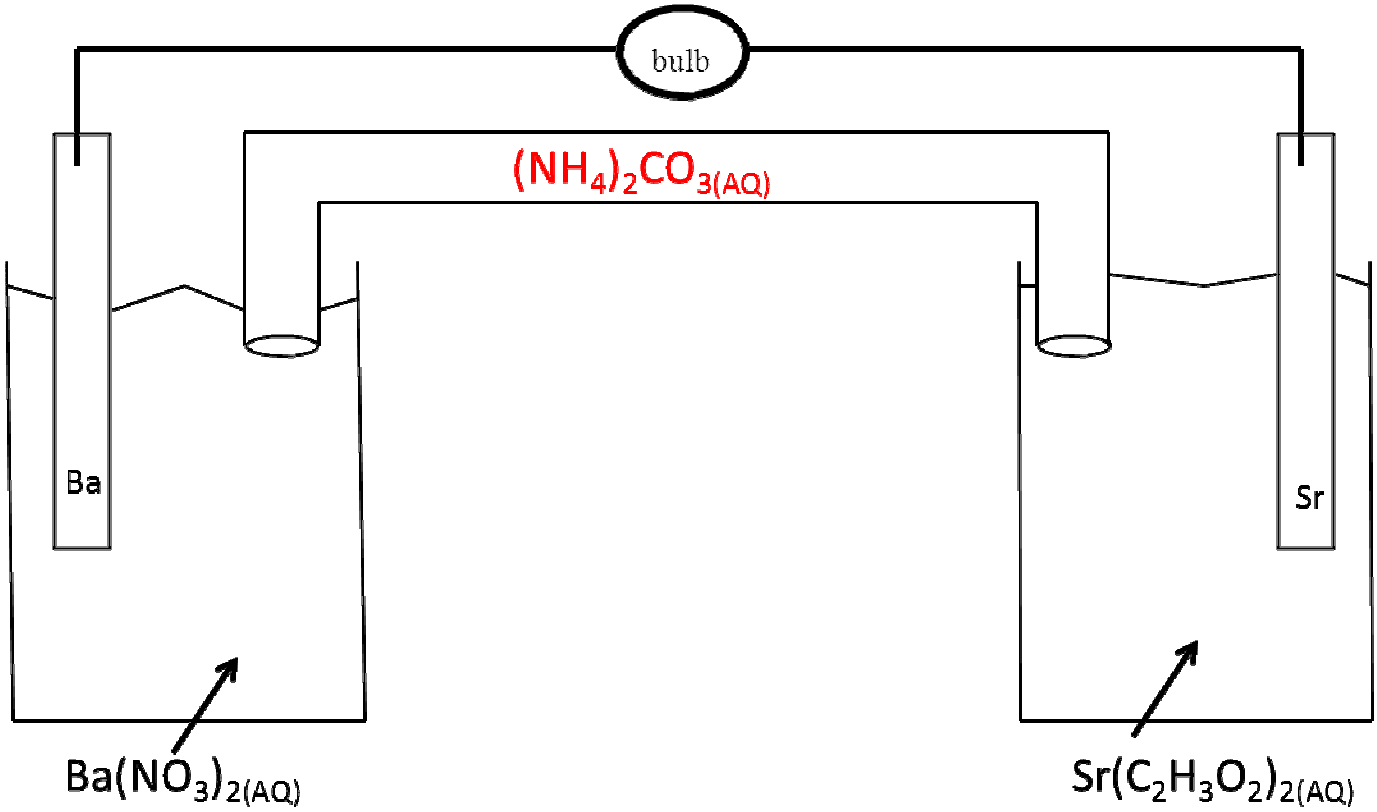


½ Oxidation: _____

½ Reduction: _____

Net Ionic Equation: _____

50. State the 3 specific reasons that **THIS voltaic cell** will die.

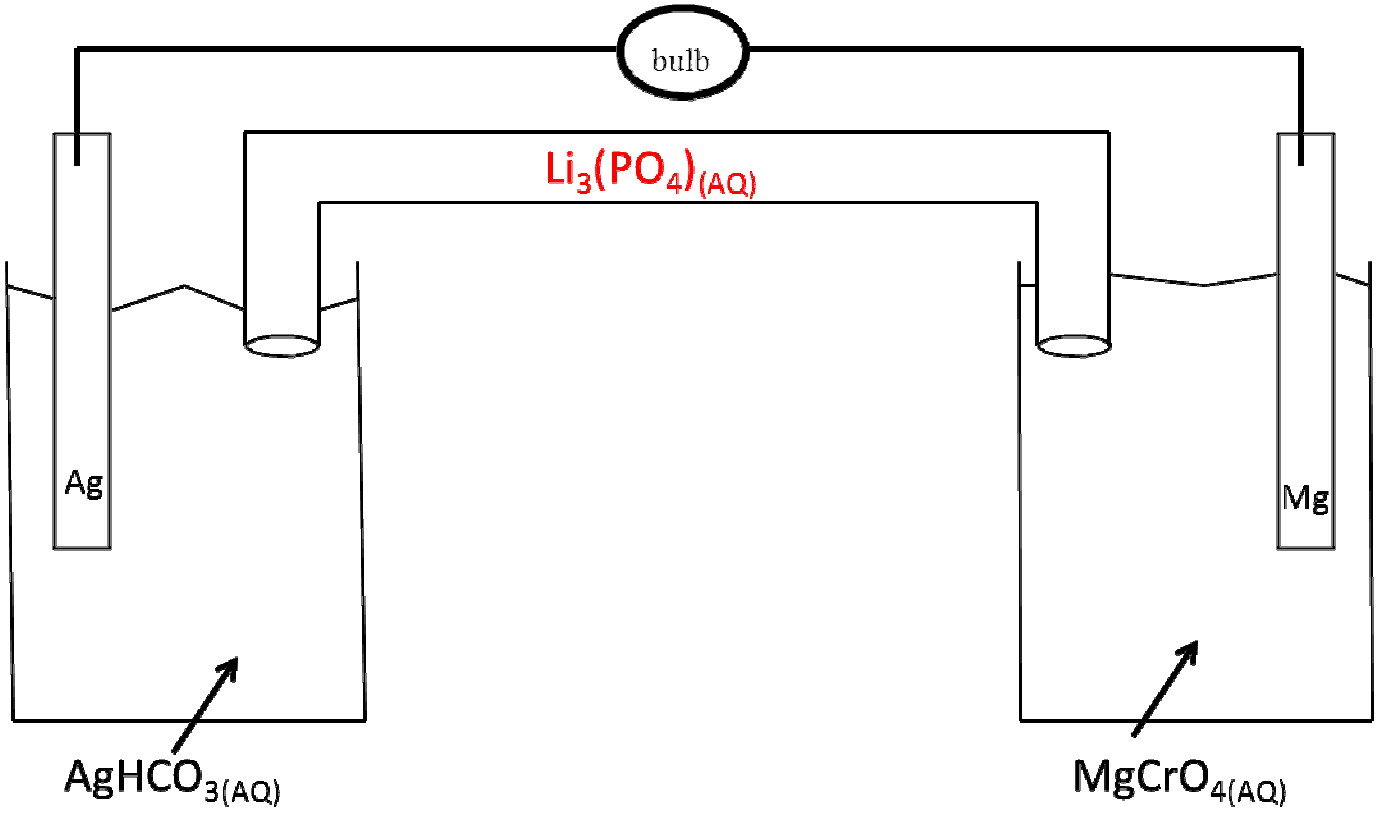


½ Oxidation: _____

½ Reduction: _____

Net Ionic Equation: _____

53. State the 3 specific reasons that <u>THIS voltaic cell</u> will die.



54. Write both half reactions, then the net ionic equation.

½ Oxidation: _____

½ Reduction: _____

Net Ionic Equation: _____

55. State the 3 specific reasons that <u>THIS voltaic cell</u> will die. Run out of

56. There are two kinds of ELECTROCHEMICAL CELLS, the one we know, Voltaic cells, and a new one called the _____ Cell.

57. Voltaic cells have chemistry spontaneously creating electricity. An electrolytic cell REQUIRES

_____ to force a chemical reaction.

58. There are 2 kinds of electrochemical cells, the _____ + the

_____ cell.

59. When copper goes into silver nitrate solution, write out the spontaneous, balanced chemical equation.

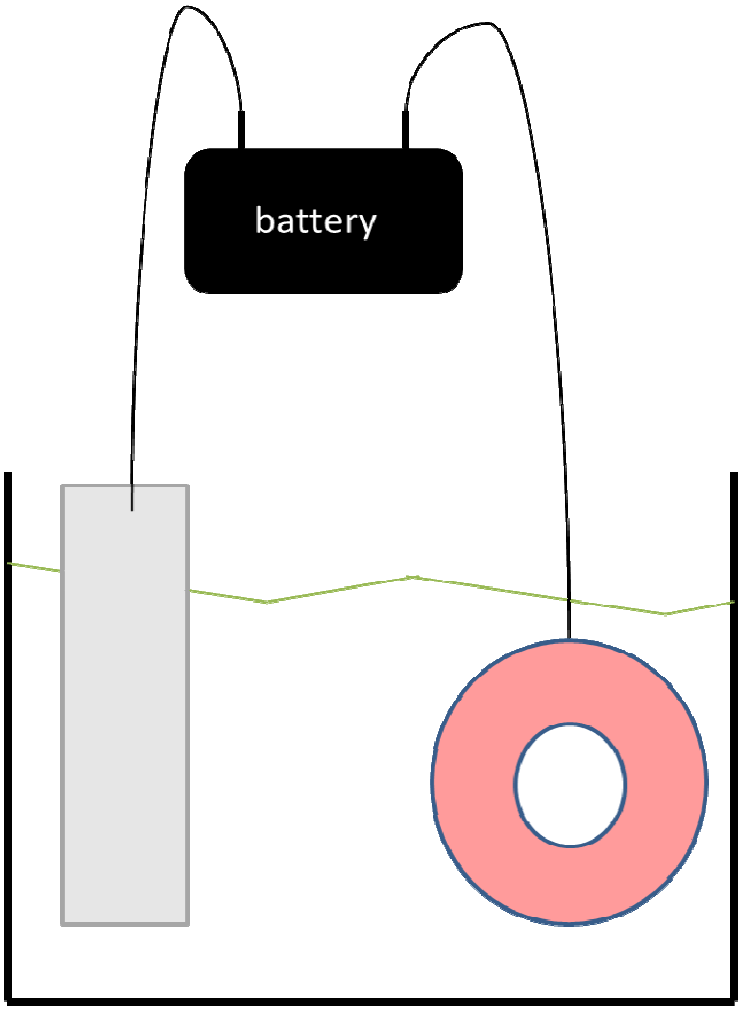
_____

60. We can STOP THAT from happening, if we use an outside energy source, like a battery.

61. By using electricity to PUSH a nonspontaneous redox reaction, we've created an

_____ cell

62. Label this diagram completely: flow of electricity, anode, cathode, state clearly what metal is going to electroplate onto the other.



66. Write the half reactions now, try the net ionic equation!

½OX: _____

½OX: _____

NET: _____

69. Draw the electrolytic cell that plates gold metal onto an aluminum spoon. Label it completely.

70. Write both half reactions, then the net ionic equation.

½ Oxidation: _____

½ Reduction: _____

Net Ionic Equation: _____

73. Electrolysis:

Hydrolysis:

74.

75. Write the electrical decomposition of water chemical equation, include the oxidation numbers

_____

76. Write out the half reactions for oxidation and reduction now.

½ Oxidation: _____

½ Reduction: _____

NET IONIC EQ: _____

Quick Review…

77. Name the type of electrochemical cell that spontaneously produces electricity from a chemical reaction.

_____cell

78. Name the type of cell where electricity forces a redox reaction that would not be spontaneous.

_____cell

79. What always happens at the anode? _____

80. What always happens at the cathode? _____

81. Is Leo ALWAYS a RED-CAT?