Name: _____

1) In an electrolytic cell, to which electrode will a positive ion migrate and undergo reduction?

A) the anode, which is negatively charged
B) the cathode, which is positively charged
C) the cathode, which is negatively charged
D) the anode, which is positively charged

2) In an electrolytic cell, Cu^{2+} ions will

A) migrate to the negative electrode
B) be reduced at the negative electrode
C) be reduced at the positive electrode
D) migrate to the positive electrode

3) Given the equation for the electrolysis of a fused salt:

$$LiCl(l) + \text{electricity} \rightleftharpoons 2Li(l) + Cl_2(g)$$

Which reaction occurs at the cathode?

A) $2Cl^- + 2e^- \rightleftharpoons Cl_2(g)$
B) $Li^+ \rightleftharpoons Li(l) + e^-$
C) $Li^+ + e^- \rightleftharpoons Li(l)$
D) $2Cl^- \rightleftharpoons Cl_2(g) + 2e^-$

4) What occurs when an electrolytic cell is used for silverplating a spoon?

A) An oxidation reaction takes place at the cathode.
B) A reduction reaction takes place at the anode.
C) A chemical reaction produces an electric current.
D) An electric current produces a chemical reaction.

5) The reaction $2H_2O(l) \rightleftharpoons 2H_2(g) + O_2(g)$ is forced to occur by use of an externally applied electric current. This procedure is called

A) hydrolysis
B) esterification
C) neutralization
D) electrolysis

6) Which half-reactions occurs at the cathode in an electrolytic cell in which an object is being plated with copper?

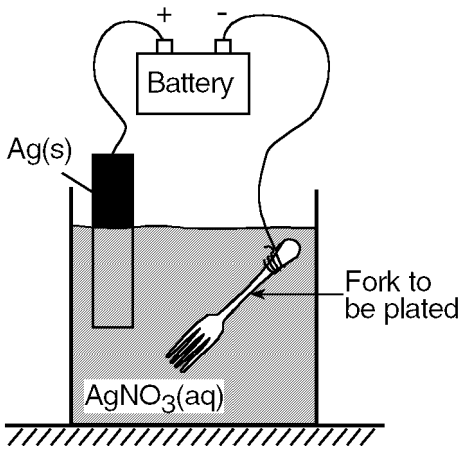
A) $Cu^{2+} + 2e^- \rightleftharpoons Cu(s)$
B) $Cu^{2+} \rightleftharpoons Cu(s) + 2e^-$
C) $Cu(s) + 2e^- \rightleftharpoons Cu^{2+}$
D) $Cu(s) \rightleftharpoons Cu^{2+} + 2e^-$

7) Redox reactions are made to occur by an externally applied electrical current in a(n)

A) voltaic cell
B) galvanic cell
C) Danielle cell
D) electrolytic cell

Questions 8 and 9 refer to the following:

The diagram below represents the electroplating of a metal fork with Ag(s).



8) Which part of the electroplating system is provided by the fork?

A) the cathode, which is the positive electrode
B) the anode, which is the positive electrode
C) the anode, which is the negative electrode
D) the cathode, which is the negative electrode

9) Which equation represents the half-reaction that takes place at the fork?

A) $Ag^+ + e^- \rightleftharpoons Ag(s)$
B) $Ag^+ + NO_3^- \rightleftharpoons AgNO_3$
C) $Ag(s) \rightleftharpoons Ag^+ + e^-$
D) $AgNO_3 \rightleftharpoons Ag^+ + NO_3^-$

10) The following equation represents the reaction for a zinc-copper chemical cell:

$$Zn(s) + Cu^{2+}(aq) \rightleftharpoons Zn^{2+}(aq) + Cu(s)$$

If 0.1 mole of copper is deposited on the copper electrode, the mass of the zinc electrode will

A) increase by 13 g B) increase by 6.5 g C) decrease by 13 g D) decrease by 6.5 g

11) During the electrolysis of fused NaCl, which half-reaction occurs at the negative electrode?

A) $Cl_2^0 + 2e^- \rightleftharpoons 2Cl^-$ B) $2Cl^- \rightleftharpoons Cl_2^0 + 2e^-$ C) $Na^0 \rightleftharpoons Na^+ + 1e^-$ D) $Na^+ + 1e^- \rightleftharpoons Na^0$

12) In an electrolytic cell, oxidation takes place at the

A) anode, which is positive
B) anode, which is negative
C) cathode, which is negative
D) cathode, which is positive

13) Given the reaction:

$$2H_2O + \text{electricity} \rightleftharpoons 2H_2 + O_2$$

In which type of cell would this reaction *most* likely occur?

A) a voltaic cell, because it is endothermic
B) a voltaic cell, because it is exothermic
C) an electrolytic cell, because it is endothermic
D) an electrolytic cell, because it is exothermic

14) Which atom forms an ion that would migrate toward the cathode in an electrolytic cell?

A) Cl B) I C) Na D) F

15) Which of the following statements *best* describes the reaction represented by the equation below?

$$2NaCl + 2H_2O + \text{electricity} \rightleftharpoons Cl_2 + H_2 + 2NaOH$$

A) The reaction occurs in a voltaic cell and releases energy.
B) The reaction occurs in an electrolytic cell and releases energy.
C) The reaction occurs in an electrolytic cell and absorbs energy.
D) The reaction occurs in a voltaic cell and absorbs energy.

16) Given the reaction:

$$Cu(s) + 2Ag^+(aq) \rightleftharpoons Cu^{2+}(aq) + 2Ag(s)$$

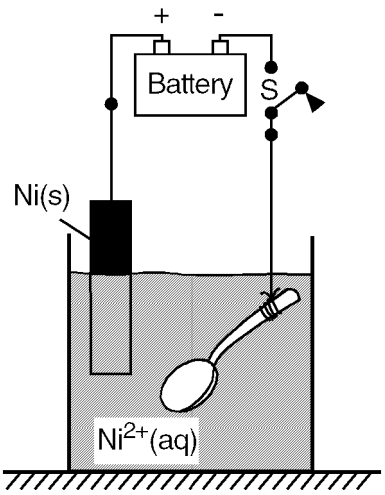
Which of the following statement correctly indicates the electron change that occurs?

A) Two moles of $Ag^+(aq)$ loses a total of 2 moles of electrons.
B) Two moles of $Ag^+(aq)$ gains a total of 1 mole of electrons.
C) One mole of Cu(s) loses a total of 2 moles of electrons.
D) One mole of Cu(s) gains a total of 1 mole of electrons.

17) An electrolytic cell differs from a voltaic cell in that the electrolytic cell

A) uses an applied electric current
B) involves redox
C) produces an electric current
D) is exothermic

18) The diagram below shows a spoon that will be electroplated with nickel metal.



What will occur when switch *S* is closed?

A) The spoon will gain mass, and the Ni(s) will be reduced.
B) The spoon will lose mass, and the Ni(s) will be reduced.
C) The spoon will lose mass, and the Ni(s) will be oxidized.
D) The spoon will gain mass, and the Ni(s) will be oxidized.

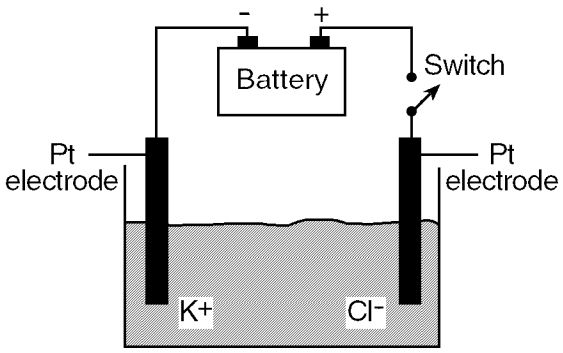
19) Which process occurs at the cathode during the electrolysis of fused KCl?

A) the oxidation of Cl^- ions
B) the reduction of K^+ ions
C) the oxidation of K^+ ions
D) the reduction of Cl^- ions

20) How many moles of electrons would be required to completely reduce 1.5 moles of Al^{3+} to Al?

A) 3.0 B) 4.5 C) 0.50 D) 1.5

21) The diagram below shows the electrolysis of fused KCl.



What occurs when the switch is closed?

A) Positive ions migrate toward the cathode, where they gain electrons.
B) Positive ions migrate toward the cathode, where they lose electrons.
C) Positive ions migrate toward the anode, where they gain electrons.
D) Positive ions migrate toward the anode, where they lose electrons.

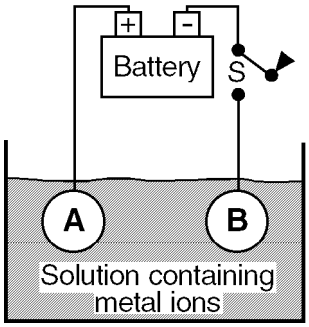
22) In an electrolytic cell, the negative electrode is called the

A) cathode, at which reduction occurs
B) cathode, at which oxidation occurs
C) anode, at which reduction occurs
D) anode, at which oxidation occurs

23) Which equation represents the half-cell reaction that occurs at the negative electrode during the electrolysis of fused calcium chloride?

A) $2Cl^- \rightleftharpoons Cl_2(g) + 2e^-$
B) $2Cl^- + 2e^- \rightleftharpoons Cl_2(g)$
C) $Ca^{2+} + 2e^- \rightleftharpoons Ca(s)$
D) $Ca^{2+} \rightleftharpoons Ca(s) + 2e^-$

24) The diagram below represents an electroplating arrangement.



In the setup shown, an object to be plated with metal would be the

A) cathode at *A*
B) anode at *B*
C) cathode at *B*
D) anode at *A*

25) How many moles of electrons are needed to reduce one mole of Cu^{2+} to Cu^+?

A) 4
B) 2
C) 1
D) 3

26) Given the reaction:

$$2Al^0(s) + 3Ni^{2+}(aq) \rightleftharpoons 2Al^{3+}(aq) + 3Ni^0(s)$$

What is the total number of moles of electrons lost by 2 moles of $Al^0(s)$?

A) 6
B) 2
C) 3
D) 8

27) In the electrolytic process used to plate copper onto a material, the material is the

A) cathode which is negative
B) anode which is negative
C) anode which is positive
D) cathode which is positive

28) In an electrolytic cell, which ion would migrate through the solution to the positive electrode?

A) a hydronium ion
B) a hydrogen ion
C) an ammonium ion
D) a chloride ion

29) In an electrolytic cell, a Cl^- ion would be attracted to the

A) negative electrode and reduced
B) negative electrode and oxidized
C) positive electrode and oxidized
D) positive electrode and reduced