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***Applied Electrochemstry 2 (Chem. 433)***

***Date: 16/1/2019***

***Time: 1 hr***

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**Choose the right answer in the following:** **(48** marks)

1) Electrowinning is defined as:
   a) The process in which the electrolyte is prepared by leaching the ore containing a certain metal and the pure metal is deposited on the cathode when an electrical current is passed through the electrolyte solution.
   b) The process in which the anode consists of impure metal which dissolved in the electrolyte and upon application of electric current pure metal is deposited at the cathode.
   c) The process in which the smoothness and the appearance of the deposit are very important.
2) In the electroplating process and to give high hardness and good resistance the parts required that should electroplated using:
   a) Silver metal b) Gold metal c) Chromium metal
3) To give metal surface a high reflection degree of light and other radiations, it should be electroplated by:
   a) Silver or palladium metals b) Nickel metal c) Chromium metal
4) To render the metal surface to soldering, it should be electroplated by:
   a) Gold metal b) Silver metal c) Tin or tin- lead alloy
5) The electrochemical equivalent is defined as:
   a) The atomic weight of an element divided by the number of electrons involved in the reaction.
   b) The current divided by the electrode surface area.
   c) The weight of deposit element when a current of unit electricity is passed through the electrolyte solution for unit time.
6) Faraday stated that, the amount of different substances produced by a given quantity of electricity consumed is proportional to:
   a) Their chemical equivalent weights. b) Their molecular weights.
   c) The electrochemical equivalent.
7) Cathodic overpotential is obtained when:
   a) The rate of oxidation reaction is equal to the rate of reduction reaction.
   b) The rate of oxidation reaction exceeds the rate of reduction reaction.
   c) The rate of reduction reaction exceeds the rate of oxidation reaction.
8) In the electroplating process:
   a) The high of the hydrogen overpotential ($E_{H2}$), the high of the interference with the electroplating process.

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b) The high of the hydrogen overpotential ($E_{H2}$), the low of the interference with the electroplating process.
c) The value of hydrogen overpotential ($E_{H2}$) does not affect the electroplating process.

9) In the electroplating process:
a) If the applied potential (E) is made more negative than the standard potential ($E^o$), the metallic ions will deposit.
b) If the applied potential (E) is made more positive than the standard potential ($E^o$), the metallic ions will deposit.
c) If the applied potential (E) equals to the standard potential ($E^o$), the metallic ions will deposit.

10) The oxygen evolution at the anode:
a) Decreases the anodic dissolution efficiency.
b) Increases the anodic dissolution efficiency.
c) Increases the cathodic deposition efficiency.

11) To protect metals from corrosion:
a) The metal is plated by another one which is more noble than it.
b) The metal is plated by another one which is less noble than it.
c) Both methods can be used to protect metals from corrosion.

12) Concentration polarization:
a) Can be decreased by decreasing the distance between the two electrodes.
b) Can be increased by decreasing the distance between the two electrodes.
c) Can be decreased and neglected by strong agitation of the electrolyte.

13) Activation polarization can be described by using:
a) Nernst equation. b) Tafel equation. c) Ohm's equation.

14) In electroplating of nickel, the nickel chloride salt is involved due to:
a) It is the major source of nickel ions in the plating solution.
b) It serves to improve anodic corrosion and increase the conductivity.
c) Its function to lower the surface tension of the plating solution.

15) In the electroplating process, as the passed current increases:
a) Metal ions concentration, increases in the cathodic area.
b) Metal ions concentration, decreases in the anodic area.
c) Metal ions concentration, increases in the anodic area.

16) The thickness of the deposited substance during electroplating depends on:
a) The amount of deposit substance. b) The surface area of thelectrode.
c) Both (a) and (b).

17) In electrorefining processes, the anode is made of:
a) Pure metal. b) Impure metal. c) Unpolarized electrode

18) In nickel electroplating process and in solutions of higher pH:
a) Nickel only dissolved at the anode.
b) Nickel dissolved at the anode and also oxygen gas may be evolved.
c) Nickel dissolved at the anode and also hydrogen gas may be evolved.

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19) If the discharge of metal cations on the cathode is the only cathdic process:
   a) The amount of deposit metal calculated using Faraday equation is more than that be actually deposited.
   b) The amount of deposit metal calculated using Faraday equation is less than that be actually deposited.
   c) The current efficiency is 100%.
20) The formation of insoluble metal oxide film on the anode:
   a) Increases the anodic efficiency. b) Decreases the anodic efficiency.
   c) Does not affect the anodic efficiency.
21) The fraction of the total current carried by a given species is:
   a) Mobility. b) Transport number. c) Conductivity.
22) The shift of potential under applied current is:
   a) The overpotential. b) The polarization. c) The electrode potential.
23) The property of solution which tends to decrease the difference between thickest and thinner deposits on a given part called:
   a) Current efficiency. b) Current density. c) Throwing power.
24) The electrodeposited material in electroplating process should be:
   a) Adherent. b) Brightness. c) Both (a) and (b).
25) The movement of an ion under the influence of an applied current is called:
   a) Current efficiency. b) Mobility. c) Transport number.
26) Amphoteric surfactants have:
   a) Positively charged entity. b) Negatively charged entity.
   c) Both (a) and (b).
27) In alkaline immersion cleaning, the used surfactant is:
   a) Anionic or cationic. b) Nonionic or amphoteric.
   c) The four types can be used.
28) For cleaning small parts, the cleaning method is:
   a) Immersion. b) Spray. c) Barrel.
29) The cleaning method in which an electrical current is imposed on the part is;
   a) Emulsion cleaning. b) Alkaline cleaning. c) Electrolytic cleaning.
30) The test method for cleaning in which acid copper test is used is:
   a) Nielson method. b) Fluorescent test. c) Atomizer test.
31) Addition of cyanide ions to plating solution of a mixture of copper ions and zinc ions:
   a) The depositing potential of zinc is altered to more negative potential.
   b) The depositing potential of copper is altered to more negative potential.
   c) The depositing potentials of copper is altered to more positive potential.
32) Sacrificial protection means that:
   a) The metal is protected from corrosion by plating with another one which is more noble than it.
   b) The metal is protected from corrosion by plating with another one which is more active than it.

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c) The metal is protected from corrosion by covering the metal surface by a paint:

33) Electroplating can be used to:

a) Prevent corrosion. b) Add decoration. c) Both (a) and (b).

34) Electrolytic cells in which:

a) Chemical energy is converted to electrical energy.
b) Kinetic energy is converted to electrical energy.
c) Electrical energy is converted to chemical energy.

35) The selection of cleaning process must be based on:

a) The substance being cleaned. b) The soil to be removed.
c) Both (a) and (b).

36) In electrolytic cleaning, the anodic cleaning is called:

a) Direct cleaning. b) Indirect cleaning. c) Reverse cleaning.

37) The method of cleaning in which a blue dye is used is:

a) Nielson method. b) Atomizer test. c) Water-break test.

38) For spray cleaning:

a) Anionic or cationic surfactants can be used.
b) Nonionic surfactants can be used.
c) Amphteric surfactants can be used.

39) In nickel electroplating and in solutions of higher pH:

a) Cathodic efficiency increases. b) Anodic efficiency increases.
c) Anodic efficiency decreases.

40) In electroplating process, the cell used is:

a) Polarographic cell. b) Galvanic cell. c) Electrolytic cell.

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# Model Answer

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|---|---|---|---|---|
| **(1) a** | **(2) c** | **(3) a** | **(4) c** | **(5) c** |
| **(6) a** | **(7) c** | **(8 ) b** | **(9) a** | **(10) a** |
| **(11) c** | **(12) c** | **(13) b** | **(14) b** | **(15) c** |
| **(16) c** | **(17) b** | **(18) b** | **(19) c** | **(20) b** |
| **(21) b** | **(22) a** | **(23) c** | **(24) c** | **(25) b** |
| **(26) c** | **(27) c** | **(28) c** | **(29) c** | **(30) a** |
| **(31) b** | **(32) b** | **(33) c** | **(34) c** | **(35) c** |
| **(36) c** | **(37) b** | **(38) b** | **(39) c** | **(40) c** |