CHEMISTRY

NCERT - FULL MARKS

CHEMISTRY(TAMIL)

ELECTRO CHEMISTRY - I

Examples

1. If 50 milli ampere of current is passed through copper coulometer for 60 min,

calculate the amount of copper deposited.

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2. 0.1978 g of copper is deposited by a current of 0.2 ampere in 50 minutes. What is the electrichemical equivalent of copper ?

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3. What current strength in amperes will be required to liberate 10 g of iodine from

potassium iodide solution in one hour ?

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4. An electric current is passed through three cells in series containing respectively solutions of copper sulphate, silver nitrate and potassium iodide. What weights of silver and iodine will be liberated while 1.25 g of copper is being deposited ?

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5. The resistance of a 0.01 N solution of an electrolyte was found to 210 ohm at $25^{\circ}C$ using a conductance cell with a cell constant $0.88cm^{-1}$. Calculate the specific conductance and equivalent conductance of the solution.

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6. Specific conductance of 1 M KNO_3 solution is observed to be 5.55×10^{-3} mho cm^{-1}. What is the equivalent conductance of KNO_3 when one litre of the solution is used?

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7. Equivalent conductivity of acetic acid at infinite dilution is 39.7 and for 0.1 M acetic acid the equivalent conductance is $5.2\ \mathrm{mho.cm^2.\ gm.equiv.^{-1}}$. Calculate degree of dissociation, H^+ ion concentration and dissociation constant of the acid.

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8. Find the degree of dissociation of HF in 1 M aqueous solution. The value of K for the ionic equilibrium $HF = H^+ + F^-$ is 7.2×10^{-4}.

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9. The hydrogen ion concentration of a fruit juice is $3.3 \times 10^{-2} M$. What is the pH of the juice ? Is it acidic or basic ?

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10. If a solution has a pH of 7.41, determine its H^+ concentration.

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11. pH of a solution is 5.5 at $25^\circ C$. Calculate its $[OH^-]$

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12. Calculate the pH of $0.001\ \mathrm{M}\ \mathrm{HCl}$ solution

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13. Find the pH of a buffer solution containing 0.20 mole per litre CH_3COONa and 0.15 mole per litre CH_3COOH, K_a for acetic acid is 1.8×10^{-5}

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14. The Ka of propionic acid is 1.34×10^{-5}. What is the pH of a solution containing 0.5 M propionic acid and 0.5 M sodium

proportionate ? What happens to the pH of the solution when volume is doubled by adding water ?

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Self Evaluation A Choose The Correct Answer

1. The new sources of energy is termed as .....

A. neutralisation

B. hydrolysis

C. electrolysis

D. ionisation

Answer:

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2. Faraday's laws of electrolysis are related to .....

A. Dalton

B. Faraday

C. Kekule

D. Avogadro

Answer:

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3. When 5 coulomb of charge, flows through a circuit for 20 seconds. Calculate the current?

A. equivalent weight

B. molecular weight

C. electrochemical equivalent

D. one gram

Answer:

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4. Explain Faraday's laws of electrolysis.

A. atomic number of the cation

B. atomic number of the anion

C. equivalent weight of the electrolyte

D. speed of the cation

Answer:

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5. The specific conductance of a 0.01 M solution of KCl is $0.0014\,\text{ohm}^{-1}\ \text{cm}^{-1}$ at $25^\circ C$. Its equivalent conductance is .....

A. $14\,\text{ohm}^{-1}\text{cm}^2 eq^{-1}$

B. $140\ \text{ohm}^{-1}cm^2eq^{-1}$

C. $1.4\ \text{ohm}^{-1}cm^2eq^{-1}$

D. $0.14\ \text{ohm}^{-1}cm^2eq^{-1}$

Answer:

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6. The equivalent conductivity of CH_3COOH at $25^\circ C$ is $80\ \text{ohm}^{-1}cm^2eq^{-1}$ and at infinite dilution $400\ \ \text{ohm}^{-1}\ \ \text{cm}^2eq^{-1}$. The degree of dissociation of CH_3COOH is .....

A. 1

B. 0.2

C. 0.1

D. 0.3

Answer:

7. Why is it necessary to use acetic acid and not sulphuric acid for acidification of sodium

extract for testing sulphur by lead acetate test?

A. increases

B. decreases

C. does not change

D. becomes zero

Answer:

8. Attempt titrating an amino acid against a weak base and discover the number of dissociating (ionizable) functional groups in the amino acid.

A. it has low vapour pressure

B. it is only partially ionised

C. it is completely ionised

D. it has low density

Answer:

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9. Which one of the following formulae represents Ostwald's dilution law for a binary electrolyte whose degree of dissociation is α and concentration C.

A. $K = \frac{(1-\alpha)C}{\alpha}$

B. $K = \frac{\alpha^2 C}{1-\alpha}$

C. $K = \frac{(1-\alpha)C}{\alpha^2}$

D. $K = \frac{\alpha^2 C}{(1-\alpha)C}$

Answer:

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10. State Ostwald's dilution law.

A. CH_3COOH

B. $NaCl$

C. $NaOH$

D. H_2SO_4

Answer:

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11. Which one of the following relationship is correct ?

A. $pH = \frac{1}{[H^+]}$

B. $pH = \log_{10}[H^+]$

C. $\log_{10} pH = [H^+]$

D. $pH = \log_{10} \cdot \frac{1}{[H^+]}$

Answer:

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12. When 10^{-6} mole of a monobasic strong acid is dissolved in one litre of solvent, the pH of the solution is .....

A. 6

B. 7

C. less than 6

D. more than 7

Answer:

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13. When pH of a solution is 2, the hydrogen ion concentration in moles litre^{-1} is .....

A. 1×10^{-12}

B. 1×10^{-2}

C. 1×10^{-7}

D. 1×10^{-4}

Answer:

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14. The pH of a solution containing 0.1 N NaOH solution is

A. 1

B. 10^{-1}

C. 13

D. 10^{-13}

Answer:

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15. A chemical reaction which involves addition of oxygen is called as _____.

A. buffer solution

B. true solution

C. isohydric solution

D. ideal solution

Answer:

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16. The hydrogen ion concentration of a buffer solution consisting of a week acid and its salts is given by

A. $\left[H^+\right] = K_a \dfrac{[\text{Acid}]}{[\text{Salt}]}$

B. $\left[H^+\right] = K_a[\text{Salt}]$

C. $\left[H^+\right] = K_a[\text{Acid}]$

D. $\left[H^+\right] = K_a \dfrac{[\text{Salt}]}{[\text{Acid}]}$

Answer:

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17. Indicators used in acid-base titrations are .....

A. strong organic acids

B. strong organic bases

C. weak organic acids or weak organic bases

D. non-electrolysis

Answer:

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18. For the titration between oxalic acid and sodium hydroxide, the indicator used in .....

A. potassium permanganate

B. phenolphthalein

C. litmus

D. methyl orange

Answer:

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Self Evaluation B Answer In One Or Two Sentences

1. Obtain an expression for electrical conductor.

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2. Define Faraday.

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3. Define electrochemical equivalent.

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4. What are insulators. Give examples.

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5. State Ostwald's dilution law.

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6. What is common ion effect. Give examples.

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7. What is a buffer action ?

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8. What are indicators ?

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9. The resistance of a 0.01 N solution of an electrolyte was found to 210 ohm at $25^{\circ}C$ using a conductance cell with a cell constant $0.88cm^{-1}$. Calculate the specific conductance and equivalent conductance of the solution.

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10. What is Henderson equation ?

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Self Evaluation C Answer Not Exceeding Sixty Words

1. Write an account of the Arrhenius theory of electrolytic dissociation.

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2. What is electrolysis?

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3. State Ostwald's dilution law.

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4. Explain buffer action with example.

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5. Derive Henderson equation.

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6. State and explain Kohlrausch's law.

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Self Evaluation D Solve The Problems

1. What is the electrochemical equivalent of a substance when 150 gm of it is deposited by 10 ampere of current passed for 1 sec?

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2. The electrochemical equivalent of an electrolyte is 2.35 gm $amp^{-1}\sec^{-1}$. Calculate the amount of the substance deposited when 5 ampere is passed for 10 sec.

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3. To 1 M solution of $AgNO_3$, 0.75 F quantity of current is passed. What is the concentration of the electrolyte, $AgNO_3$ remaining in the solution?

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4. 0.5 F of electric current was passed though 5 molar solutions of $AgNO_3, CuSO_4$ and $AlCl_3$ connected in series. Find out the concentration of each of the electrolyte after the electrolysis ?

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5. To one molar solution of a trivalent metal salt, electrolysis was carried out and 0.667 M

was the concentration remaining after electrolysis. Calculate the quantity of electricity passed.

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6. A conductance cell has platinum electrodes, each with 5 cm^2 area and separated by 0.5 cm distance. What is the cell constant?

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7. Using a conductivity cell with $0.9\,\mathrm{cm}^{-1}$ cell constant, the conductance was observed to be 2.5×10^{-3} mho for $0.07\,\mathrm{M\,KCl}$ solution. What is the specific conductance of the solution ?

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8. Specific conductance of 1 M KNO_3 solution is observed to be 5.55×10^{-3} mho cm^{-1}.

What is the equivalent conductance of KNO_3 when one litre of the solution is used?

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9. Explain why on dilution does the conductivity decrease whereas molar conductivity increases for an electrolytic solution.

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10. The equivalent conductances at infinite dilution of HCl, CH_3COONa and $NaCl$ are 426.16, 91.0 and 126.45 $ohm^{-1}cm^2$ gm equivalent^{-1} respectively. Calculate the equivalent conductance (λ_∞) of acetic acid.

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