CHEMISTRY

NCERT - NCERT CHEMISTRY(GUJRATI)

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. 0.04 N solution of a weak acid has a specific conductance 4.23×10^{-4} $\mathrm{mho.cm}^{-1}$. The degree of dissociation of acid at this dilution is 0.0612. Calculate the equivalent conductance of weak acid at infinite solution.

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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 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 process in which chemical change occurs on passing electricity is termed as .....

A. neutralisation

B. hydrolysis

C. electrolysis

D. ionisation

Answer: electrolysis

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2. The laws of electrolysis were enunciated first by .....

A. Dalton

B. Faraday

C. Kekule

D. Avogadro

Answer: Faraday

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3. When one coulomb of electricity is passed through an electrolytic solution, the mass deposited on the electrode is equal to .....

A. equivalent weight

B. molecular weight

C. electrochemical equivalent

D. one gram

Answer: electrochemical equivalent

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

A. atomic number of the cation

B. atomic number of the anion

C. equivalent weight of the electrolyte

D. speed of the cation

Answer: equivalent weight of the electrolyte

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

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

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

Answer: $140\ \text{ohm}^{-1} cm^2 eq^{-1}$

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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:

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7. When sodium acetate is added to acetic acid, the degree of ionisation of acetic acid .....

A. increases

B. decreases

C. does not change

D. becomes zero

Answer:

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8. NH_4OH is a weak base because .....

A. it has low vapour pressure

B. it is only partially ionised

C. it is completely ionised

D. it has low density

Answer: it is completely ionised

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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. Ostwald's dilution law is applicable in the case of the solution of .....

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^{-2}

B. 1×10^{-1}

C. 1×10^{-7}

D. 1×10^{-4}

Answer: 1×10^{-1}

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14. The pH of a solution containing $0.1\,\mathrm{N}\,\mathrm{NaOH}$ solution is .....

A. 1

B. 10^{-1}

C. 13

D. 10^{-13}

Answer:

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15. A solution which is resistant to changes of pH on addition of small amounts of an acid or a base is known as .....

A. buffer solution

B. true solution

C. isohydric solution

D. ideal solution

Answer: buffer solution

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

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

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

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

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

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: weak organic acids or weak organic bases

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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: phenolphthalein

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Self Evaluation D Solve The Problems

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

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

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

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5. Specific conductance of $1\,\mathrm{M}\,\mathrm{KNO_3}$ solution is observed to be $5.55 \times 10^{-3}\ \mathrm{mho.cm^{-1}}$. What is the equivalent conductance of KNO_3 when one litre of the solution is used ?

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

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