CHEMISTRY

BOOKS - PEARSON IIT JEE FOUNDATION

WATER, SOLUTION, SOLUBILITY AND HYDROGEN

Example

1. How are the resins regenerated after prolonged usage ?

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2. What happens when blue litmus paper is dipped in water in which a piece of calcium metal is dropped ?

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3. Effervescence is observed when the water is warmed. What is the reason behind it ?

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4. How many grams of potassium chloride is present in 250 g of saturated solution ? The solubility of KCl is 35.8 at $25^{\circ} C$?

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5. Complete the following table :

Weight %	Mass of solute (g)	Mass of solution (g)	Mass of solvent (g)
–	20	80	–
30	–	–	80
20	–	–	75

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6. What is ratio by mass of magnesium and calcium obtained when the electrolysis of their respective chlorides are carried out in the molten state, if the number of moles of both the chlorides taken are same ?

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7. Calculate the mass of magnesium deposited during the electrolysis of molten magnesium chloride by passing 193 amperes of current for 600 minutes.

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8. Complete the following table :

Mass of metal deposited (g)	Atomic mass	Current (amp)	Time (min)	Valency
23	23	–	500	–
–	24	386	600	–
–	27	193	965	–

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Numerical Problems

1. (i) Calculate the weight of aluminium deposited during the electrolysis of molten aluminium chloride by passing 193 amp of current for 500 min.

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2. A current of 9.65 amperes is passed through three different electrolytes, i.e., $NaNO_3$, KCl and $ZnSO_4$ for 30 min separately. Calculate the mass ratio of the metals deposited at the respective electrodes. Also find out the weights of various metals deposited at the respective electrodes.

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Very Short Answer Type Questions

1. The molarity of a 250 mL solution is 0.5 M. The amount of solute present in it is _____ g. (molecular weight of the solute = 58)

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2. Equivalent weight of phosphate radical is equal to _____.

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3. In what ratio by mass, hydrogen and oxygen are produced by the electrolysis of water ?

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4. What are the equivalent weights of cuprous ion and cupric ion ?

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5. The number of water molecules present in Glauber's salt is _____.

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Short Answer Type Questions

1. What is the mass of the solute present in 1 L of 0.2 M sodium carbonate solution ?

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2. How many moles of electrons are required to liberate 112 L of oxygen at STP when acidulated water is electrolysed ?

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Level 1

1. The molarity of 4 g of $NaOH$ in 100 mL solution is 0.5 M.

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2. 144750 C is equal to two faradays.

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3. Formula of green vitriol is _____.

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4. Phosphorus pentoxide used in the preparation of N_2O_5 from HNO_3 acts as a

A. reducing agent

B. catalyst

C. dehydrating agent

D. drying agent

Answer:

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5. Which among the following is having maximum molarity ?

A. 20 g of $NaOH$ in 500 mL solution

B. 49 of H_2SO_4 250 mL solution

C. 7.4 g of $Ca(OH)_2$ in 100 mL solution

D. 73 g of HCl in 2000 mL solution

Answer:

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6. Time required for the deposition of 40 g of calcium by passing 965 amp current through molten calcium chloride is

A. 100 s

B. 200 s

C. 50 s

D. 150 s

Answer:

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7. The $w/w\,\%$ of 25 g of calcium hydroxide in 50 g of solvent of _____ $\%$.

A. 40

B. 33.33

C. 36.3

D. 30

Answer: B

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8. An aqueous solution of a metal salt on electrolysis with 1930 amp current for 20 s

produces 8 g of the metal. The valency of the metal is _____ (atomic weight = 40).

A. three

B. two

C. four

D. one

Answer:

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9. Write the steps in sequence for electroplating of brass spoon with silver.

(1) k^+ and H^+ ions are not dishcharged at cathode due to higher discharge potential than Ag^+.

(2) Silver gets deposited on brass spoon.

(3) A highly cleaned brass spoon which has to be electroplated is taken.

(4) Due to electrolytic dissociation, Ag^+, K^+, H^+, OH^- and CN^- ions are formed.

A. 3 4 1 2

B. 1 4 3 2

C. 4 1 3 2

D. 1 4 2 3

Answer:

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10. Which among the following elements cause water pollution ?

A. mercury

B. lead

C. arsenic

D. all of these

Answer:

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11. Which property of water is responsible for water pollution ?

A. high dielectric constant

B. high specific heat

C. high specific gravity

D. all of these

Answer:

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12. Which among the following has water of crystallisation ?

A. washig soda

B. baking soda

C. common salt

D. calcium hydroxide

Answer:

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13. Which of the following is not a property of the colloids ?

A. Brownian movement

B. Tyndall effect

C. coagulation

D. crystallisation

Answer:

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14. Which among the following has minimum molarity ?

A. 20 g of $NaOH$ in 100 mL solution

B. 24.5 g of H_2SO_4 in 500 mL solution

C. 14 g of HCl in 100 mL solution

D. 37 g of $Ca(OH)_2$ in 2000 mL solution

Answer: D

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15. Which among the following is a true solution ?

A. vinegar in water

B. sulphur in water

C. aluminium paint

D. starch solution

Answer:

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16. Arrange the statements in sequence for the calculation of weight of aluminium deposited during the electrolysis of molten aluminium

chloride by passing c amperes of current for t minutes.

(1) Find the product of current (c) and time (t).

(2) Convert time in minutes to seconds.

(3) Write reduction equation of the metal ion.

(4) Conversion of charge into Faradays.

(5) Relation between mass of metal and number of Faradays passed through

A. 2 1 4 3 5

B. 1 2 3 4 5

C. 4 2 1 5 3

D. 2 1 4 5 3

Answer:

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17. Relation between electrochemical equivalent (e) and equivalent mass (E) is given by

A. $E = \frac{e}{96500}$

B. $E = \frac{96500}{e}$

C. $e = \frac{E}{96500}$

D. $e = \frac{\text{valency}}{96500}$

Answer:

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18. Electrolysis principle is not used in the following processes :

A. plating of silver on copper

B. extraction of metals

C. refining of metals

D. purification of drinking water

Answer:

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Level 2

1. When a piece of metal is dropped in cold water, the water slowly becomes turbid and effervescence is observed. What will you

observe, if blue litmus paper is dipped into the turbid water ? Indentify the metal and justify the observation.

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2. Explain the role of lime and washing soda for the removal of permanent hardness of water.

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3. Why are carbonated beverages kept in sealed containers ?

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4. Some amount of Glauber's salt, hydrated magnesium chloride and hydrated calcium chloride are separately is kept in three containers. What will you observe, if blue coloured cobalt chloride is introduced in the three containers ? Explain with a reason.

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5. 100 g of $25\,\%$ (w/w) sodium hydroxide is prepared in a laboratory. If the density of water is 0.9 g/cc at room temperature, calculate the volume of water taken

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6. 200 mL of pure water contains 60 g of a solute at $60^{\circ}C$. The salt solution is cooled slowly up to $30^{\circ}C$. Based on the data given

below calculate the mass of the solute precipitated from the solution :

Temperatures (°C)	Solubilities of the given solute
60	55
45	30
30	40

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7. The amount of solute (H_2SO_4) and solvent present in a solution are 49 g and 90 g. respectively. If the specific gravities of the solute and solvent are 1.96 and 0.9,

respectively, then calculate the molarity of the solution.

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8. 5.4 g of a trivalent metal is deposited by passing 5 amp current during the electrolysis of its molten chloride. If the atomic weight of the metal is 27, calculate the time taken for the deposition.

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9. The density of the particles of the dispersed phase is more than that of the dispersion medium in a colloid. But the colloid particles do not settle down. Give a reason.

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10. Calculate the molarity of 30% (w/w) $NaOH$ solution, if the density of the solution is 1.05 g/cc.

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11. If 6 g of a metal gets deposited by passing 2 amp of current for 2 h 30 min, calculate the equivalent weight of the metal.

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12. Why does smoke produced by a cigarette appear blue in colour ?

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13. Why is ferric chloride solution used to stop bleeding from a wound?

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14. Common salt increases in weight on long standing. Justify with an appropriate reason.

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15. Compare the conductivity of a solution of $NaOH$ in water and in alcohol.

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16. Why does the colour of the solid blue copper sulphate becomes white on heating ?

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17. When equal number of moles of CO_2, SO_3 and nitrogen gases are passed through water under pressure and then heated, which gas is evolved in maximum percentage ? Justify.

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