



CHEMISTRY

BOOKS - MODERN PUBLICATION

PHYSICAL CHEMISTRY

Problem

1. Answer any seven questions of the following:

$CuSO_4$ solution is electrolysed for 20 minutes with a current of 3 amperes. What mass of copper will be deposited at the cathode?

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2. 50 ml of $\frac{N}{10}$ NaOH. solution, 100 ml of $\frac{N}{5}$ NaOH solution and 500ml of $N/2$ NaOH solution are mixed together. What is the strength of the

resultant solution?

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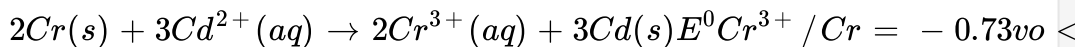
3. Boiling point of water is 100°C . Calculate the boiling point of an aqueous solution containing 5g urea (mol. mass = 60) in 100 g water. (K_b for water = $0.52\text{K. kg mol}^{-1}$)

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4. Equivalent conductance at infinite dilution of NH_4Cl , NaOH and NaCl are 129.8, 217.4 and $108.45\text{ mho cm}^2\text{ gm equivalent}^{-1}$ respectively. Calculate the equivalent conductance of HN_4OH at infinite dilution.

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5. Represent the cell and calculate the Standard e.m.f. of the cell having following cell reaction:



$$\text{and } E^{\circ}Cd^{2+}/Cd = -0.40 \text{ volt}$$

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6. Predict whether we can store $CuSO_4$ solution in a zinc vessel from the following data. Show your calculation.

$$E^{\circ}_{Zn^{2+}/Zn} = 0.76V$$

$$E^{\circ}_{Cu^{2+}/Cu} = 0.34V$$

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7. The rate constants of a reaction at 500 K and 700 K are 0.025 sec^{-1} and 0.075 sec^{-1} respectively. Calculate the energy of activation of the reaction.

$$(R = 8.314 \text{ JK}^{-1} \text{ mol}^{-1} \text{ and } \log 3 = 0.447)$$

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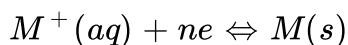
8. The osmotic pressure of a solution containing 50 g of a solute in one litre of solution at 300K is 20.5 atmosphere. Calculate the molecular mass of the solute.

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9. Prove that for a 1st order reaction, the time taken for 99% completion of the reaction is twice the time required for the completion of 90% of the reaction.

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10. Derive the Nernst equation of electrode potential at 25° C for the electrode reaction.

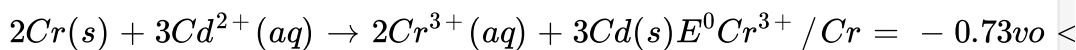


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11. In a first order reaction, the reactant concentration decreases from 0.8 M to 0.4 M in 15 min. What is the time taken for the concentration to change from 0.1 M to 0.025 M?

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12. Represent the cell and calculate the Standard e.m.f. of the cell having following cell reaction:



and $E^0 Cd^{2+} / Cd = -0.40 \text{ volt}$

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Exercise

1. Give two applications of Kohlrausch Law.

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2. What is galvanic cell? Give an example.

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3. State Kohlrausch's law.

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4. Why can't $CuSO_4$ solution be stored in an iron vessel?

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5. Why Fe^{3+} is more stable than Fe^{2+} ?

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6. Write a note on hydrogen-oxygen fuel cell.



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7. Explain what are ionic and covalent solids. Give one example of each.



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8. How does Schottky defect arise ? In which type of ionic compounds does this defect arise ?



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9. Answer any seven questions of the following:

Under which condition the rate of reaction becomes equal to the specific reaction rate?

Write the expressions for the rate of reaction of



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10. Give two difference between crystalline and amorphous solids.

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11. What is a semiconductor? What aren-type and p-type semiconductors?

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12. Differentiate between multimolecular and macromolecular colloids.

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