**PROBLEMS AND SOLUTIONS (LAB MANUAL, PAGE 26 & 27)**

1. Calculate the amount of oxalic acid (C2H2O4.2H2O, MW 126) for the preparation of 250 ml 0.1 N oxalic acid solutions.

Solution: We know, 

Given that, C = 0.1N, V = 250ml, M = 63 (gram-equiv-wt of oxalic acid), W = ?

Therefore, rearranging the above formulae,

W = (C×M×V)/1000 = (0.1×63×250)/1000 = 1.575 gm (Ans)

1. Calculate the normality of HCl solution if 5gm of HCl (MW 36.5) is taken in 250 ml solution.

Solution: We know, 

Given that, W = 5 gm, V = 250ml, M = 36.5 (gram-equiv-wt of oxalic acid), C = ?

Therefore, putting the values in the above formulae,

C = (5×1000)/(36.5×250) = 0.548 N (Ans)

1. If 15ml 0.25 N HCl solutions react with 20ml NaOH solution, then calculate the normality of NaOH solution.

Solution: We know, Sbase × Vbase = Sacid × Vacid

Given that, Vacid = 15 ml, Sacid = 0.25 N, Vbase = 20 ml, Sbase = ?

Therefore, rearranging the above formulae,

Sbase = (Sacid × Vacid)/ Vbase = (0.25 × 15)/20 = 0.1875 N (Ans)

1. Suppose, 9.5 ml of oxalic acid solution and 11.5 ml of dil. HCl solution are required to titrate 10 ml NaOH solution separately. Calculate the normality of NaOH and dil. HCl solutions. [Given that oxalic acid solution is 0.13(N)].

Solution: We know, Sbase × Vbase = Sacid × Vacid

1. Given that, Voxalic acid = 9.5 ml, Soxalic acid = 0.13 N, VNaOH = 10 ml, SNaOH = ?

Therefore, rearranging the above formulae,

SNaOH = (Soxalic acid × Voxalic acid)/ VNaOH = (0.13 × 9.5)/10 = 0.1235 N (Ans)

1. Given that, Vdil.HCl = 11.5 ml, SNaOH = 0.1235 N, VNaOH = 10 ml, Sdil.HCl = ?

Therefore, rearranging the above formulae,

Sdil.HCl = (SNaOH × VNaOH)/ Vdil.HCl = (0.1235 × 10)/11.5 = 0.107 N (Ans)

1. Calculate the amount of Na2CO3 (MW 106) to prepare 0.3 N 200ml Na2CO3 solution.

Solution: We know, 

Given that, C = 0.3 N, V = 200 ml, M = 53 (gram-equiv-wt of Na2CO3), W = ?

Therefore, rearranging the above formulae,

W = (C×M×V)/1000 = (0.3×53×200)/1000 = 3.18 gm (Ans)

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1. Calculate the amount of Cu+2 in a 150 ml blue vitriol solution if 10 ml of it is titrated with 5 ml 0.039N sodium thiosulphate solution. (1 ml 1N Na2S2O3 ≡ 0.06354 gm of Cu+2).

Solution: We know, 1 ml 1N Na2S2O3 ≡ 0.06354 gm of Cu+2

Given that, Vthio = 5 ml, Sthio = 0.039 N, volume of blue vitriol solution = 150 ml

Therefore, amount of Cu+2 in 10 ml of blue vitriol solution = 0.06354 × VThio × SThio gm

Amount of Cu+2 in 150 ml of blue vitriol solution = 0.06354 × VThio × SThio × 15 gm

= 0.06354 × 5 × 0.039 × 15 gm

= 0.18585 gm (Ans)

1. Calculate the known value of copper when 3g blue vitriol is dissolved in100 ml of solution. (Atomic weight of Cu = 63.54, Mol. weight of CuSO4.5H2O = 249.68).



Solution: We know,

Given that, Atomic weight of Cu = 63.54, Mol. weight of CuSO4.5H2O = 249.68; Amount of blue vitriol taken = 3 gm;

Therefore, Known value of copper in 100 ml of blue vitriol solution = (63.54 × 3)/249.68

= 0.76345 gm (Ans)

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1. Calculate the amount of Fe+2 in a 300 ml Mohr’s salt solution if 10 ml of this solution is titrated with 4 ml 0.075N K2Cr2O7 solution. (1 ml 1N K2Cr2O7 ≡ 0.05584 gm of Fe+2). Ans: 0.50256 gm

Solution: We know, 1 ml 1N K2Cr2O7 ≡ 0.05584 gm of Fe+2

Given that, VK2Cr2O7 = 4 ml, SK2Cr2O7 = 0.075 N, volume of Mohr’s salt solution = 300 ml

Therefore, amount of Fe+2 in 10 ml of Mohr’s salt solution = 0.05584 × VK2Cr2O7 × SK2Cr2O7 gm

Amount of Fe+2 in 300 ml of Mohr’s salt solution = 0.05584 × VK2Cr2O7 × SK2Cr2O7 × 30 gm

= 0.05584 × 4 × 0.075 × 30 gm

= 0.50256 gm (Ans)

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1. Calculate the amount of Fe+2 ions in 500 ml Mohr’s salt solution if 10ml of this solution is titrated with 7.5ml 0.06N KMnO4 solution. (1ml 1N KMnO4= 0.05584 gm of F+2). Ans: 1.256 gm

Solution: We know, 1 ml 1N KMnO4 ≡ 0.05584 gm of Fe+2

Given that, VKMnO4 = 7.5 ml, SKMnO4 = 0.06 N, volume of Mohr’s salt solution = 500 ml

Therefore, amount of Fe+2 in 10 ml of Mohr’s salt solution = 0.05584 × VKMnO4 × SKMnO4 gm

Amount of Fe+2 in 500 ml of Mohr’s salt solution = 0.05584 × VK2Cr2O7 × SK2Cr2O7 × 50 gm

= 0.05584 × 7.5 × 0.06 × 50 gm

= 1.2564 gm (Ans)

1. Calculate the known value of iron when 2g Mohr’s salt is dissolved in100 ml of solution. (Atomic weight of Fe = 55.84, Mol. weight of FeSO4.(NH4)2SO4.6H2O = 392.14). Ans: 0.2847 gm



Solution: We know,

Given that, Atomic weight of Fe = 55.84, Mol. weight of FeSO4.(NH4)2SO4.6H2O = 392.14, Amount of Mohr’s salt taken = 2 gm;

Therefore, Known value of iron in 100 ml of blue vitriol solution = (55.84 × 2)/392.14

= 0.28479 gm (Ans)