Question #82052, Chemistry / General Chemistry | for completion

(a) How many milliliters of 0.155 M HCl are needed to neutralize completely 45.0 mL of 0.101 M Ba(OH)2 solution?

(b) How many milliliters of 2.50 M H2SO4 are needed to neutralize 50.0 g of NaOH?

(c) If 54.8 mL of BaCl2 solution is needed to precipitate all the sulfate in a 554 mg sample of Na2SO4 (forming BaSO4), what is the molarity of the solution?

(d) If 47.5 mL of 0.375 M HCl solution is needed to neutralize a solution of Ca(OH)2, how many grams of Ca(OH)2 must be in the solution?

Answer:

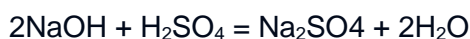(a) How many milliliters of 0.155 M HCl are needed to neutralize completely 45.0 mL of 0.101 M Ba(OH)2 solution?

$Ba(OH)_2 + \underline{2}HCl(\textbf{разб.}) = BaCl_2 + \underline{2}H_2O$

$C_M=n/V$, $n=C_M \times V$, $V=n/C_M$

n= 0.101 x 0.045 = 0,004545 mol ($Ba(OH)_2$)

0,004545 x 2 = 0,00909 mol (HCl)

V=0.00909 / 0.155 = 0,0586 L = **58.64 ml**

(b) How many milliliters of 2.50 M H2SO4 are needed to neutralize 50.0 g of NaOH?

$2NaOH + H_2SO_4 = Na_2SO4 + 2H_2O$

$C_M=n/V$, $n=C_M \times V$, $V=n/C_M$, n=m/Mr

n=m/Mr= 50/40 = 1.25 mol (NaOH)

1.25 / 2 = 0.625 mol (H_2SO_4)

V= n/ C_M= 0.625 / 2.5 = 0.25 L= **250 ml**

(c) If 54.8 mL of BaCl2 solution is needed to precipitate all the sulfate in a 554 mg sample of Na2SO4 (forming BaSO4), what is the molarity of the solution?
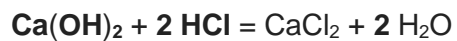
$BaCl_2+Na_2SO_4->BaSO_4(осадок)+2NaCl$

$C_M=n/V$, $n=C_M \times V$, $V=n/C_M$, n=m/Mr

n=m/Mr = 0.554 / 142 = 0.0039 mol (Na_2SO_4)

0.0039 ($BaCl_2$)

$C_M=n/V$ = 0.0039/0.0548 = 0.0712 M

(d) If 47.5 mL of 0.375 M HCl solution is needed to neutralize a solution of Ca(OH)2, how many grams of Ca(OH)2 must be in the solution?

$Ca(OH)_2 + 2\ HCl = CaCl_2 + 2\ H_2O$

$C_M = n/V$, $n = C_M \times V$, $V = n/C_M$, $n = m/Mr$

$n = C_M \times V = 0.375 \times 0.0475 = 0,0178125$ (HCl)

$0,0178125 \times 2 = 0,035625$ mol (**Ca(OH)$_2$**)

$n = m/Mr$, therefore $m = n \times Mr = 0.035625 \times 74 = $ 2,63625 gr.

Answer provided by www.AssignmentExpert.com