SOLUTIONS

TEST

Molarity

Date:

1. $1,2*10^{24}$ molecules of H_2SO_4 are dissolved in water to prepare 400 mL of solution. What is the molarity of H_2SO_4 solution ?

   A) 5 B) 0,4 C) 12 D) 0,8 E) 2

2. To prepare 300 mL of 0,2 M $NaNO_3$ solution, how many grams of solute are necessary ? ($NaNO_3$: 85)

   A) 5,1 B) 0,3 C) 3,2 D) 17 E) 0,06

3. 8,2 L of HCl gas measured at 0,75 atm and 27 ºC is used to prepare a 2,5 L HCl solution. What is the molarity of HCl in the solution ?

   A) 0,25 B) 0,05 C) 3,28 D) 0,20 E) 0,10

4. 6,84 g of $Al_2(SO_4)_3$ is used to prepare 400 mL of solution. Which one of the following statements is wrong for this solution ? ($Al_2(SO_4)_3$: 342 g/mol)

   A) The solution contains 0,02 mol of solute.
   B) $[Al^{3+}]$ = 0,1 M in the solution
   C) $[SO_4^{2-}]$ = 0,15 M in the solution
   D) If 600 mL of water is added to the solution, $[SO_4^{2-}]$ becomes 0,06 M.
   E) When the volume of the solution is decreased to 200 mL by evaporating water, $[Al^{3+}]$ becomes 0,15 M.

5. A 100 mL of 10 % NH_3 solution that has a density of 0,85 g/mL is diluted to 1000 mL. Which is the molarity of NH_3 in the resulting solution ? (NH_3 = 17 g/mol)

   A) 5 B) 2,5 C) 1,5 D) 0,5 E) 1

6. Concentrated HNO_3 solution is 50,4 % by mass and has a density of 1,3 g/mL. What is the molarity of the solution ? (HNO_3 : 63 g/mol)

   A) 20,8 B) 0,8 C) 38,7 D) 10,4 E) 5,2

7. To prepare 400 mL of 2 M H_2SO_4 solution, 100 mL of H_2SO_4 solution whose density is 1,4 g/mL are used. What is the percentage concentration of the given solution ? (H_2SO_4 : 98 g/mol)

   A) 78,4 B) 56 C) 0,8 D) 140 E) 72

8. What is the molarity of 200 g of 28 % by mass KOH solution which has a density of 1,2 g/mL ? (KOH : 56)

   A) 2 B) 6 C) 4 D) 3 E) 8

9. Equal volumes of 0,4 M $NaNO_3$ and 0,6 M $Ca(NO_3)_2$ solutions are mixed. What is the molar concentration of NO_3^- ions in the mixture ?

   A) 0,4 B) 1,2 C) 0,8 D) 1,6 E) 1

10. How many mL of 98 % H_2SO_4 by mass solution with a density of 1,84 g/mL are needed to prepare 100 mL of 0,1 M H_2SO_4 solution ?

    A) 1,84 B) 9,8 C) 0,543 D) 5,43 E) 18,4

11. 800 mL of water is added to 400 mL of 0,6 M $CaCl_2$ solution. What is the molar concentration of Cl^- ions after dilution ?

    A) 1,2 B) 0,4 C) 0,8 D) 0,6 E) 2,4

12. A solution is prepared by dissolving 17,1 g of $Al_2(SO_4)_3$ in sufficient water to make 500 mL of solution. What is the concentration of SO_4^{-2} ions in the solution ?

    A) 0,05 B) 0,3 C) 0,1 D) 0,2 E) 0,15

13. How many grams of $Al_2(SO_4)_3$ are present in 200 mL solution of it if SO_4^{-2} ion molar concentration is 0,3 M ?

    A) 61,56 B) 20,52 C) 6,84 D) 34,2 E) 13,68

14. 200 mL of a solution is prepared by using 9,8 grams of Na_2CO_3. x H_2O. The concentration of Na^+ ion is 0,5 M in the solution. What is the numerical value of the coefficient x in Na_2CO_3. x H_2O ?

    A) 1 B) 2 C) 5 D) 10 E) 12

15. What volume of a 20 % NaOH solution, having a density of 1,2 g/mL, is required to prepare 200 mL of 0,15 M NaOH solution ? (in mililiters)

    A) 5 B) 10 C) 50 D) 100 E) 25

16. The concentration of X^{+3} ions in a solution made by dissolving 4 g of salt $X_2(YZ_4)_3$ in 100 mL of the solution is 0,2 M. If the salt contains 24 % Y and 48 % Z by mass, what is the atomic mass of the element represented by X ?

    A) 56 B) 112 C) 96 D) 32 E) 16

17. When **x** liters of 0,1 M Na_2SO_4 solution and **y** liters of 0,3 M $NaNO_3$ solution are mixed, the concentration of Na^+ ions is 0,24 M. What is the x/y ratio ?

    A) 1/2 B) 3/2 C) 2/3 D) 1/3 E) 5/2

18. 30 mL of 2 M XCl_2 solution is 41,6 g. If the solution is 30 % by mass, what is the atomic weight of X ? (Cl : 35,5)

    A) 87,5 B) 137 C) 33 D) 208 E) 104

19. 600 mL of 0,5 M $X(OH)_2$ solution is prepared from 255 g $X(OH)_2$ solution that contains 20 % $X(OH)_2$ by mass. What is the atomic weight of X ? (O: 16, H: 1)

    A) 51 B) 56 C) 27 D) 170 E) 136

20. When a 8,22 g mixture of $CaCl_2$ and $AlCl_3$ is dissolved in sufficient water to make 400 mL of solution, the Cl^- concentration in the solution is found to be 0,4 M. What is the mass of $AlCl_3$ in the original mixture ?

    A) 3,66 B) 5,55 C) 21,36 D) 4,11 E) 2,67

21. What is the molar concentration of Cl^- ions if 300 mL of 0,2 M NaCl, 400 mL of 0,3 M $MgCl_2$ and 300 mL of 0,2 M $AlCl_3$ solutions are mixed ?

    A) 0,06 B) 0,12 C) 0,24 D) 0,48 E) 0,96