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so many fake sites. this is the first one which worked! Many thanks

19. What volume of a 0.100 M NaCl solution is needed to prepare 200 mL of a 0.100 M NaCl solution?

$$(0.500 \text{ M})(V_1) = (0.100 \text{ M})(200 \text{ mL})$$
$$V_1 = 50.0 \text{ mL}$$

20. 20.0 mL of a 0.100 M solution of the salt NaCl is mixed with 80.0 mL of water. After several days the volume of solution is reduced to 100.0 mL. What is the molarity of the new solution after evaporation? If the volume is reduced to 100 mL, what is the new molarity after dilution? (2 answers)

$$(20.0 \text{ mL})(0.100 \text{ M}) = M_2(100.0 \text{ mL}) \quad (0.100 \text{ M})(200 \text{ mL}) = M_2(100.0 \text{ mL})$$
$$M_2 = 0.200 \text{ M} \quad M_2 = 0.200 \text{ M}$$

21. What mass of sodium chloride must be added to 200 mL of a 0.100 M solution of sodium chloride?

$$200 \text{ mL} \times 0.100 \text{ M} = 0.020 \text{ mol} \quad \frac{58.44 \text{ g}}{1 \text{ mol}} = 1.168 \text{ g}$$

22. 200 mL of a 0.100 M sodium chloride solution is diluted to a new volume of 500 mL. What is the new molarity of the solution?

$$(0.100 \text{ M})(200 \text{ mL}) = M_2(500 \text{ mL})$$
$$M_2 = 0.040 \text{ M}$$

23. How many grams of potassium sulfate are needed to prepare 200 mL of a 0.100 M solution?

$$200 \text{ mL} \times 0.100 \text{ M} = 0.020 \text{ mol} \quad \frac{174.18 \text{ g}}{1 \text{ mol}} = 3.484 \text{ g}$$

24. Calculate the molar concentration of all ions in a solution that contains 0.100 mol of copper(II) sulfate in 100 mL of solution.

$$\text{CuSO}_4 \rightarrow \text{Cu}^{2+} + \text{SO}_4^{2-}$$
$$0.100 \text{ mol} \quad \frac{0.100 \text{ mol}}{0.100 \text{ L}} = 1.00 \text{ M} \quad \frac{0.100 \text{ mol}}{0.100 \text{ L}} = 1.00 \text{ M}$$

25. A student places 1.00 g of salt containing aluminum in water. (a) How many moles of aluminum ions are in the solution? (b) How many moles of sulfate ions are in the solution? (c) How many moles of aluminum sulfate are in the solution?

The Cu salt is soluble since it contains a transition metal.

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