You dissolve 11.7 g of NaCl (FW = 58.5 g/mol) in 100 mL of water. You then dilute it to 1.0 L. What is the final concentration in M?

Prepare a solution by dissolving 180 g of glucose (FW = 180 g/mol) in 250 mL water. Then dilute it to 2.0 L. What is the final concentration in % (w/v) and Molarity?

You dissolve 37 g of $CaCl_2$ (FW = 111 g/mol) in 300 mL and dilute to 900 mL. What is the final concentration in % (w/v)?

You make a 2.0 M NaOH solution by dissolving 80 g (FW = 40 g/mol) in water. If this is diluted to 2.0 L, what is the final concentration in parts and Molarity?

Dissolve 6.3 g of KCl (FW = 74.5 g/mol) in 100 mL and dilute to 500 mL. What is the concentration in (w/v)?

You have 250 mL of 1.0 M HCl. If you evaporate 50 mL of water, what is the new concentration in % (w/v)?

You dissolve 9.5 g of NaOH (FW = 40.0 g/mol) in 200 mL of water, then dilute it to 1.5 L. What is the final concentration in parts and molarity?

You dissolve 27.0 g of KNO_3 (FW = 101.1 g/mol) in 150 mL of water and dilute the solution to 1.0 L. What is the final concentration in parts and %?

A student dissolves 120 g of glucose (FW = 180 g/mol) in 300 mL water and dilutes it to 2.4 L. What is the resulting molarity?

Dissolve 222 g of $CaCl_2$ (FW = 111.0 g/mol) in 400 mL, then dilute it to 2.0 L. What is the final concentration in %?

You prepare a solution by dissolving 14.6 g of NaCl (FW = 58.5 g/mol) in 100 mL of water. If the total solution is then diluted to 500 mL, what is the concentration in parts and Molarity?

Dissolve 8.0 g of acetic acid (FW = 60.0 g/mol) in 160 mL and then dilute to 640 mL. What is the molarity?

You dissolve 11.7 g of NaCl (FW = 58.5 g/mol) in 100 mL of water. You then dilute it to 1.0 L. What is the final concentration in M?

$$C_1 = \frac{m}{\forall_{total}}$$

$$C_1 = \frac{11.7\,g}{100\,mL}\left(\frac{1\ mol}{58.5\,g}\right)\left(\frac{1000\,mL}{1\,L}\right) = 2\,M$$

$$C_1 V_1 = C_2 V_2$$

$$[2M][100\,mL] = C_2[1.0\,L]$$

$$C_2 = \frac{(2M)(100\,mL)}{1.0\,L}\left(\frac{1\,L}{1000\,mL}\right)$$

$$C_2 = 0.2\,M$$

$$\boxed{C_2 = 0.2\,M}$$

Prepare a solution by dissolving 180 g of glucose (FW = 180 g/mol) in 250 mL water. Then dilute it to 2.0 L. What is the final concentration in % (w/v) and Molarity?

$$C_1 = \frac{M}{V_{total}}$$

$$C_1 = \frac{180\,g}{250\,mL} = \left(0.72\,\frac{g}{mL}\right)\left(\frac{100\,mL}{100\,mL}\right) = 72\,\frac{g}{100\,mL} = 72\,\%$$

$$C_1V_1 = C_2V_2$$

$$(72\%)(250\,mL) = C_2(2.0\,L)$$

$$C_2 = \frac{(72\%)(250\,mL)}{(2.0\,L)}\left(\frac{1\,L}{1000\,mL}\right) = 9\,\%$$

$$\boxed{C_2 = 9.0\,\%}$$

$$C_2 = 9\,\% = 9\,\frac{g}{100\,mL}\left(\frac{mol}{180\,g}\right)\left(\frac{1000\,mL}{1\,L}\right) = 1\,\frac{mol}{L}$$

$$\boxed{C_2 = 1.0\,M}$$

You dissolve 37 g of $CaCl_2$ (FW = 111 g/mol) in 300 mL and dilute to 900 mL. What is the final concentration in % (w/v)?

$$C_1 = \frac{m}{V_{total}}$$

$$C_1 = \frac{37\,g}{300\,mL} = 0.12\bar{3}\ \frac{g}{mL}\left(\frac{100\,mL}{100\,mL}\right) = 12.\bar{3}\ \%$$

$$C_1 V_1 = C_2 V_2$$

$$(12.\bar{3}\%)(300\,mL) = C_2(900\,mL)$$

$$C_2 = \frac{(12.3\%)(300\,mL)}{900\,mL} = 4.\bar{1}\ \%$$

$$\boxed{C_2 = 4\ \%}$$

You make a 2.0 M NaOH solution by dissolving 80 g (FW = 40 g/mol) in water. If this is diluted to 2.0 L, what is the final concentration in parts and Molarity?

$$2.0\,M = 2.0\,\frac{mol}{L}\left(40\,\frac{g}{mol}\right) = 80\,\frac{g}{L}$$

$$C = \frac{m}{V_{total}}$$

$$\left[80\,\frac{g}{L}\right] = \frac{[80\,g]}{V_{total}}, \quad V_{total} = \frac{(1\,L)(80\,g)}{80\,g} = 1\,L$$

$$C_1V_1 = C_2V_2$$

$$(2.0\,M)(1\,L) = C_2(2.0\,L)$$

$$C_2 = \frac{(2.0\,M)(1\,L)}{2.0\,L} = 1\,M$$

$$\boxed{C_2 = 1\,M}$$

$$C_2 = 1\,M = 1\,\frac{mole}{L}\left(40\,\frac{g}{mol}\right) = 40\,\frac{g}{L} = 40\,ppt$$

$$\boxed{C_2 = 40\,ppt}$$

Dissolve 6.3 g of KCl (FW = 74.5 g/mol) in 100 mL and dilute to 500 mL. What is the concentration in (w/v)?

$$C_1 = \frac{m}{v} = \frac{6.3\,g}{100\,mL} = 0.063\ \frac{g}{mL}$$

$$C_1V_1 = C_2V_2$$

$$\left[\frac{0.063\,g}{mL}\right]\left[100\,mL\right] = C_2\left[500\,mL\right]$$

$$C_2 = \frac{(0.063\,g)(100\,mL)}{(1\,mL)(500\,mL)} = 0.0126\ \frac{g}{mL}\left(\frac{1000\,mL}{1\,L}\right)$$

$$= 12.6\ \frac{g}{L}$$

$$\boxed{C_2 = 10\ \frac{g}{L}}$$

You have 250 mL of 1.0 M HCl. If you evaporate 50 mL of water, what is the new concentration in % (w/v)?

assume 250 mL = 250. mL & 50 mL = 50. mL

$$C_1 V_1 = C_2 V_2$$

$$[1.0\,M][250\,mL] = C_2[250 - 50\,mL]$$

$$C_2 = \frac{(1\,M)(250\,\cancel{mL})}{200\,\cancel{mL}} = 1.25\,M$$

$$HCl = (H) + (Cl) = (1.00794) + (35.453) = 36.461\ \frac{g}{mol}$$

$$C_2 = 1.25\,M = 1.25\ \frac{\cancel{mol}}{L}\left(36.461\ \frac{g}{\cancel{mol}}\right) = 45.576\ \frac{g}{L}$$

$$= 45.576\ \frac{g}{\cancel{L}}\left(\frac{1\,\cancel{L}}{1000\,\cancel{mL}}\right)\left(\frac{100\,\cancel{mL}}{100\,mL}\right) = 4.56\ \frac{g}{100\,mL}$$

$$\boxed{C_2 = 4.6\ \%}$$

You dissolve 9.5 g of NaOH (FW = 40.0 g/mol) in 200 mL of water, then dilute it to 1.5 L. What is the final concentration in parts and molarity?

assume $200\ mL = 2.00 \times 10^2\ mL$

$$C_1 = \frac{m}{\forall_{total}} = \frac{9.5\,g}{200\,mL} = 0.0475\ \frac{g}{mL}$$

$$C_1 V_1 = C_2 V_2$$

$$\left[\frac{0.0475\,g}{1\,mL}\right]\left[200\,mL\right] = C_2\left[1.5\,L\right]$$

$$C_2 = \frac{(0.0475\,g)(200\,mL)}{(1\,mL)(1.5\,L)} = 6.\bar{3}\ \frac{g}{L} = 6.\bar{3}\ ppt$$

$$\boxed{C_2 = 6.3\ ppt}$$

$$C_2 = 6.\bar{3}\ \frac{g}{L}\left(\frac{mol}{40\,g}\right) = 0.158\ \frac{mol}{L} = 0.158\ M$$

$$\boxed{C_2 = 0.16\ M}$$

You dissolve 27.0 g of KNO_3 (FW = 101.1 g/mol) in 150 mL of water and dilute the solution to 1.0 L. What is the final concentration in parts and %?

$$C_1 = \frac{m}{V_{total}} = \frac{27.0\ g}{150\ mL} = 0.18\ \frac{g}{mL}$$

dilution:

$$C_1 V_1 = C_2 V_2$$

$$\left[\frac{0.18\ g}{1\ mL}\right]\left[150\ mL\right] = C_2\left[1\ L\right]$$

$$C_2 = \frac{(0.18\ g)(150\ mL)}{(1\ mL)(1\ L)} = 27\ \frac{g}{L} = 27\ ppt$$

$$\boxed{C_2 = 27\ ppt}$$

$$C_2 = 27\ \frac{g}{L}\left(\frac{1\ L}{1000\ mL}\right)\left(\frac{100\ mL}{100\ mL}\right) = 2.7\ \frac{g}{100\ mL}$$

$$\boxed{C_2 = 2.7\ \%}$$

A student dissolves 120 g of glucose (FW = 180 g/mol) in 300 mL water and dilutes it to 2.4 L. What is the resulting molarity?

assume $300\ mL = 3.00 \times 10^2\ mL$

concentration:

$$C = \frac{m}{V_{total}} = \frac{120\ g}{300\ mL} = 0.4\ \frac{g}{mL}$$

dilution:

$$C_1V_1 = C_2V_2$$

$$\left[\frac{0.4\ g}{1\ mL}\right]\left[300\ mL\right] = C_2\left[2.4\ L\right]$$

$$C_2 = \frac{(0.4\ g)(300\ mL)}{(1\ mL)(2.4L)} = 50\ \frac{g}{L}\left(\frac{1\ mol}{180\ g}\right) = 0.2\overline{7}\ \frac{mol}{L}$$

$$\boxed{C_2 = 0.27\ M}$$

Dissolve 222 g of $CaCl_2$ (FW = 111.0 g/mol) in 400 mL, then dilute it to 2.0 L. What is the final concentration in %?

assume $400\ mL = 4.00 \times 10^2\ mL$

concentration:

$$C_1 = \frac{m}{V} = \frac{222\ g}{400\ mL} = 0.555\ \frac{g}{mL}$$

dilution:

$$C_1 V_1 = C_2 V_2$$

$$\left[\frac{0.555\ g}{1\ mL}\right]\left[400\ mL\right] = C_2\left[2\ L\right]$$

$$C_2 = \frac{(0.555\ g)(400\ \cancel{mL})}{(1\ \cancel{mL})(2\ L)} = 111\ \frac{g}{L}$$

units:

$$C_2 = 111\ \frac{g}{L}\left(\frac{1\ \cancel{L}}{1000\ \cancel{mL}}\right)\left(\frac{100\ \cancel{mL}}{100\ mL}\right) = 11.1\ \frac{g}{100\ mL}$$

$$C_2 = 11\ \%$$

You prepare a solution by dissolving 14.6 g of NaCl (FW = 58.5 g/mol) in 100 mL of water. If the total solution is then diluted to 500 mL, what is the concentration in parts and Molarity?

assume: $100\ mL = 1.00 \times 10^2\ mL$ & $500\ mL = 5.00 \times 10^2\ mL$

concentration:

$$C_1 = \frac{m}{V} = \frac{14.6\ g}{100\ mL} = 0.146\ \frac{g}{mL}$$

dilution:

$$C_1V_1 = C_2V_2$$

$$\left[\frac{0.146\ g}{1\ mL}\right]\left[100\ mL\right] = C_2\left[500\ mL\right]$$

$$C_2 = \frac{(0.146\ g)(100\ mL)}{(1\ mL)(500\ mL)} = 0.0292\ \frac{g}{mL}$$

units:

$$C_2 = 0.0292\ \frac{g}{mL}\left(\frac{1000\ mL}{1\ L}\right) = 29.2\ \frac{g}{L} = 29.2\ ppt$$

$$\boxed{C_2 = 29.2\ ppt}$$

$$C_2 = 0.0292\ \frac{g}{mL}\left(\frac{1\ mol}{58.5\ g}\right)\left(\frac{1000\ mL}{1\ L}\right) = 0.4991\ \frac{mol}{L}$$

$$\boxed{C_2 = 0.499\ M}$$

Dissolve 8.0 g of acetic acid (FW = 60.0 g/mol) in 160 mL and then dilute to 640 mL. What is the molarity?

concentration:

$$C_1 = \frac{8\ g}{160\ mL} = 0.05\ \frac{g}{mL}$$

dilution:

$$C_1V_1 = C_2V_2$$

$$\left[\frac{0.05\ g}{1\ mL}\right]\left[160\ mL\right] = C_2\left[640\ mL\right]$$

$$C_2 = \frac{(0.05\ g)(160\ \cancel{mL})}{(1\ mL)(640\ \cancel{mL})} = 0.0125\ \frac{g}{mL}$$

units:

$$C_2 = 0.0125\ \frac{\cancel{g}}{\cancel{mL}}\left(\frac{1\ mol}{60.0\ \cancel{g}}\right)\left(\frac{1000\ \cancel{mL}}{1\ L}\right) = 0.208\bar{3}\ \frac{mol}{L}$$

$$\boxed{C_2 = 0.21\ M}$$