You have a solution with a concentration [4.2 x 10^7 cells/mL], how would you dilute your cells to get a concentration of [2.1 cells/mL].

You dilute 100uL of a sample containing 1x10^6 cells/mL to a total volume of 1.0mL,

a) what is the concentration of the cells in the final (diluted) solution.
b) what is the dilution factor.

You preform a 1/10 dilution a stock solution (concentration of 10mg/mL), you then take a 1.0mL sample of the dilution, how much solute would there be in the sample solution.

You make a series of five (1/10) dilutions of your stock culture and bacteria, you then plate 1mL onto TSA agar from each of your five dilutions. If you count 100 colonies on your fifth plate, what is the concentration (in cells/mL) of your stock solution.

You have a 20%(v/v) solution of SDS, you want to make 1.0mL of a 1%(v/v) solution of SDS, how much diluent would you add.

If you have a pellet that contains 372.56 nmoles of DNA how would you make a 100µM solution.

How would you make 160mL of 1X TBE from a 5X stock.

You need 112ppm calcium in a 3.2L final volume, If you have a stock solution of 3M $CaCl_2$, how much chlorine do you end up with.
MW (Ca) = 40.08 g/mol
MW (Cl) = 35.43 g/mol

You have a BSA standard that is 3mg/mL, how much of this would you need to add to 6mL of Coomassie Blue to attain a final concentration of [100µg/mL].

18g/L of a particular chemical is required to obtain a 0.2M solution, how much of this chemical is required to obtain a 300µM solution.

How much Tris base is required to make up 600mL of 0.4M Tris. MW (Tris) = 121.1 g/mol.

If 800mg/mL gives you 800ppm how much gives you 400ppm.

If you prepare a 1/5 dilution of a 150mg/mL solution, what is the final concentration of the solution.

You have 10mL of [50mg/mL] Ethidium Bromide, you need to make 5000µL of [10mg/mL] working stock, how would you do this.

You need to make 5000uL of [10mg/mL] solution of Ethidium Bromide, how much [50mg/mL] Ethidium Bromide solution would you need.

How would you make $1.2x10^{-3}$ L of 1X TBE from a 6X stock.

You have a solution with a concentration [4.2 x 10⁷ cells/mL], how would you dilute your cells to get a concentration of [2.1 cells/mL].

$C_1 = 4.2 \times 10^7$ cells/mL

$C_2 = 2.1$ cells/mL

use: $C_1V_1 = C_2V_2$

$$\frac{V_1}{V_2} = \frac{C_2}{C_1} = \frac{2.1 \text{ cells/mL}}{4.2 \times 10^7 \text{ cells/mL}}$$

$$\frac{V_1}{V_2} = 5 \times 10^{-8}$$

$$\frac{V_1}{V_2} = \frac{\text{solute volume}}{\text{Final volume}} = \text{dilution}$$

$$DF = \frac{1}{\text{dilution}} = \frac{1}{5 \times 10^{-8}} = 2 \times 10^7$$

use a dilution $= 5 \times 10^{-8}$

$DF = 2 \times 10^7$

You dilute 100uL of a sample containing 1x10⁶ cells/mL to a total volume of 1.0mL,

a) what is the concentration of the cells in the final (diluted) solution.

b) what is the dilution factor.

$C_1 = 1 \times 10^6$ cells/mL

$V_1 = 100\ \mu L$

$V_2 = 1.0$ mL

use: $C_1V_1 = C_2V_2$

$$C_2 = \frac{C_1V_1}{V_2} = \frac{(1 \times 10^6 \frac{\text{cells}}{\text{mL}})(100\ \mu L)}{(1.0 \text{ mL})}$$

$$C_2 = 1 \times 10^8 \frac{\text{cells}}{\text{mL}} \frac{\mu L}{1} \frac{1}{\text{mL}} \left(\frac{\text{mL}}{1000\ \mu L}\right)$$

$$C_2 = 1 \times 10^5 \frac{\text{cells}}{\text{mL}} \left(\frac{\text{mL}}{1000\ \mu L}\right)$$

$C_2 = 100$ cells/μL

$$DF = \frac{\text{Final volume}}{\text{solute volume}}$$

$$DF = \frac{1 \text{ mL}}{100\ \mu L} \left(\frac{1000\ \mu L}{1 \text{ mL}}\right)$$

$DF = 10$

You preform a 1/10 dilution a stock solution (concentration of 10mg/mL), you then take a 1.0mL sample of the dilution, how much solute would there be in the sample solution.

$C_1 = 10 \text{ mg/mL}$

$\text{dilution} = \frac{1}{10} = 0.1 = \frac{V_1}{V_2}$

use $C_1 V_1 = C_2 V_2$

$C_2 = C_1 \frac{V_1}{V_2} = (C_1)(\text{dilution})$

$C_2 = (10 \text{ mg/mL})(0.1)$

$C_2 = 1 \text{ mg/mL}$

now

use

$C = \frac{M}{V}$

$M = CV = (1 \text{ mg/mL})(1.0 \text{ mL}) = 1 \text{ mg}$

You make a series of five (1/10) dilutions of your stock culture and bacteria, you then plate 1mL onto TSA agar from each of your five dilutions. If you count 100 colonies on your fifth plate, what is the concentration (in cells/mL) of your stock solution.

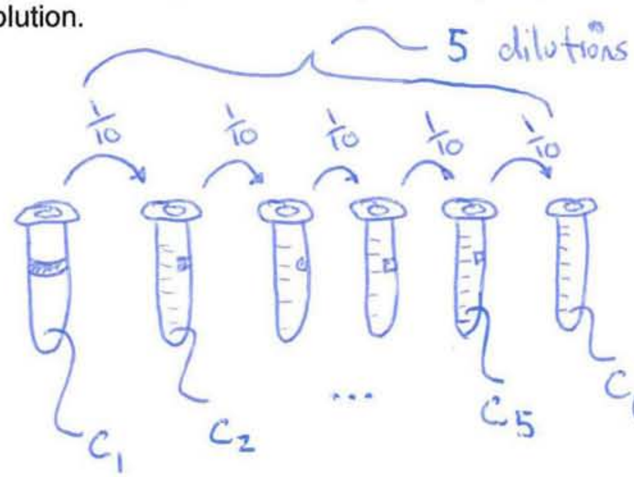
$\text{dilution} = \frac{1}{10} = 0.1$

$V_6 = 1 \text{ mL}$

$M_6 = 100 \text{ colonies}$

$C_6 = \frac{M_6}{V_6} = \frac{100 \text{ colonies}}{1 \text{ mL}}$

$C_6 = 100 \text{ colonies/mL}$



use

$C_1 V_1 = C_2 V_2$

$C_1 = C_2 \left(\frac{V_2}{V_1}\right) = C_2 \left(\frac{1}{\text{dilution}}\right) = C_3 \left(\frac{1}{\text{dilution}}\right)^2 = \ldots = C_6 \left(\frac{1}{\text{dilution}}\right)^5$

$C_1 = (100 \text{ colonies/mL})\left(\frac{1}{0.1}\right)^5 = 1 \times 10^7 \text{ colonies/mL}$

You have a 20%(v/v) solution of SDS, you want to make 1.0mL of a 1%(v/v) solution of SDS, how much diluent would you add.

$$C_1 = 20\,\%\,(v/v) = \frac{20\ mL}{100\ mL}$$

use:

$$C_1V_1 = C_2V_2$$

$$V_2 = 1.0\ mL$$

$$C_2 = 1\,\%\,(v/v) = \frac{1\ mL}{100\ mL}$$

$$V_1 = \frac{C_2V_2}{C_1}$$

$$V_1 = \frac{\left(1 \frac{mL}{100\,mL}\right)(1\ mL)}{\left(20 \frac{mL}{100\,mL}\right)}$$

$$V_1 = 0.05\ mL$$

solvent volume = 1 mL − 0.05 mL = 0.95 mL

solute volume

total = 1.0 mL

If you have a pellet that contains 372.56 nmoles of DNA how would you make a 100µM solution.

$$C_1 = 372.56\ \frac{n\,mol}{pellet}$$

Set:

$$C_1 = C_2$$

$$C_2 = 100\,\mu M = 100\ \frac{\mu mol}{L}$$

$$\frac{372.56\ n\,mol/pellet}{x} = \frac{100\,\mu mol}{1\,L}$$

$$x = 372.56\left(\frac{n\,mol}{pellet}\right)\left(\frac{1\ L}{100\,\mu mol}\right)$$

$$= 3.7256\left(\frac{n\,mol}{pellet}\cdot\frac{1L}{\mu mol}\right)\left(\frac{\mu mol}{10^3\ n\,mol}\right)$$

$$= 3.7256 \times 10^{-3}\ L/pellet\ \left(\frac{10^3\ mL}{L}\right)$$

$$= 3.7256\ mL/pellet$$

$$\boxed{x = 3.7256\ mL/pellet}$$

How would you make 160mL of 1X TBE from a 5X stock.

$V_2 = 160\ mL$

$C_2 = 1X$

$C_1 = 5X$

use $C_1V_1 = C_2V_2$

$V_1 = \frac{C_2V_2}{C_1} = \frac{(1X)(160\ mL)}{(5X)}$

$V_1 = 32\ mL$ → solute volume

so

solvent volume $= 160mL - 32mL$

$= 128\ mL$

You need 112ppm calcium in a 3.2L final volume, If you have a stock solution of 3M $CaCl_2$, how much chlorine do you end up with.
MW (Ca) = 40.08 g/mol
MW (Cl) = 35.43 g/mol

$C_2 = 112\ ppm = \frac{112\ mg}{L}$

$V_2 = 3.2\ L$

$C_1 = 3M = \frac{3\ moles}{L}\left(40.08\ \frac{g}{mol}\right) = 120.24\ g/L$ (this is of Ca only, because that is the concentration of intrest.)

use: $C_1V_1 = C_2V_2$

$V_1 = \frac{C_2V_2}{C_1} = \frac{(112\ \frac{mg}{L})(3.2\ L)}{(120.24\ g/L)} = 2.98\ \frac{mg}{L}\ \frac{L}{1}\ \frac{L}{g}\left(\frac{g}{1000\ mg}\right)$

$= 2.98 \times 10^{-3}\ L\left(\frac{1000\ mL}{L}\right) = 2.98\ mL$ (of Ca)

so

$CaCl_2 \Rightarrow V_{Cl_2} = V_{Ca} = 2.98\ mL$ (of Cl_2)

2.98 mL of Cl_2

You have a BSA standard that is 3mg/mL, how much of this would you need to add to 6mL of Coomassie Blue to attain a final concentration of [100µg/mL].

$C_1 = 3\ mg/mL$

$V_2 = 6\ mL$

$C_2 = 100\ \mu g/mL$

use:

$$C_1 V_1 = C_2 V_2$$

$$V_1 = \frac{C_2 V_2}{C_1}$$

$$V_1 = \frac{(100\ \mu g/mL)(6\ mL)}{(3\ mg/mL)}$$

$$V_1 = 200 \frac{\mu g}{mL} \frac{mL}{1} \frac{mL}{mg} \left(\frac{1\ mg}{1000\ \mu g}\right)$$

$$\boxed{V_1 = 0.2\ mL}$$

18g/L of a particular chemical is required to obtain a 0.2M solution, how much of this chemical is required to obtain a 300µM solution.

$C_{1in} = 18\ g/L$

$C_{1out} = 0.2\ M$

$C_{2out} = 300\ \mu M$

use:

$$\frac{C_{1in}}{C_{1out}} = \frac{C_{2in}}{C_{2out}}$$

$$C_{2in} = C_{2out}\left(\frac{C_{1in}}{C_{1out}}\right)$$

$$C_{2in} = (300\ \mu M)\left(\frac{18\ g/L}{0.2\ M}\right)$$

$$C_{2in} = 2.7\times10^4 \frac{\mu M}{1} \frac{g}{L} \frac{1}{M}\left(\frac{M}{10^6\ \mu M}\right)$$

$$C_{2in} = 0.027\ g/L \left(\frac{1000\ mg}{1 g}\right)$$

$$\boxed{C_{2in} = 27\ mg/L}$$

How much Tris base is required to make up 600mL of 0.4M Tris. MW (Tris) = 121.1 g/mol.

$V_2 = 600\ mL$

$C_2 = 0.4\ M = \frac{0.4\ mole}{L}\left(121.1\ \frac{g}{mol}\right) = 48.44\ g/L$

use

$C = \frac{M}{V}$

$M = CV = (48.44\ g/L)(600\ mL)\left(\frac{1\ L}{1000\ mL}\right)$

$M = 29.1\ g$

If 800mg/mL gives you 800ppm how much gives you 400ppm.

part A　　　　part B.

Part A:

$C_1 = 800\ mg/mL$

$C_2 = 800\ ppm$

use

$C_1V_1 = C_2V_2$

$dilution = \frac{V_1}{V_2} = \frac{C_2}{C_1}$

$= \frac{800\ ppm}{800\ mg/mL}$

$dilution = 1\ \frac{ppm}{1}\ \frac{mL}{mg}$

Part B:

$C_2 = 400\ ppm$

use

$C_1V_1 = C_2V_2$

$dilution = \frac{V_1}{V_2} = \frac{C_2}{C_1}$

$C_1 = \frac{C_2}{dilution} = \frac{400\ ppm}{1\ \frac{ppm \cdot mL}{mg}}$

$C_1 = 400\ \frac{ppm}{1}\ \frac{mg}{ppm \cdot mL}$

$C_1 = 400\ mg/mL$

If you prepare a 1/5 dilution of a 150mg/mL solution, what is the final concentration of the solution.

$\text{dilution} = \frac{1}{5} = 0.2 = \frac{V_1}{V_2}$

$C_1 = 150 \text{ mg/mL}$

use

$C_1 V_1 = C_2 V_2$

$C_2 = C_1 \left(\frac{V_1}{V_2}\right) = C_1 (\text{dilution})$

$C_2 = (150 \text{ mg/mL})(0.2)$

$\boxed{C_2 = 30 \text{ mg/mL}}$

You have 10mL of [50mg/mL] Ethidium Bromide, you need to make 5000µL of [10mg/mL] working stock, how would you do this.

$C_1 = 50 \text{ mg/mL}$

$C_2 = 10 \text{ mg/mL}$

$V_2 = 5000 \ \mu L$

use:

$C_1 V_1 = C_2 V_2$

$V_1 = \frac{C_2 V_2}{C_1}$

$V_1 = \frac{(10 \text{ mg/mL})(5000 \ \mu L)}{(50 \text{ mg/mL})}$

$V_1 = 1000 \ \frac{\text{mg}}{\text{mL}} \frac{\mu L}{1} \frac{\text{mL}}{\text{mg}}$

$V_1 = 1000 \ \mu L \left(\frac{1 \text{ mL}}{1000 \ \mu L}\right)$

$\boxed{V_1 = 1 \text{ mL}}$

take 1mL of the 10mL you have.

You need to make 5000uL of [10mg/mL] solution of Ethidium Bromide, how much [50mg/mL] Ethidium Bromide solution would you need.

$V_2 = 5000\,\mu L$

$C_2 = 10\ mg/mL$

$C_1 = 50\ mg/mL$

use.

$$C_1V_1 = C_2V_2$$

$$V_1 = \frac{C_2V_2}{C_1}$$

$$V_1 = \frac{(10\ mg/mL)(5000\,\mu L)}{(50\ mg/mL)}$$

$$V_1 = 1000\ \frac{mg}{mL}\ \frac{\mu L}{1}\ \frac{mL}{mg}$$

$$V_1 = 1000\,\mu L\left(\frac{1\ mL}{1000\,\mu L}\right)$$

$$\boxed{V_1 = 1\ mL}$$

How would you make 1.2x10^{-3} L of 1X TBE from a 6X stock.

$V_2 = 1.2 \times 10^{-3}\ L$

$C_2 = 1X$

$C_1 = 6X$

use:

$$C_1V_1 = C_2V_2$$

$$V_1 = \frac{C_2V_2}{C_1}$$

$$V_1 = \frac{(1X)(1.2\times10^{-3}\ L)}{(6X)}$$

$$V_1 = 2\times10^{-4}\ L\left(\frac{1000\ mL}{1\ L}\right)$$

$$\boxed{V_1 = 0.2\ mL}$$

solute volume

so

$$\text{solvent volume} = 1.2\times10^{-3}\ L - 2\times10^{-4}\ L$$

$$= 1\times10^{3}\ L\left(\frac{1000\ mL}{1\ L}\right)$$

$$= 1\ mL$$