CORRECTION SHEET

Dilution

correction

1. **Calculate** the initial concentration of a 1.3 L solution used to make 8000mL of a 220 mg/L solution.

$C_1 = X$ mg/L
$C_2 = 220$ mg/L
$V_1 = 1.3$ L
$V_2 = 8000$ mL $= 8$ L

$C_1 V_1 = C_2 V_2$

$(X \frac{mg}{L})(1.3 L) = (220 \frac{mg}{L})(8 L)$

$X \frac{mg}{L} = \frac{(220 \text{ mg/L})(8 L)}{1.3 L}$

$C_1 = 1353.8 \frac{mg}{L} = 1.4$ g/L

2. You add 350 mL of water to a 1.1 L solution. The new solution has a concentration of 85 g/L. **Calculate** the concentration of the initial solution.

$C_1 = X$ g/L
$C_2 = 85$ g/L
$V_1 = 1.1$ L
$V_2 = 1.45$ L

$C_1 V_1 = C_2 V_2$

$(X \text{ g/L})(1.1 L) = (85 \text{ g/L})(1.45 L)$

$X \text{ g/L} = \frac{(85 \text{ g/L})(1.45 L)}{1.1 L}$

$C_1 = 112$ g/L

3. **Calculate** the final concentration of a 350 mL solution made from 25 mL of a 45 g/L solution.

$C_1 = 45$ g/L
$V_1 = 25$ mL
$C_2 = X$ g/L
$V_2 = 350$ mL

$C_1 V_1 = C_2 V_2$

$(45 \text{ g/L})(25 \text{ mL}) = (X \text{ g/L})(350 \text{ mL})$

$\frac{(45 \text{ g/L})(25 \text{ mL})}{(350 \text{ mL})} = X \text{ g/L}$

$C_2 = 3.2$ g/L

4. You add 50 mL to a 200 mL solution with a concentration of 26%. **Calculate** the concentration of the new solution.

$C_1 = 26\%$

$V_1 = 200\ mL$

$C_2 = X\%$

$V_2 = 250\ mL$

$C_1 V_1 = C_2 V_2$

$(26\%)(200\ mL) = (X\%)(250\ mL)$

$\frac{(26\%)(200\ mL)}{(250\ mL)} = X\%$

$C_2 = 20.8\%$

5. **Calculate** the the volume of of a 15 g/L solution needed to make 300 mL of a 400 mg/L solution.

$C_1 = 15\ g/L$

$V_1 = X\ mL$

$C_2 = 400\ mg/L = 0.4\ g/L$

$V_2 = 300\ mL$

$C_1 V_1 = C_2 V_2$

$(15\ g/L)(X\ mL) = (0.4\ g/L)(300\ mL)$

$(X\ mL) = \frac{(0.4\ g/L)(300\ mL)}{(15\ g/L)}$

$V_1 = 8\ mL$

6. You have a solution with a concentration of 25%. You want 500 mL of a 15% solution. **Calculate** the volume of the original solution needed.

$C_1 = 25\%$

$V_1 = X\ mL$

$C_2 = 15\%$

$V_2 = 500\ mL$

$C_1 V_1 = C_2 V_2$

$(25\%)(X\ mL) = (15\%)(500\ mL)$

$X\ mL = \frac{(15\%)(500\ mL)}{(25\%)}$

$V_1 = 300\ mL$

7. **Calculate** the volume of a 36 g/L solution made from 20 mL of a 80 g/L solution.

$C_1 = 80$ g/L
$V_1 = 20$ mL
$C_2 = 36$ g/L
$V_2 = X$ mL

$C_1 V_1 = C_2 V_2$

$(80 \text{ g/L})(20 \text{ mL}) = (36 \text{ g/L})(X \text{ mL})$

$$\frac{(80 \text{ g/L})(20 \text{ mL})}{(36 \text{ g/L})} = (X \text{ mL})$$

$V_2 = 44.4$ mL

8. **Calculate** the volume of a 20 g/L solution made from 100 mL of a 0.5 g/mL solution.

$C_1 = 0.5 \text{ g/mL} = 500 \text{ g/L}$
$V_1 = 100$ mL
$C_2 = 20$ g/L
$V_2 = X$ mL

$C_1 V_1 = C_2 V_2$

$(500 \text{ g/L})(100 \text{ mL}) = (20 \text{ g/L})(X \text{ mL})$

$$\frac{(500 \text{ g/L})(100 \text{ mL})}{(20 \text{ g/L})} = (X \text{ mL})$$

$V_2 = 2500 \text{ mL} = 2.5 \text{ L}$

9. You have 450 mL of a 28% solution. **Calculate** the volume of water added to make a 15% solution.

$C_1 = 28\%$
$V_1 = 450$ mL
$C_2 = 15\%$
$V_2 = X$ mL

$C_1 V_1 = C_2 V_2$

$(28\%)(450 \text{ mL}) = (15\%)(X \text{ mL})$

$$\frac{(28\%)(450 \text{ mL})}{(15\%)} = (X \text{ mL})$$

$V_2 = 840$ mL

Water added:

$V_2 - V_1 = 840 \text{ mL} - 450 \text{ mL} = 390 \text{ mL}$

10. You have a solution made with 47 g of solute and 550 mL of solvent

a. **Calculate** the concentration in g/L

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

550mL ÷ 1000 = 0.55L

$C = \frac{47\,g}{0.55\,L}$

$C = 85.5\,g/L$

b. **Calculate** the volume of a solution of 25 g/L made from the original solution.

$C_1 = 85.5\,g/L$

$V_1 = 550\,mL$

$C_2 = 25\,g/L$

$V_2 = X\,mL$

$C_1V_1 = C_2V_2$

$(85.5\,g/L)(550mL) = (25\,g/L)(X\,mL)$

$\frac{(85.5\,g/L)(550\,mL)}{(25\,g/L)} = (X\,mL)$

$V_2 = 1881\,mL = 1.9\,L$

11. A solution with a concentration of 30% V/V is made with 10 mL of solute.

a. **Calculate** the volume of solvent needed.

$\%\frac{V}{V} = \frac{V_{(solute)}}{V_{(solution)}} \cdot 100$

$30\% = \left(\frac{10\,mL}{X\,mL}\right) \cdot 100$

$0.3 = \frac{10\,mL}{X\,mL}$

$V_{(solution)} = 33.3\,mL$

$V_{(solvent)} = V_{(solution)} - V_{(solute)}$

$V_{(solvent)} = 33.3mL - 10mL$

$V_{(solvent)} = 23.3mL$

b. You want to dilute the solution to a concentration of 12% V/V Calculate the volume of solvent added.

$C_1 = 30\%$

$V_1 = 33.3\,mL$

$C_2 = 12\%$

$V_2 = X\,mL$

$C_1V_1 = C_2V_2$

$(30\%)(33.3mL) = (12\%)(X\,mL)$

$\frac{(30\%)(33.3mL)}{(12\%)} = X\,mL$

$V_2 = 83.25\,mL$

Solvent added: $83.3\,mL - 33.3\,mL = 50\,mL$

12. A solution of 27 g/L is made with 3500 mg of solute.

a. **Calculate** the volume of the solution.

$C = m/V$

$3500\ mg \div 1000 = 3.5\ g$

$27\ g/L = \frac{3.5\ g}{X\ L}$

$V = 0.13\ L = 130\ mL$

b. 400 mL of solvent is added to the solution. **Calculate** the concentration of the diluted solution.

$C_1 = 27\ g/L$

$V_1 = 130\ mL$

$C_2 = X\ g/L$

$V_2 = 530\ mL$

$C_1 V_1 = C_2 V_2$

$(27\ g/L)(130\ mL) = (X\ g/L)(530\ mL)$

$\frac{(27\ g/L)(130\ mL)}{(530\ mL)} = X\ g/L$

$C_2 = 6.6\ g/L$

13. You add 60 g of solute into 1.4 L of solvent.

a. **Calculate** the %m/V.

$1.4\ L \cdot 1000 = 1400\ mL$

$\%\ m/V = \frac{m_{(solute)}}{V_{(solution)}} \cdot 100$

$\%\ m/V = (60\ g/1400\ mL) \cdot 100$

$\%\ m/V = 4.3\%$

b. You want to dilute the solvent to 1%. **Calculate** the volume of solvent added.

$C_1 = 4.3\%$

$V_1 = 1.4\ L$

$C_2 = 1\%$

$V_2 = X\ L$

$C_1 V_1 = C_2 V_2$

$(4.3\%)(1.4\ L) = (1\%)(X\ L)$

$\frac{(4.3\%)(1.4\ L)}{(1\%)} = X\ L$

$V_2 = 6\ L$

Solvent added:

$6\ L - 1.4\ L = 4.6\ L$

correction
↘ m/v

14. You have 600 mL of a 18% ~~V/V~~ solution. You want to dilute the solution to 60 g/L. **Calculate** the volume of the diluted solution.

1. Conversion: 60 g/L → x %

$\frac{60\ g}{L} = \frac{60\ g}{1000\ mL}$ $\quad \%\ m/v = \frac{m_{(solute)}}{V_{(solution)}} \cdot 100$

$\%\ m/v = \left(\frac{60\ g}{1000\ mL}\right) \cdot 100 = 6\ \%$

2. Dilution:

$C_1 = 18\ \%$
$V_1 = 600\ mL$
$C_2 = 6\ \%$
$V_2 = x\ mL$

$C_1 V_1 = C_2 V_2$

$(18\ \%)(600\ mL) = (6\ \%)(x\ mL)$

$\frac{(18\ \%)(600\ mL)}{(6\ \%)} = x\ mL$

$V_2 = 1800\ mL = 1.8\ L$

15. You have a solution with a concentration of 120 g/L. You dilute it to make a 1.5 L of a 8% m/V solution. **Calculate** the volume of the original solution.

1. Conversion: 8% m/v → x g/L

$8\%\ m/v = \frac{x\ g}{100\ mL} \cdot 100$ $\quad \frac{8\ \%}{100} = \frac{x\ g}{100\ mL} = \frac{8\ g}{100\ mL}$

$C = m/V = 8\ g / 0.1\ L = 80\ g/L$

2. Dilution:

$C_1 = 120\ g/L$
$V_1 = x\ L$
$C_2 = 80\ g/L$
$V_2 = 1.5\ L$

$C_1 V_1 = C_2 V_2$

$(120\ g/L)(x\ L) = (80\ g/L)(1.5\ L)$

$x\ L = \frac{(80\ g/L)(1.5\ L)}{(120\ g/L)}$

$V_1 = 1\ L$