

4.59a) The concentration of a solution is an intensive property, meaning concentration does not depend on how much solution you have (i.e. - dividing a solution in half does not change its concentration).

b) 0.50 mol HCl refers to the number of HCl molecules present; in this case 3.01×10^{23} molecules. In contrast, 0.50M HCl refers to the concentration of a solution; in this case 0.50 moles of molecules for every 1 liter of solution.

$$4.64 \quad \frac{4.6\text{L} \mid 0.118 \text{ mol Na}^+}{\mid 1 \text{ L}} = 0.54 \text{ mol Na}^+$$

$$\frac{4.6\text{L} \mid 0.138 \text{ mol Na}^+}{\mid 1 \text{ L}} = 0.63 \text{ mol Na}^+$$

$$\frac{0.09 \text{ mol Na}^+ \mid 1 \text{ mol NaCl} \mid 58.5\text{g NaCl}}{\mid 1 \text{ mol Na}^+ \mid 1 \text{ mol NaCl}} = 5.27 \text{ NaCl}$$

Originally, the blood contained 0.54 moles of Na^+ ion. To correct the patient's sodium deficiency, it needs to contain 0.63 moles of Na^+ ion, or an additional 0.09 mole of Na^+ ion. Adding 5.27g NaCl will creating this change.

4.74a

$$M_i V_i = M_f V_f$$

$$6.0M \bullet X = 0.500M \bullet 100 \text{ mL}$$

Steps:

$$X = 8.3 \text{ mL}$$

1 - PPE

2 - partially fill a 100mL volumetric flask with distilled water

3 - add 8.3 mL of 6.0M HNO₃ to the flask

4 - swirl to mix

5 - fill to the 100 mL line on the flask

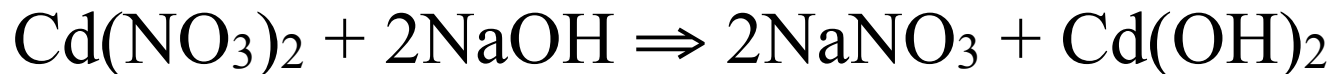
4.74b

$$M_i V_i = M_f V_f$$

$$6.0M \bullet 10\text{mL} = X \bullet 250 \text{ mL}$$

$$X = 0.24M$$

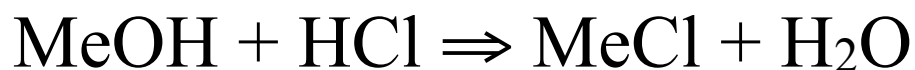
4.80



35.0 ml	1 L	0.500 mol Cd(NO ₃) ₂	2 mol NaOH	40.0 g NaOH
1000 ml	1 L	1 mol Cd(NO ₃) ₂	1 mol NaOH	1 mol NaOH

$$= 1.40 \text{ g NaOH}$$

4.85



$$\frac{17.0 \text{ ml} \left| \frac{1 \text{ L}}{1000 \text{ ml}} \right| 2.50 \text{ mol HCl} \left| \frac{1 \text{ mol MeOH}}{1 \text{ mol HCl}} \right.}{1} = 0.0425 \text{ mol MeOH}$$

$$\text{Mol Mass} = \frac{\text{Mass}}{\text{Moles}} = \frac{4.36 \text{ g}}{.0425 \text{ mol}} = 102.6 \text{ g mol}^{-1}$$

We know the base is a hydroxide of an alkali metal. As such, the metal must be bonded to one OH⁻ group. If the mass of the entire compound is 102.6 g mol⁻¹ and the mass of OH⁻ is 17.0 g mol⁻¹, the metal must have a mass of 85.6 g mol⁻¹, making it Rubidium.