Answer on Question #44048 - Chemistry - Other

Question:

How many grams of NaI would be used to produce a 2.0 M solution with a volume of 10.0 L?

Solution:

Molarity, symbolized M, is defined as the number of moles of solute per liter of solution:

$$M = \text{(moles of solute)/(liters of solution)}$$

2.0 M NaI solution means that there is 2 moles of NaI per 1 liter of solution.

Therefore, we need to add 20 moles of NaI to prepare 10 L of 2.0 M solution:

$$\text{moles of solute} = M \times \text{(liters of solution)} = (2 \text{ mol/L}) \times 10 \text{ L} = 20 \text{ mol}$$

One mole of NaI is found to be 150 grams/mole (from the periodic table 23+127= 150).
Mass of 20 moles of NaI is:

$$m = \text{(molar mass)} \times \text{(number of moles)} = (150 \text{ g/mol}) \times 20 \text{ mol} = 3000 \text{ g}$$

Answer: we need 3000 grams of NaI to prepare 10 L of 2.0 M solution.