Examples of Pesticide Use Calculations

I. Calculating amount of Active Ingredient (A.I.) in dry and liquid pesticide formulations

Problem 1. How many pounds of active ingredient are there in a 10 pound bag of a 50WP pesticide?

For dry formulations, active ingredient is measured in percentage active ingredient by weight of product. That means that in a product labeled “50 WP”, 50% of every pound of that product, or 0.5 pounds, is active ingredient:

0.5 pounds A.I.
1 pound product

To determine how many pounds of active ingredient (X = unknown amount) there are in ten pounds, set up ratios with the same units on the top and the same units on the bottom. Then cross multiply and solve for “X”.

0.5 pounds A.I. = X pounds A.I.
1 pound product 10 pounds of product

(1) (X) = (0.5) (10)

X = 5 pounds A.I. are contained in a 10 pound bag of 50WP

Problem 2. How many pounds of a 75%WP are needed to supply 15 pounds of active ingredient?

Again, 75%WP = 0.75 pounds A.I.
1 pound product

This time, you know how many pounds of active ingredient you want - you need to figure out how many pounds of product (X = unknown amount) you need to provide that amount of A.I.

0.75 pounds A.I. = 15 pounds A.I.
1 pound of product X pounds of product

(1) (15) = (0.75) (x)
15 = .75X; divide both sides by .75 to solve for “X”

15 = .75X
.75 .75

X = 20 pounds of 75%WP product are needed to provide 15 pounds of active ingredient.
Problem 3. How many pounds of active ingredient are there in a 5 gallon container of Atrazine 4L.
For liquid formulations, active ingredient is measured in pounds per gallon, and the number of pounds usually precedes the letter abbreviation of the formulation. In the example, “Atrazine 4L”, “L” indicates that the product is a liquid formulation, and it contains 4 pounds of active ingredient per gallon.

You simply multiply the number of gallons by the number of pounds A.I. per gallon:
5 gallons X 4 pounds A.I. per gallon = 20 pounds A.I.

II. Calculating the amount of pesticide needed to treat a given area.

Problem 4. The label on a granular pesticide calls for an application rate of 4 pounds of A.I. per 1,000 square feet. How many pounds of active ingredient (X = unknown) would you need to treat an area that measures 125 feet long by 90 feet wide.

First, calculate the area, or square footage, by multiplying the length of the area by the width:
125 feet X 90 feet = 11,250 square feet

You know you need 4 pounds to treat 1,000 square feet.

Again, set up ratios:

\[
\frac{4 \text{ pounds A.I.}}{1,000 \text{ square feet}} = \frac{X \text{ pounds A.I.}}{11,250 \text{ square feet}}
\]

Cross multiply: \((4) (11,250) = (X) (1,000)\)
\[45,000 = 1,000 X\]

Solve for X by dividing each side of the equation by 1,000:
\[
\frac{45,000}{1,000} = X
\]

\[X = 45 \text{ pounds of active ingredient are needed to treat 11,250 square feet}\]

Problem 5. You will then need to determine how much of a given product you will need to deliver the needed amount of active ingredient. Building upon problem #4:

You know you need 45 pounds of active ingredient to treat the area calculated in problem #4. You have a 25G product (or 25% of every pound of product is active ingredient). How much of a 25G product (X = unknown) would you need to provide the 45 pounds of active ingredient needed to treat the area?

\[
\frac{.25 \text{ pounds A.I.}}{1 \text{ pounds of product}} = \frac{45 \text{ pounds A.I.}}{X \text{ pounds of product}}
\]

\[.25 X = 45 \]
\[X = 180 \text{ pounds of product}\]
\[ \frac{25}{25} \times = \frac{45}{.25} \quad \exists \quad X = 180 \text{ pounds of a 25G product are needed to treat 11,250 square feet.} \]

[Or - to do it the really simple way - you know 1/4 of every pound of product is active ingredient. You can just multiply 45 by 4 to arrive at the same answer of 180 pounds of product.]

### III. Equipment Use Calculations

**Problem 6.** A sprayer is calibrated to deliver 2.5 gallons per minute. You are able to spray 1 acre in 20 minutes. How many gallons per acre did you apply?

Simply multiply 2.5 gallons per minute \( \times \) 20 minutes per acres = 50 gallons per acre

**Problem 7.** Often, applicators will spray a unit area thoroughly with water, then determine how much liquid is needed to refill their application equipment. This allows you to determine how much product will be needed for adequate coverage of an area. For example:

2 gallons of water are added to a 4 gallon backpack sprayer. After spraying a 100 square foot test area, the applicator must add 15 ounces of water to refill the tank to the 2 gallon mark. At this application rate, **how much liquid** \((X = \text{unknown amount})\) will be needed to treat an area that measures 75 by 100

128 ounces = 1 gallon

**Solution:** Since you needed to add 15 ounces to refill the pack to the starting point of 2 gallons, you know that you applied 15 ounces to 100 square feet, or: \( \frac{15 \text{ oz.}}{100 \text{ square feet}} \)

Next, calculate the square footage of the area to be treated: \(75 \times 100 = 7,500 \text{ square feet}\)

Set up your ratios:

\[
\frac{15 \text{ oz.}}{100 \text{ square feet}} = \frac{X \text{ oz.}}{7,500 \text{ square feet}}
\]

\((100) (X) = (15) (7,500)\)

\(100X = 112,500\)

\(x = \frac{112,500}{100} ; X = 1,125 \text{ ounces}\)

You can simplify to gallons by dividing the number of ounces by 128: \(X = 8.79 \text{ gallons}\)