

HOW TO PREPARE INSECTICIDE DILUTIONS

When you service a structure, you will need to dilute concentrated insecticides until you have a solution containing the recommended final percentage of active ingredient. The dilution is known as the diluent, dilute solution or final solution.

When preparing your dilute solution, you will face two questions: "How much of the concentrated insecticide will I need?" and "How much diluent will I need?"

Question I

"How much of the concentrated insecticide will I need?"

Let:

Q = Quantity of concentrated insecticide needed.

S = Final percentage of active ingredient needed in the solution.

A = Amount of spray needed to do the job (Usually expressed in ounces).
Remember, 1 gallon of water contains 128 ounces.

C = Percentage of active ingredient in concentrate.

Try this SAC formula to prepare a certain quantity:

$$Q = \frac{S \times A}{C}$$

What you are doing is multiplying the percent of insecticide needed in the dilute solution (S) by the number of ounces needed to do the job (A) and then dividing by the percent of active ingredient in the concentrated insecticide (C).

Question II

"How much diluent will I need?"

Let:

R = Amount of diluent needed.

A = Amount of spray needed to do the job (usually expressed in ounces).

Q = Quantity of concentrated insecticide needed.

Try this formula: $R = A - Q$

What you are doing is subtracting the quantity of concentrate you need (Q) from the amount of spray needed (A).

Example:

"How much concentrate will I need if I want to prepare a 1% spray from a 25% concentrate if I will need 1 gallon to do the job? How much water diluent will I need?"

Step I

S = 1 %

A = 1 gallon or 128 fluid ounces

C = 25 %

Q = $\frac{S \times A}{C}$ or $\frac{1 \times 128 \text{ oz.}}{25} = \frac{128 \text{ oz.}}{25} = 5.12 \text{ fluid oz.}$

"I will. need 5.12 fluid oz. of concentrate."

Step II

$$R = A - Q \text{ or } 128 \text{ ounces} - 5.12 \text{ ounces} = 122.8 \text{ ounces}$$

"I will need 122.8 oz. of diluent (water)."

The SAC formula can be used to mix one gallon of spray, 100 gallons of a spray mixture or 10 or more pounds of dust.

Sad Sac Formula

This formula, $Q = \frac{S \times A \times D}{C}$ may be used to prepare a solution of suspension on a weight to weight basis using a concentrate wettable powder and diluent.

Question I

"How much of the concentrated insecticide will I need?"

Q = Pounds of WP concentrate to use

S = Percent of active ingredient in the finished spray

A = Amount in gallons of finished spray

D = Density: Weight of one gallon of water (water weighs 8.34 pounds per gallon)

C = Concentrate: Percentage of active ingredient.

Try this formula: $Q = \frac{S \times A \times D}{C}$

What you are doing is multiplying the percent of insecticide needed in the dilute spray (S) by the number of gallons needed to do the job (A) by the weight (density) of one gallon of water (D) and dividing by the percent of active ingredient in the concentrated wettable powder (C).

Question II

"How much diluent will I need?"

Let:

R = Amount of diluent

A = Amount of spray needed to do the job (usually expressed in gallons)

Q = Quantity of wettable powder concentrate (usually expressed in pounds)

Try this formula: $R = A - Q$

What you are doing is subtracting the quantity of concentrate you need (**Q**) from the amount of spray needed (**A**).

Fill the mixing tank with most of the gallons of diluent (water). Add the pounds of wettable powder (**Q**). Fill the tank to the (**A**) level desired with water.

Example:

"How much concentrate will I need if I want to prepare ten (10) gallons of a 5% malathion suspension from 75 percent wettable powder and water?"

Step I

S = 5 %

A = 10 gallons or 83.4 lbs. (weight of water)

C = 75%

Q = $\frac{S \times A \times D}{C}$ o r

$$= \frac{5 \times 10 \times 8.34}{.75} = \frac{50 \times 8.34}{.75} = \frac{417}{.75} = 5.56 \text{ lbs..}$$

"I will need 5.56 lbs. of 75% malathion wettable powder concentrate."

Step II.

$$R = A - Q \text{ or } R = 83.4 \text{ lbs. of water} - 5.56 \text{ lbs. of wettable powder} = 77.84 \text{ lbs. of water (9.33 gallons of water)}$$

"I will need 9.33 gallons of water. Add most of the 9.33 gallons of water to the tank, stir in 5.56 lbs. of 75% malathion wettable powder and fill the tank to the 10 gallon level with water."

Sad Cow Formula

This formula: $Q = \frac{S \times A \times D}{Co \times W}$

may be used to dilute liquid concentrate prepared on the basis of pounds of insecticide per gallon.

Question I

"How much of the concentrate insecticide will I need?"

- Q = Quantity of concentrate required in gallons.
- S = Percentage of active ingredient in spray
- A = Amount of spray to be prepared in gallons
- D = Density: weight of a. gallon of diluent (water) 8.34 lbs. per gallon
- Co = Concentrate 100%
- W = Weight of insecticide in pounds per gallon

Insecticides are sold with the label indicating pounds of insecticide per gallon rather than percentage of active ingredient.

Dursban® TC contains 4 lbs. per gallon or 42% of active ingredient. In this case, the weight to weight formula (sad sac $Q = \frac{S \times A \times D}{C}$)

is modified so that the factor CO is considered as 100% and a factor W pounds of insecticide per gallon is added.

Try this formula: $Q = \frac{S \times A \times D}{Co \times W}$

What you are doing is multiplying the percent of the insecticide needed in the dilute mixture (**S**) by the number of gallons needed to do the job (**A**) by the density or weight of a gallon of water (used to dilute) (**D**). The product of this multiplication is divided by the product of (**Co**) x **W** to give the (**Q**) of the concentrate you need to mix the quantity of spray needed to do the job.

Question II

"How much diluent will I need?"

R = Amount of diluent (water) needed

Q = Quantity of concentrate needed

A = Amount of spray mixture needed to do the job

Try this formula: $R = A - Q$

What you are doing is subtracting the amount of concentrate (**Q**) from the amount of spray (**S**) needed to do the job.

Example:

Prepare 100 gallons of a 1.0% spray from Dursban® TC containing 4 lbs. of active ingredient.

Step I

$$Q = \frac{S \times A \times D}{Co \times W}$$

$$Q = \frac{1 \times 100 \times 8.3}{100 \times 4} = \frac{830}{400}$$

	2.075	
400	830.00	
	800	
	3000	
	2800	
	2000	

Q = 2.075 gallons of Dursban® TC I will need 2.075 gallons of concentrate.

Step II

$$R = A - Q$$

$$R = 100 - 2.075$$

$$\begin{array}{r} 100.000 \\ 2.075 \\ \hline 97.025 \end{array}$$

R = 97.025 gallons of **(D)** water to make 100 gallons of spray. Partially fill the spray tank with water; add 2.075 gallons of concentrate and fill the tank to the 100 gallon level with water.

Solve these problems:

Use this formula:

$$Q = \frac{S \times A}{C}$$

1. Mix one gallon of a 1% spray using a 25% EC concentrate and water.
2. Mix one gallon of a 1% spray using a 57% EC and water.
3. Mix one gallon of a 0.5% spray using a 44% EC and water.
4. Mix one gallon of a 2% spray using a 25% EC concentrate and water.
5. Mix one gallon of a 0.25% spray using a 25% EC and water.

Use this formula:

$$\frac{S \times A \times D}{C}$$

1. Mix 10 gallons of a 5% spray using a 50% WP and water.
2. Mix one gallon of a 2.5% spray using a 75% WP and water.
3. Mix 100 gallons of a 1.25% spray using a 75% WP and water.
4. Mix one gallon of a 1% spray using a 50% WP and water.
5. Mix 50 gallons of a 2% spray using a 25% WP and water.

Answers to (SAC Problems): $Q = \frac{S \times A}{C}$

- (1) 5.12 ounces of (C) and 122.88 ounces of water (D)
- (2) 2.25 ounces of (C) and 125.75 ounces of water (D)
- (3) 1.45 ounces of (C) and 126.55 ounces of water (D)
- (4) 10.24 ounces of (C) and 117.76 ounces of water (D)
- (5) 1.28 ounces of (C) and 126.72 ounces of water (D)

Answers to SAD SAC Problems: $Q = \frac{S \times A \times D}{C}$

- (1) 8.3 pounds of (C), and enough water to fill the tank to the 10 gallon level, approximately 9 gallons.
- (2) 2.8 lbs. (4.5 ounces) of (C) and enough water to fill the sprayer to the one gallon level.
- (3) 13.9 lbs. of (C) and enough water to fill the tank to the 100 gallon level.
- (4) 0.167 lbs. (2.67 ounces) of (C) and enough water to fill sprayer tank to one gallon level.
- (5) 33.36 lbs. of (C) and enough water to fill the tank to the 50 gallon level (approximately 45 $\frac{2}{3}$ gallons).

Answers to SAD COW Formula Problems: $\frac{Q=SxAxD}{Co \times W}$

- (1) 2.08 gallons of (C) and 97.92 gallons of (D) water.
- (2) 1.038 gallons of (C) and 98.62 gallons of (D) water.
- (3) 1.04 gallons of (C) and 98.96 gallons of (D) water.
- (4) 1.04 gallons of (C) and 48.96 gallons of (D) water.
- (5) 0.26 gallons of (C) and 24.74 gallons of (D) water.