Mixture Problems

To Solve mixture problems, you need to remember two things.

1. Amount in first mixture plus amount in second mixture equals amount in total mixture. You will use this fact to identify unknowns.

2. Amount of pure substance in first mixture plus amount of pure substance in second mixture equals amount of pure substance in total mixture. This is the equation information.

Example: A mixture containing 6% boric acid is to be mixed with 2 quarts of a mixture that is 15% acid in order to obtain a solution that is 12% acid. How much of the 6% solution must be used?

Diagram: | 1st mixture | + | 2nd mixture | = | total mixture |

Formula: $amt_1\,(\%) + amt_2\,(\%) = (amt_1 + amt_2)(\%)$

Equation: Determine the amount of pure acid in each mixture. Use this information to make an equation.

Let x = quarts of 6% solution

$x(.06) + 2(.15) = (x + 2)(.12)$

$.06x + .30 = .12x + .24$

(Multiply by 100 to remove all decimals, if you wish)

$6x + 30 = 12x + 24$

$6 = 6x$

$x = 1$

We must use 1 quart of the 6% solution.

Sample Problems:

1. A farmer has 100 gallons of 70% pure disinfectant. He wishes to mix it with disinfectant that is 90% pure in order to obtain 75% pure disinfectant. How much 90% pure must he use?

2. If an alloy containing 30% silver is mixed with a 55% silver alloy to get 800 pounds of 40% alloy, how much of each must be used?

3. Forty liters of a 60% salt solution are reduced to a 45% solution. How much must be drained off and replaced with distilled water to that the resulting solutions will contain only 45% salt?

4. Dr. Wong orders 20 grams of a 52% solution of a certain medicine. The pharmacist has only bottles of 40% and bottles of 70% solution. How much of each must he use to obtain the 20 grams of the 52% solution?

5. Bryan discovers at the end of the summer that his radiator antifreeze solution has dropped below the safe level. If the radiator contains 4 gallons of a 255 solution, how many gallons of pure antifreeze must he add to bring it up to a desired 50% solution?

Answers:

1. 33 1/3 gallons
2. 480 pounds of 30% alloy and 320 pounds of 55% alloy
3. 10 liters must be drained off.
4. 12 grams of the 40% solution and 8 grams of the 70% solution
5. 2 gallons