How to Solve Ratio Strength Calculations - Part 2

RxCalculations

Ratio strength calculations are frequently required in pharmaceutical calculations. Initially, they can be tricky and time-consuming to solve, but with the right tools at your disposal they become much easier. This is part 2 of our series on how to solve ratio strength calculations, so if you missed the original tutorial and part 1 we recommend starting there before continuing with this post.

In this post you will learn how to solve three NAPLEX type ratio strength calculations questions step-by-step. So, if you want to solve ratio strength calculations questions accurately and with expediency, follow the guide on how to properly analyze these types of problems.

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Video Transcription

I'm going to show you how to calculate the amount of solute in a given preparation, given the ratio strength and the volume of the preparation, and we are starting right now.

Hello, this is Dr. Danquah, and if this is your first time here and you would like to learn pharmaceutical calculations, tips, tricks and more, then start by subscribing and clicking the bell so you don't miss anything.

This video is part of a series on ratio strength calculations, so be sure to check the other videos out I would put links in the description and a card should be popping up pretty shortly.

Now, one of the things you should be able to do when it comes to ratio strength is to be able to calculate the amount of a substance when you know the ratio strength and the volume. So I'm going to demonstrate how you do that using three powerful examples. And by the time we are done, you should never get these type of questions wrong. So let's get right to it.

Example 1

This question says a skin test for fire ant allergy involves the intradermal skin prick of 0.05 mL of 1:1,000,000 (w/v) dilution of fire ant extract. How many micrograms of extract would be administered in this manner?

So here we are required to find the amount in milligrams which will be the amount of solute of the fire and extract and we have been given the ratio strength. So the first thing we want to do is take the definition of ratio strength.

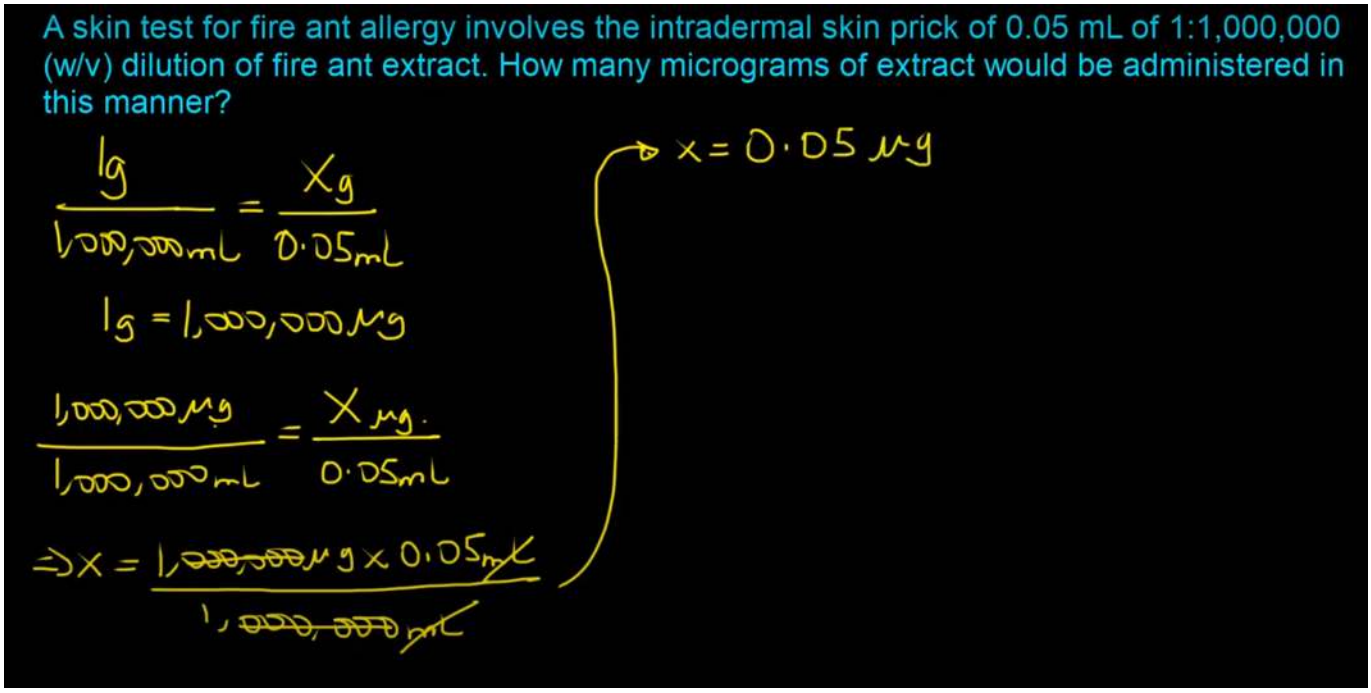
Here, it is 1:1,000,000, so what that means is you have one gram of fire ant extract in a 1,000,000 mL. Now this should be equal to some quantity in grams over the given volume of the preparation.

And here our volume is 0.05 mL. Now, because we want our answer in micrograms. A prudent thing we want to do is to basically convert the grams to micrograms so the conversion states that one gram is equal to a million microgram.

So we can rewrite this ratio as follows. We will say that a million micrograms of fire ant extract is present in a million milliliters. So that's the ratio strength expressed in micrograms. And what that will mean is our quantity that we try to find also the X micrograms over 0.05 mL.

So this is a proportion, which means that units on the left hand side of the equal to sign should be the same as the units on the right hand side, both in the numerator and the denominator.

So we can go ahead and solve for X, which means that X is going to be equal to one million microgram times, 0.05 mL divided by a million milliliters, the milliliters cancel out and the zeroes cancel out. And so now what you end up having is X equals 0.05 micrograms.



Example 2

Let's take a look at another question which says, in acute hypersensitivity reactions, 0.5 mL of a 1:1000 (w/v) solution of epinephrine may be administered subcutaneously or intramuscularly. Calculate the milligrams of epinephrine given.

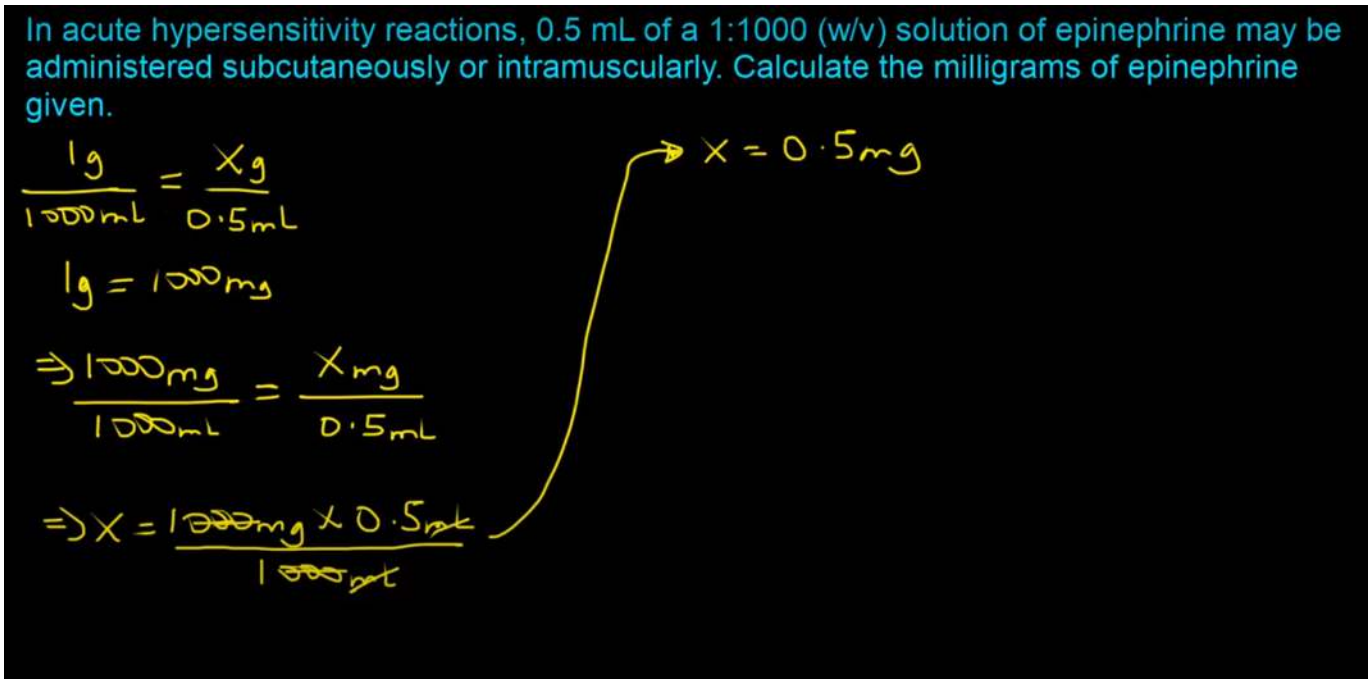
So let's start off by analyzing the question. Here, our goal is to find the amount in milligrams of epinephrine we've been given, the ratio strength, which is 1:1000, and we know the volume of the preparation, which is 0.5 mL.

So we start off by taking the ratio strength, which is 1:1000 and what that means is that you have one gram of epinephrine in a 1000 mL of preparation. And so we want to figure out how many grams will be also present in the 0.5 mL preparation.

Now, since our answer is going to be in milligrams, a prudent step would be to convert the grams directly to milligrams at this stage so that your calculations become really easy.

So the conversion is one gram is equal to a 1000 mg. And so we can substitute that into the ratio and proportion above which would mean that you have a 1000 mg of epinephrine in a 1000 mL of preparation. It would then be equal to some quantity in milligrams over the 0.5 mL.

We can now go ahead and solve for X. So X is going to be equal to a 1000 mg times the 0.5 mL divided by a 1000 mL. The milliliters cancel out and the zeroes also cancel out. And so now what you have is you have X being equal to 0.5 mg.



Example 3

Now, let's take a look at another question. Here, you have a prescription which has tetracaine hydrochloride, 0.75%. You have epinephrine hydrochloride, 1:4000. You have cocaine hydrochloride, 3%. You need to add some sodium chloride and then your total preparation is 30 mL.

So now the question says how many milligrams of epinephrine hydrochloride is needed to fill the prescription?

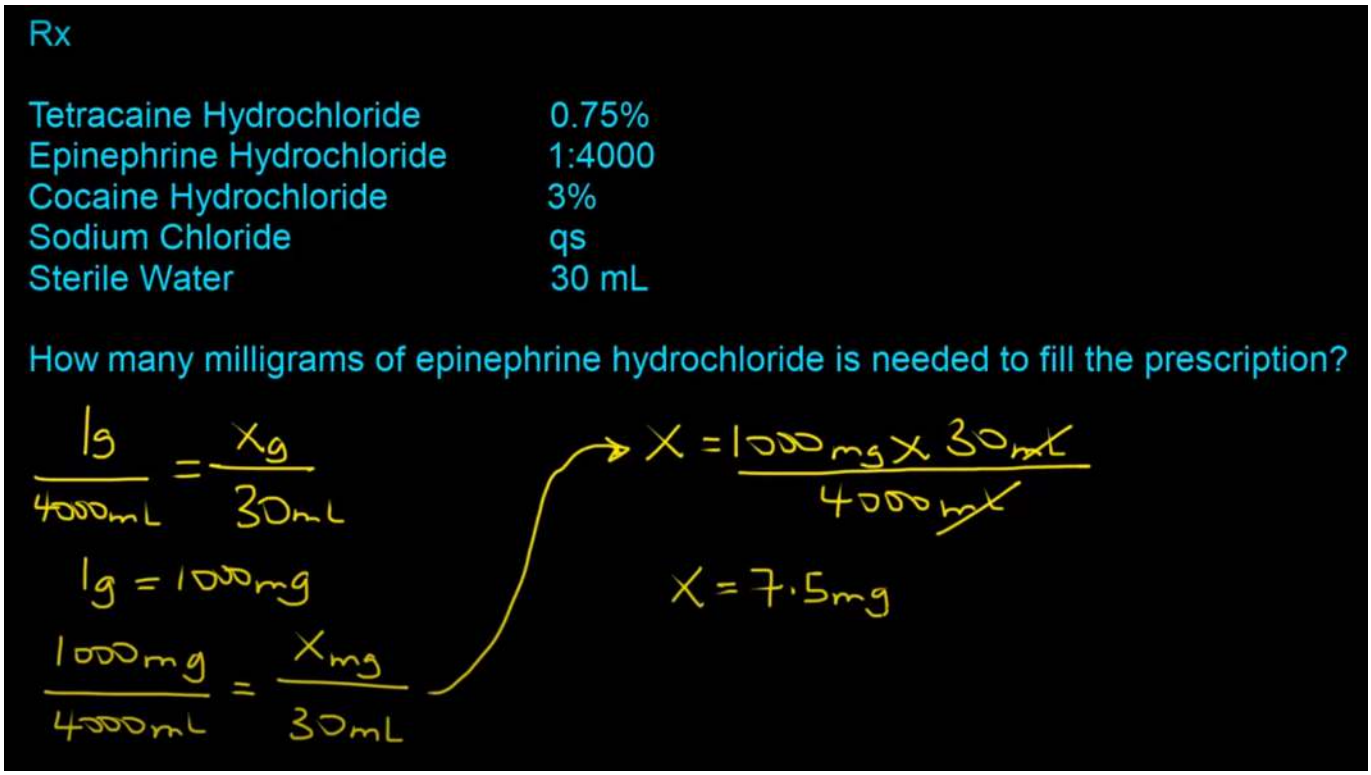
So let's start off by analyzing the question. Our goal here is to calculate the amount in milligrams of epinephrine hydrochloride should be given the ratio strength to be 1:4000, and we have the quantity of preparation to be 30 mL.

So now what we do is we start off with the ratio strength, which is 1:4000, and that will mean that we have one gram of epinephrine hydrochloride in 4000 mL of preparation.

Now, that should be equal to some quantity in grams over the 30 mL. So because our answer is going to be milligrams, it may be a good idea at this point to convert the grams to milligrams, which will make our calculations really easy down the line. So the conversion factor is one gram is a 1000 mg.

So now wherever we have one gram we are going to put a 1000 mg. And so what that will mean is you now have a thousand milligrams of epinephrine hydrochloride and 4000 mL of preparation.

That would also mean that we have some quantity in milligrams divided by 30 mL. So we can now go ahead and solve for X, which is our unknown. So X is going to be equal to 1000 mg times 30 mL divided by 4000 mL. The milliliters cancel out. And so X is going to be equal to 7.5 mg.



So I hope you found this tutorial useful. And if you did like the video and share it, if you have any comments, leave them in the comments below and I will get to them as soon as I see them.

Now if you would like to learn more pharmaceutical calculations, tips, tricks and strategies be sure to subscribe to the channel and click the bell so you don't miss anything. Thank you so much for watching. Enjoy your life. And I'll see you in the next video.

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