RECONSTITUTING MEDICATIONS:
HOW TO FLUFF UP MEDICATIONS

After the completion of this module you will be able to:

- Define medication reconstitution.
- Read a medication label.
- Reconstitute a medication.
- Calculate simple doses from reconstituted medications.

KEY TERMS

Concentration: How much solute is dissolved in a certain amount of fluid. This is going to be a specific amount of drug which is dissolved in a specific amount of fluid.

Diluent: Product added to a solution, powder, ointment, cream or other product used to reconstitute, dissolve, or dilute another product.

Medication Reconstitution: Using the given directions, or recipe, on a prescription label to reconstitute the powder contained inside to a specific concentration as indicated.

Reconstitution: The process of adding a diluent to a dry ingredient to make it a liquid.

Shelf Life: The length of time medication can be stored safely and administered.

WHAT IS RECONSTITUTION

It is Saturday afternoon and you are studying for finals when you get a sudden craving for brownies. On the back of box you read the given directions, or recipe, on how to turn the brownie powder inside the box into yummy liquid brownie batter:

1. Add ⅓ cup vegetable oil
2. Add ½ cup water
3. Add one egg
4. Mix well

By following the given directions on the back of the box, you have in actuality completed the process of reconstitutionYou have dissolved the brownie powder by using three diluents (oil, water, and an egg) to make a liquid brownie batter.

Like the brownie powder, medications are also available in a dry form – powders and crystals. The dry medication is available in three common containers: a glass vial, a glass ampule, and a plastic bottle. The container is to medications what the box is to the brownie mix. The container containing the powdered medications will have directions, or recipe, on the label on how to properly reconstitute the medication. Before reconstituting a medication, it is important to thoroughly read the medication label on the container.

Directions for Reconstitution

Medications are packaged in a dry form so that they can be stored for a longer period of time. The dry form of medication may come from the pharmacy or may be kept in a medication system on the nursing unit. A pharmacist or other health professional will need to reconstitute the medication so that it can be administered to the patient.

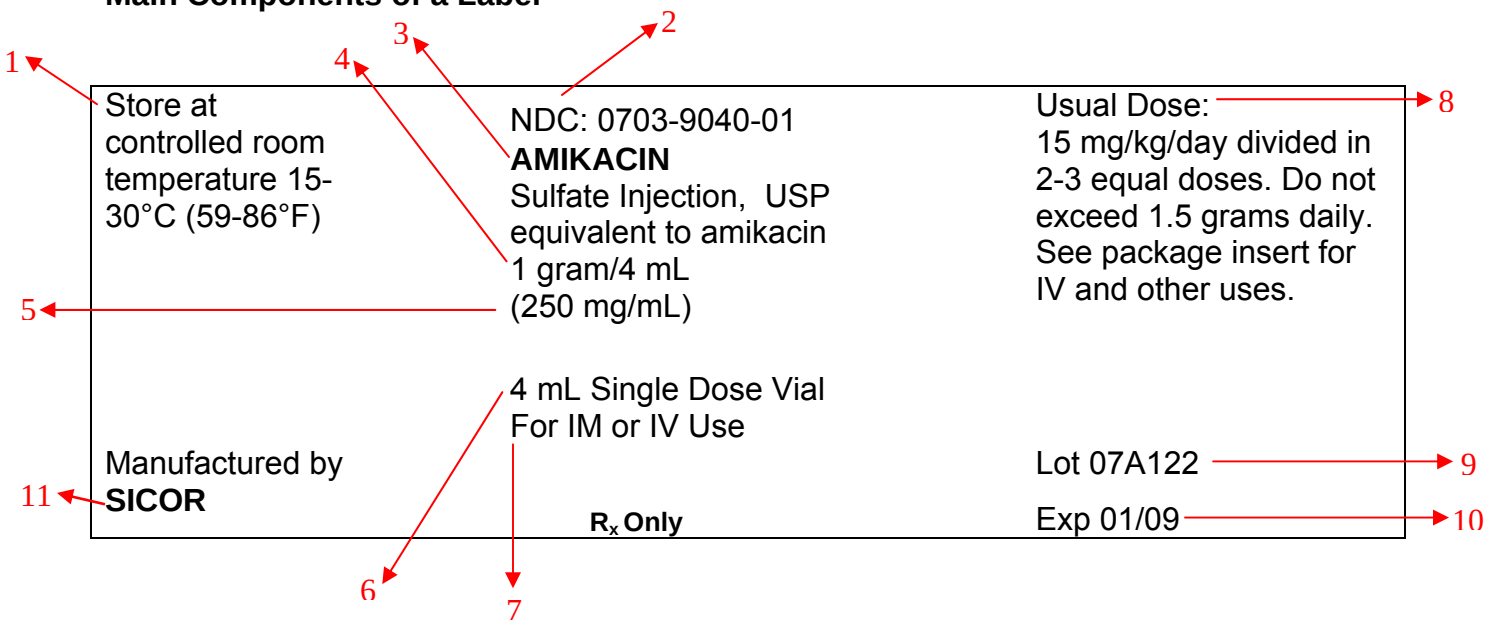
After a medication has been reconstituted, it can be stored only for a short time before it can no longer be used. The length of time a liquid medication, or any medication, can be stored safely is known as the shelf life of a medication. The medication label will have an expiration date on it and will indicate how long the shelf life is after it has been reconstituted. Additionally, the medication label will indicate the concentration after reconstitution. For example, 250 mg/5 mL or 10,000 U/mL.

MEDICATION LABEL

The medication label is like the outside of the brownie box. The brownie box tells you the name of the company who makes the brownie mix, the ingredients, the latest date to use the brownie mix, and how to mix the ingredients. The medication label provides much of the same information:

- Name of the medication – Brand and/or generic name
- Quantity of medication in the vial
- Concentration of Medication
- Directions on how to properly reconstitute the medication
- Expiration date
- Proper administration – IM, IV, SC, ect. Name of the pharmaceutical company who makes the medication

Main Components of a Label



1. How to store the medication. Some medication labels will also indicate how to store the medication after it has been reconstituted.
2. NDC number identifies the product.
3. Name of the medication. Some labels will have both Brand (Trade) name and generic name.
4. Concentration of the medication in the vial.
5. Unit dose of medication.
6. How much liquid is in the vial after proper reconstitution.
7. How the medication should be administered after reconstitution.
8. Usual dose of the medication.
9. Batch from which medication was taken from.
10. The last date the medication can be safely used. Some medication labels will also indicate shelf life after reconstitution.
11. Name of pharmaceutical company who manufactured medication.

EXAMPLE 1

For Dosage and Administration, See Literature

Preparation of the Solution:

Add 7.5 mL of Normal Saline for Injection to
Provide a solution containing 10 mg per mL.
MIX WELL

CONTAINS NO PERSERVATIVE.

Prior to reconstitution: Store at Controlled Room temperature 60 to 87 F (15 to 31 C).

After Reconstitution: Store in a refrigerator and use within 48 hours. If kept at room temperature, use within 24 hours.

See package insert to complete information.

Each vial contains 1000 mg of medication.

SAMPLE POWDER MEDICATION

What is the name of the medication?
If unsure of the medication name, look for bold lettering, all capital letters, or the abbreviation USP. These are good indicators of the medication name.

What is the name of the diluent?
Normal Saline
You will have to read label completely to find what diluent to use. In this case, it says "Add 7.5 mL of **Normal Saline for Injection**."

How many mL's of diluent should be added to medication vial?
7.5 mL
You will have to read label completely to find what diluent to use. In this case, it says "Add **7.5 mL** of Normal Saline for Injection."

How much medication is in each vial?
1000 mg
You know that the vial contains 1000 mg because it is clearly stated as "Each vial contains **1000 mg** of medication."

How much medication is in each mL? (concentration)
10 mg per mL
After adding 7.5 mL of Normal Saline for Injection, it will "Provide a solution containing **10 mg per mL.**"

How long can the medication be stored at room temperature?
24 hours
As indicated on the label, "If kept at room temperature, use within **24 hours**."

EXAMPLE 2

NDC 63323-965-10 96510 Preservative Free

Potassium Chloride
For injection concentration, USP
Sterile, Nonpyrogenic
Concentrate Must Be
Diluted Before Use

Must be diluted prior to IV Administration
Water for injection q.s. HCL and/or KOH may have been added for pH adjustment.

20 meq (2 meq/mL)
Each mL contains Potassium Chloride 2 meq (149 mg)

4000 mOsmol/L (calc.) Contains no more than 100 mcg/L of aluminum.

10 mL **$R_x$only**
Single dose vial

Usual Dosage: See insert
Store at 20 to 25°C (68-77°F)
(See USP Controlled Room Temperature)
Vial stoppers do not contain natural rubber latex.

American Pharmaceutical Partners, Inc
Lot 402651
Exp 08/09

What is the shelf life of the medication?
Exp 08/09

Remember shelf life is the length of time a medication can be stored safely and administered.

What is the concentration of the medication?
2meq/mL
Remember the concentration is the specific amount of drug which is dissolved in a specific amount of fluid.

What is the name of the medication?
Potassium Chloride
If unsure of the medication name, look for bold lettering, all capital letters, or the abbreviation USP. These are good indicators of the medication name.

How many meq's are contained in the vial?
20 meq

The total volume in the vial is 10 mL to which each mL contains 2 meq. Therefore, a total 20 meq's are in the vial.

What is the product identification?
NDC 63323 – 965 – 10
The product identification number is always the NDC number.

How should the medication be stored?
20 - 25°C (68 - 77°F)
As indicated on the label, it can be "Store(d) at **20 - 25°C (68 - 77°F)**."

RECONSTITUTING
The liquid used to mix a medication is known as the. Different medications use different diluents so be sure to read the medication label or package insert correctly so that you use the proper diluent and volume needed to reconstitute the medication. If the correct diluent is not used, the medication may clump or crystallize making it unusable for administration. Examples of diluents include normal saline (NS), sterile water for inject (SWFI), Dextrose 5% in water (D_5W), or lidocaine 1% plain.



Package Inset

Once you have determined the proper diluent and volume required, draw up the diluent in a syringe and add it to the dry medication. When the diluent is added to the dry medication, you cannot take it back out. The dry medication will expand and become the indicated concentration on the medication label when mixed with a diluent. Therefore, it is very important to read the medication label to determine how to properly reconstitute the medication to the proper concentration.

Drawing Up the Diluent
When reconstituting medications, the diluent(s) is drawn up into a sterile syringe and injected into the vial. It is then mixed until the medication is completely dissolved in the liquid. Diluents may come in an ampule or a vial.

a. 
Vial

b. 
Ampule

NOTE: Oral reconstitutable medications will be in a bottle and will usually use tap water as the diluent, which can be placed in a medication cup or a syringe. If a large amount of diluent is to be added to the bottle, a portion of the diluent (usually half) should be added to medication and then mixed. Once the medication has started to dissolve, the second portion of diluent is added and mixed. Be sure the medication has dissolved completely before administering to the patient.


Oral Reconstitutable Medication

Diluent from an Ampule

Steps to follow:

1. Use a sterile syringe and 22 gauge needle.
2. Pick up the ampule and clean the neck using an alcohol swab.
3. When opening an ampule, use an alcohol swab to break the ampule at its neck. Break the ampule away from yourself.
4. Then take the cap off of the needle, place your sterile syringe into the ampule and draw up the needed amount of liquid.

Step 1 Step 2 Step 3 Step 4

for demonstration.

1. *Assemble a sterile syringe and needle.*
2. *Hold a 2 mL ampule with an alcohol swab at the neck. Then break the ampule into two pieces away from the person.*
3. *Insert a 22 gauge needle on the liquid, it should go into the syringe until there is none in the ampule.*
4. *Turned The syringe with the needle upwards, and all the air ejected until only 2 mL's of liquid remain in the syringe.*

for an example.

The physician orders 60 mg of Ketorolac Tromethamine. It is to be reconstituted with 2 mL's of normal saline. The only normal saline available is in a 2 mL ampule.

Show how you would draw up 2 mL's from the ampule and inject it into the 2 mL vial of Ketorolac Tromethamine.

Reconstituing a Powder Medication Vial Using a Diluent in a Vial

Steps to follow:

1. Remove the cap from the diluent vial.
2. With an alcohol wipe, clean the top of the diluent vial.
3. Remove the cap from the syringe needle.
4. Pull the plunger back on the syringe to the volume of diluent you plan to withdraw – this will prevent a vacuum from forming – and inject air into the diluent vial.
5. Withdraw the amount of diluent needed.
6. Remove the cap the medication vial.
7. With an alcohol wipe, clean the top of the medication vial.
8. Inject the diluent into the powdered medication vial.
9. Agitate the mixture by shaking, inverting, or rolling the vial – rolling vial will prevent air bubbles to form in the medication.
10. The mixed contents have now formed a concentration.


Step 1


Step 2


Step 3


Step 4


Step 5


Step 6


Step 7


Step 8


Step 9


Step 10

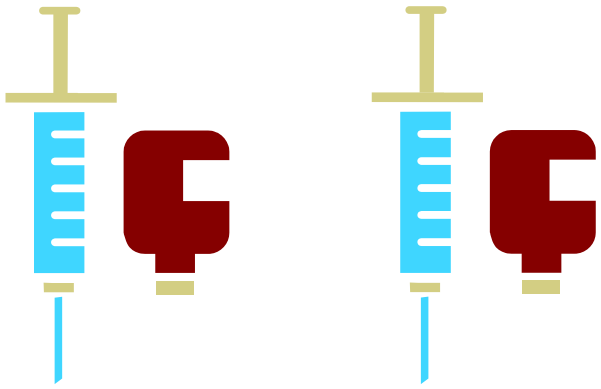
SAFETY ALERT: It is safer not to administer a medication mixed by another health professional. However, if you do, do not administer a medication mixed by the other health professional unless all the appropriate information is on the label, i.e. initials of the person who mixed the medications and expiration date.

Click here for examples on how to reconstitute a medication in order to help you see and understand the concepts we have discussed.

EXAMPLES 3

Box 1 – The nurse practitioner writes an order for Ancef 1 gram IM. The label on the medication vial reads that there is 1 gram of Ancef in 2 mL. The diluent to be used is normal saline.

Draw up into the syringe the correct amount of diluent and inject it into the Ancef vial.



Some medications can be used more than once. If the medication you are reconstituting can be used more than once, it is important to read the label for information on how to store the medication, i.e. in a refrigerator or at room temperature and how long it can be stored after it is reconstituted. Once the medication is reconstituted, you should write on the label the expiration date or the last time the medication can be used and your initials.

EXAMPLE 4

MethylPREDNISolone Sodium Succinate for Injection, USP	NDC 55390-209-10 Single Dose Vial	
	Reconstitute with 1.2 mL of	
	Bacteriostatic Water for Injection with benzyl alcohol.	Lot 1031183 Exp Dec 09
For IM or IV Use	Each 1 mL (when mixed) contains Methylprednisolone sodium succinate	
40 mg		
Rx only	equiv. to 40 mg methylprednisolone. Lyophilized in container.	
Recommended Diluent		
Contains Benzyl Alcohol as a Preservative	Protect from light.	

How much diluent should be used to dilute the Methylprednisolone?

"Reconstitute with 1.2mL of Bacteriostatic Water for Injection with benzyl alcohol" should be highlighted and dragged into box 3.

You will need a total of 1.2mL of diluent to reconstitute this medication.

Draw up into a syringe how much diluent you would inject into the medication vial?

In this case, this medication can only be used once as indicated on the vial as "Single Dose Vial." If you will not be using the entire contents of the vial, be sure to discard properly after use.

CALCULATING DOSES FROM A RECONSTITUTED MEDICATION
Once the medication has been reconstituted, it becomes the responsibility of the health professional to calculate the correct dose to be given to the patient. The dosage may be calculated by using dimensional analysis.

NOTE: If needed, review the Dimensional Analysis Module before continuing.

for examples on calculating doses from a reconstituted medication.

EXAMPLE 5
The nurse practitioner orders Azithromycin 250 mg intravenously. Azithromycin comes packaged as 500 mg in 2 mL's. How many milliliters will you need to administer?

Let's identify the Dr.'s orders or the *given quantity* in this problem. This is the start of the problem. This is the amount of drug in weight.

$$\frac{250\,mg}{1}$$ *(Expressed as a fraction in color)*

Since this is a whole number and it stands alone, this is understood to be over 1.

Let's now identify the *wanted quantity* or desired answer.

=_____ *mL*

This is the amount of milliliters that you need to administer to the patient. It is expressed like this when setting up the problem.

Let's now identify the *DOH* or what is on the shelf.

$$\frac{500\,mg}{2mL}$$ *(expressed as a fraction in color)*

When solving, be sure to set up in a way to cancel the unwanted units and keep the wanted quantity units.

We have now identified all the parts of the problem.

$\frac{250\,mg}{1}$ $\frac{500\,mg}{2mL}$ =_____ *mL*

Given Quantity *DOH* *Wanted Quantity*

Let's now begin to set up the problem using dimensional analysis.

What is the *given quantity* or Dr.'s orders?

$\frac{250\,mg}{1}$ *(Expressed as a fraction in color)*

What is the *wanted quantity* or desired answer?

$\frac{250\,mg}{1}$ =_____ *mL (in color)*

What is the *DOH* or what you have on the shelf?

$\frac{250\,mg}{1} \times \frac{2mL}{500mg}$ = _____ *mL (in color)*

The 2 mL is in the numerator position because mL is the wanted quantity for this problem. Because 2 mL is in the numerator position, the 500 mg must go in the denominator position because these values go together to reflect the dose on hand or what is on the shelf. If you had selected 500 mg to be in the numerator position and for the 2 mL to be in the denominator position, the unwanted units would not cancel out.

$\frac{250\,mg}{1} \times \frac{500mg}{2mL}$ ≠_____ *mL (in color)*

Always begin with the given quantity and then identify the wanted quantity for each and every problem. The goal is to cancel the unwanted units of measure that are not needed in the problem.

Solve the problem by multiplying the numerators and denominators. Then reduce the fraction if necessary to obtain the answer.

$\frac{250\,\cancel{mg}}{1} \times \frac{2mL}{500\,\cancel{mg}}$ = 1 *mL*

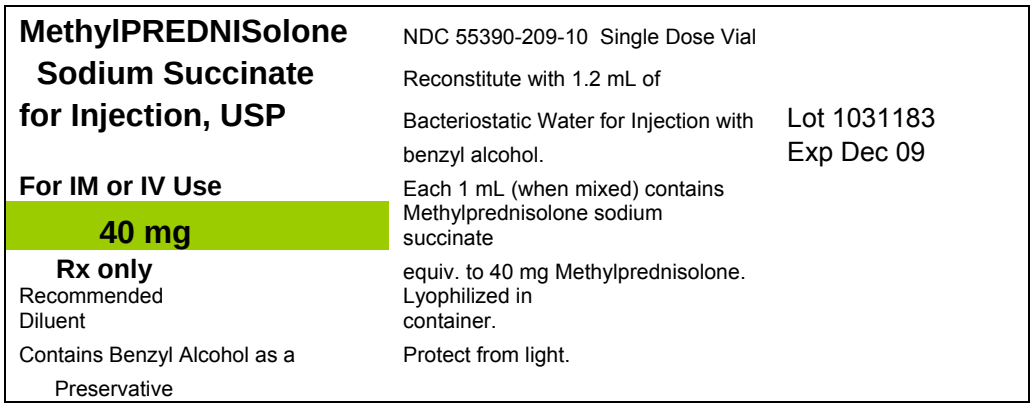
The answer indicates that you would administer 1 mL in order to administer the correct dose of 250 mg.

Now we need to draw up the correct dose. Draw back the plunger on the syringe to indicate the amount of medication you would inject into the IV bag.

When drawing up medication, always use the smallest syringe possible. This will allow you to draw up the correct amount of liquid needed more accurately.

EXAMPLE 6

You are ordered to administer 20 mg of Methylprednisolone IV. How many mL's would you inject into the IV bag?



Let's identify the Dr.'s orders or the *given quantity* in this problem. This is the start of the problem. This is the amount of drug in weight.

$$\frac{20mg}{1}$$

Since this is a whole number and it stands alone, this is understood to be over 1.

Let's now identify the *wanted quantity* or desired answer.

$$= \_\_\_\_\_\ mL$$

This is the amount of milliliters that you need to inject into the IV bag. It is expressed like this when setting up the problem.

Let's now identify the *DOH* or what is on the shelf.

$$\frac{40\,mg}{1mL}$$

When solving, be sure to set up in a way to cancel the unwanted units and keep the wanted quantity units.

We have now identified all the parts of the problem.

$\frac{20\,mg}{1}$ $\frac{40\,mg}{1mL}$ =_____ *mL*

Given Quantity *DOH* *Wanted Quantity*

Let's now begin to set up the problem using dimensional analysis.

What is the *given quantity* or Dr.'s orders?

$\frac{20\,mg}{1}$ *(Expressed as a fraction in color)*

What is the *wanted quantity* or desired answer?

$\frac{20\,mg}{1}$ =_____ *mL (in color)*

What is the *DOH* or what you have on the shelf?

$\frac{20\,mg}{1} \times \frac{1mL}{40mg}$ = _____ *mL (in color)*

(Expressed as a fraction in color)

The 1 mL is in the numerator position because mL is the wanted quantity for this problem. Because 1 mL is in the numerator position, the 40 mg must go in the denominator position because these values go together to reflect the dose on hand or what is on the shelf. If you had selected 40 mg to be in the numerator position and for the 1 mL to be in the denominator position, the unwanted units would not cancel out.

$\frac{20\,mg}{1} \times \frac{40mg}{1mL}$ ≠_____ *mL (in color)*

(Expressed as a fraction in color)

Always begin with the given quantity and then identify the wanted quantity for each and every problem. The goal is to cancel the unwanted units of measure that are not needed in the problem.

Solve the problem by multiplying the numerators and denominators. Then reduce the fraction if necessary to obtain the answer.

$$\frac{20\,mg}{1} \times \frac{1mL}{40mg} = \underline{\quad 0.5 \quad}\ mL$$

The answer indicates that you would inject 0.5 mL into the IV bag in order to administer the correct dose of 20 mg.

Now we need to draw up the correct dose. Draw back the plunger on the syringe to indicate the amount of medication you would inject into the IV bag.

When drawing up medication, always use the smallest syringe possible. This will allow you to draw up the correct amount of liquid needed more accurately.

EXAMPLE 7
You are ordered to administer 350 mcg IV. How many mL's would you inject into the IV bag?

20 mL Single-dose Vial FENTANYL CITRATE Injection, USP 1000 mcg Fentanyl/20 mL (50 mcg/mL) (0.05 mg/mL) **WARNING MAY BE HABIT FORMING.** HOSPIRA, INC., LAKE FOREST, IL 60045 USA	NDC 0409-9094- 31 Each mL contains fentanyl (as the citrate) 50 mcg (0.05 mg). May contain NaOH and/or HCL for pH adjustment pH 4.7 (4.0 to 7.5). FOR INTRAVENOUS USE BY HOSPITAL PERSONNEL SPECIFICALLY TRAINED IN THE USE OF NARCOTIC ANALGESICS. Usual dosage: See insert. Protect from light. Retain in carton until time of use. Store at 20' to 25'C (68 to 77'F). (See USP Controlled Room Temperature). Lot 50-359-DK EXP 1FEB2009

Let's identify the Dr.'s orders or the *given quantity* in this problem. This is the start of the problem. This is the amount of drug in weight.

$$\frac{350mcg}{1}$$ *(Expressed as a fraction in color)*

Since this is a whole number and it stands alone, this is understood to be over 1.

Let's now identify the *wanted quantity* or desired answer.

$$= \underline{\qquad}\ mL$$

This is the amount of milliliters that you need to inject into the IV bag. It is expressed like this when setting up the problem.

Let's now identify the *DOH* or what is on the shelf.

$\frac{50\,mcg}{1mL}$

In this case, we could also use $\frac{1000\,mcg}{20mL}$ as indicated on the label.

We have now identified all the parts of the problem.

$\frac{350mcg}{1}$ $\frac{50\,mcg}{1mL}$ =_____ *mL*

Given Quantity *DOH* *Wanted Quantity*

Let's now begin to set up the problem using dimensional analysis.

What is the *given quantity* or Dr.'s orders?

$\frac{350mcg}{1}$ *(Expressed as a fraction in color)*

What is the *wanted quantity* or desired answer?

$\frac{350mcg}{1}$ =_____ *mL (in color)*

What is the *DOH* or what you have on the shelf?

$\frac{350mcg}{1} \times \frac{1mL}{50mcg}$ = _____ *mL (in color)*

The 1 mL is in the numerator position because mL is the wanted quantity for this problem. Because 1 mL is in the numerator position, the 50 mcg must go in the denominator position because these values go together to reflect the dose on hand or what is on the shelf. If you had selected 50 mcg to be in the numerator position and for the 1 mL to be in the denominator position, the unwanted units would not cancel out.

$\frac{350mcg}{1} \times \frac{50mcg}{1mL}$ ≠_____ *mL*

(Expressed as a fraction in color)

Always begin with the given quantity and then identify the wanted quantity for each and every problem. The goal is to cancel the unwanted units of measure that are not needed in the problem.

Solve the problem by multiplying the numerators and denominators. Then reduce the fraction if necessary to obtain the answer.

$$\frac{350 \cancel{mcg}}{1} \times \frac{1 mL}{50 \cancel{mcg}} = \underline{\quad 7 \quad} mL$$

The answer indicates that you would inject 7 mL into the IV bag in order to administer the correct dose of 350 mcg.

Now we need to draw up the correct dose. Draw back the plunger on the syringe to indicate the amount of medication you would inject into the IV bag.

When drawing up medication, always use the smallest syringe possible. This will allow you to draw up the correct amount of liquid needed more accurately.

Congratulations on working through the example problems!

Now it is time for you to try it on your own!

PRACTICE PROBLEMS

PRACTICE PROBLEM 1

NDC 63323-614-01

hydrALAZINE HYDROCHLORIDE
INJECTION, USP
20 mg/mL

FOR IM OR IV USE
1 mL R_x only
Single Dose Vial
WARNING: DISCARD UNUSED PORTION.
Abraxis Pharmaceutical Products
Schaumberg, IL 60173

Lot 202048
Exp 07/08

How much diluent should be added to this vial?

correct answer is B

a. 20 mL
b. 1 mL
c. 2 mL
d. 20 mg

While the label does not specifically say to add 1 mL of diluent, we are know that this is a single dose vial of 1 mL. Therefore, we will add 1 mL of diluent."

Hydralazine 15 mg IM is ordered. How many mL's will you need to administer for the correct dose?

Identify the doctor's orders or given quantity by dragging and dropping it into the answer box.

Answer = 15 mg
Given quantity = 15mg.

What are the units wanted?

a. mg
b. tablets
c. mL

Answer c

Identify the DOH or what you have on the shelf by dragging and dropping it into the answer box.

Answer = 20mg/mL

Now that you have identified the pieces of information needed in the problem, properly setup the problem to calculate the correct dose by dragging and dropping given quantity, DOH, and wanted quantity into the correct position. Include conversion factors and equivalents when needed.

Start out with the doctor's order or given quantity.

$$\frac{15mg}{1}$$

how it should look when you set it up $\frac{15mg}{1}$

Next, drag and drop the wanted quantity where it should be.

$$\frac{15mg}{1} \qquad = \_\_\_\_\_\ mL$$

Next, multiply the given quantity by the DOH.

$$\frac{1mL}{20mg}$$

$$\frac{15mg}{1} \times \frac{1mL}{20mg} = \_\_\_\_\_\ mL$$

correct place for cancellation. You want the units to appear like this $\frac{1mL}{20mg}$, and not like this $\frac{20mg}{1mL}$ when you set it up. You need the unwanted units to cancel each other out from the starting point of the problem.

Next, cancel the unwanted units (but not their quantities).

$$\frac{15\cancel{mg}}{1} \times \frac{1mL}{20\cancel{mg}} = \_\_\_\_\_\ mL$$

You now have mL on top (or in the numerator), which is the wanted quantity. Now solve for correct dose.

$$\frac{15\cancel{mg}}{1} \times \frac{1mL}{20\cancel{mg}} = \_\ 0.75\ \_\ mL$$

Draw back the plunger on the syringe to indicate the amount of medication you would administer.

The calculated amount to be administered was 0.75 mL. Therefore, 0.75 mL should be drawn up as shown.

PRACTICE PROBLEM 2

NDC 63323-258-03

methylPREDNISolone
SODIUM SUCCINATE

For Injection, USP
125 mg

Reconstitute with 2 mL
Bacteriostatic Water for
Injection with Benzyl Alcohol.
Use within 48 hours after mixing.
For IV or IM use.

2 mL Single dose vial only R_x

American Pharmaceutical
Partners, Inc.
Schaumburg, IL 60173

Lot 201867
Exp 11/08

Methylprednisolone 125 mg is diluted in how many mL's?

answer is B

a. 1 mL
b. 2 mL
c. 3 mL
d. 4 mg

The label indicates to add 2 mL of Bacteriostatic water for injection. Therefore, we will add 2 mL of diluent."

Methylprednisolone 75mg is ordered. How many mL's will you need to administer for the correct dose?

Identify the doctor's orders or given quantity by dragging and dropping it into the answer box.

Answer = 75 mg
Given quantity = 75mg.

What are the units wanted?

a. mg
b. tablets
c. mL

Answer c

Identify the DOH or what you have on the shelf by dragging and dropping it into the answer box.

Answer = 125mg/2mL
This is the stock supply or dose on hand.

Now that you have identified the pieces of information needed in the problem, properly setup the problem to calculate the correct dose by dragging and dropping given quantity, DOH, and wanted quantity into the correct position. Include conversion factors and equivalents when needed.

Start out with the doctor's order or given quantity.

$$\frac{75mg}{1}$$

This is how it should look when you set it up $\frac{75mg}{1}$

Next, drag and drop the wanted quantity where it should be.

$$\frac{75mg}{1} \qquad = \_\_\_\_\_\ mL$$

Next, multiply the given quantity by the DOH.

$$\frac{2mL}{125mg}$$

$$\frac{75mg}{1} \times \frac{2mL}{125mg} = \_\_\_\_\_\ mL$$

You want the units to appear like this $\frac{2mL}{125mg}$, and not like this $\frac{125mg}{2mL}$ when you set it up. You need the unwanted units to cancel each other out from the starting point of the problem.

Next, cancel the unwanted units (but not their quantities).

$$\frac{75\cancel{mg}}{1} \times \frac{2mL}{125\cancel{mg}} = \_\_\_\_\_\ mL$$

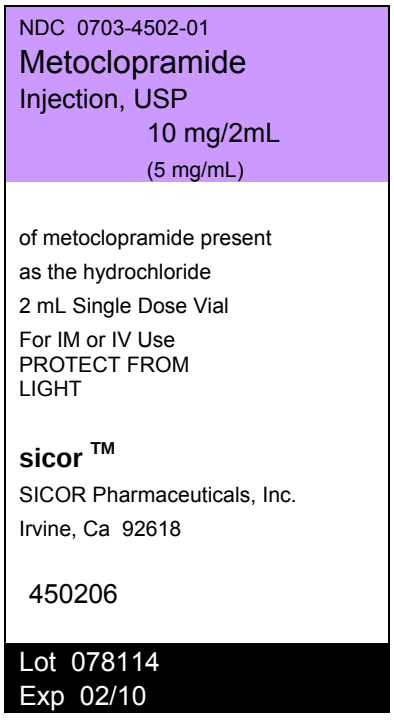
You now have mL on top (or in the numerator), which is the wanted quantity. Now solve for correct dose.

$$\frac{75\cancel{mg}}{1} \times \frac{2mL}{125\cancel{mg}} = \underline{1.2}\ mL$$

Draw back the plunger on the syringe to indicate the amount of medication you would administer.

The calculated amount to be administered was 1.2 mL. Therefore, 1.2 mL should be drawn up as shown.

PRACTICE PROBLEM 3



What is the unit dose of Metoclopramide?

– correct answer is B

a. 10 mg/2 mL
b. 5 mg/1 mL
c. 2 mg/ 10 mL
d. 5 mg/2 mL

Remember, unit dose is the amount of medication contained in 1mL.

Metoclopramide 6 mg IM is ordered. How many mL's will you need to administer for the correct dose?

Identify the doctor's orders or given quantity by dragging and dropping it into the answer box.

Answer = 6 mg
Given quantity = 6mg.

What are the units wanted?

a. mg
b. tablets
c. mL

Answer c

Identify the DOH or what you have on the shelf by dragging and dropping it into the answer box.

Answer = 5mg/mL
DOH = 5mg/mL.

Now that you have identified the pieces of information needed in the problem, properly setup the problem to calculate the correct dose by dragging and dropping given quantity, DOH, and wanted quantity into the correct position. Include conversion factors and equivalents when needed.

Start out with the doctor's order or given quantity.

$$\frac{6mg}{1}$$

This is how it should look when you set it up $\frac{6mg}{1}$

Next, drag and drop the wanted quantity where it should be.

$$\frac{6mg}{1} \qquad = \_\_\_\_\_ mL$$

Next, multiply the given quantity by the DOH.

$$\frac{1mL}{5mg}$$

$$\frac{6mg}{1} \times \frac{1mL}{5mg} = \_\_\_\_\_ mL$$

When you set up the problem, you want to be sure you have the units in the correct place for cancellation. You want the units to appear like this $\frac{1mL}{5mg}$, and not like this $\frac{5mg}{1mL}$ when you set it up. You need the unwanted units to cancel each other out from the starting point of the problem.

Next, cancel the unwanted units (but not their quantities).

$$\frac{6mg}{1} \times \frac{1mL}{5mg} = \_\_\_\_\_ mL$$

You now have mL on top (or in the numerator), which is the wanted quantity. Now solve for correct dose.

$$\frac{6mg}{1} \times \frac{1mL}{5mg} = \frac{1.2\ mL}{\text{----}}$$

1.2 mL will be administered for the correct dose of 6 mg.

Draw back the plunger on the syringe to indicate the amount of medication you would administer.

The calculated amount to be administered was 1.2 mL. Therefore, 1.2 mL should be drawn up as shown.

PRACTICE PROBLEM 4

Potassium Chloride 18 meq IV is ordered. How many mL's would you add to the IV bag?

Identify the doctor's orders or given quantity by dragging and dropping it into the answer box.

Answer = 18 meq
Given quantity = 18meq.

What are the units wanted?

a. meq
b. tablets
c. mL

Answer c

Identify the DOH or what you have on the shelf by dragging and dropping it into the answer box.

Answer = 2meq/mL
DOH = 2meq/mL.

Now that you have identified the pieces of information needed in the problem, properly setup the problem to calculate the correct dose by dragging and dropping given quantity, DOH, and wanted quantity into the correct position. Include conversion factors and equivalents when needed.

Start out with the doctor's order or given quantity.

$$\frac{18meq}{1}$$

This is how it should look when you set it up $\frac{18meq}{1}$

Next, drag and drop the wanted quantity where it should be.

$$\frac{18meq}{1} \qquad = \_\_\_\_\_ mL$$

Next, multiply the given quantity by the DOH.

$$\frac{1mL}{2meq}$$

$$\frac{18meq}{1} \times \frac{1mL}{2meq} = \_\_\_\_\_ mL$$

When you set up the problem, you want to be sure you have the units in the correct place for cancellation. You want the units to appear like this $\frac{1mL}{2meq}$, and not like this $\frac{2meq}{1mL}$ when you set it up. You need the unwanted units to cancel each other out from the starting point of the problem.

Next, cancel the unwanted units (but not their quantities).

$$\frac{18meq}{1} \times \frac{1mL}{2meq} = \_\_\_\_\_ mL$$

You now have mL on top (or in the numerator), which is the wanted quantity. Now solve for correct dose.

$$\frac{18meq}{1} \times \frac{1mL}{2meq} = \frac{9}{----} mL$$

9 mL will be injected into the IV bag for the correct dose of 18 meq.

Draw back the plunger on the syringe to indicate the amount of medication you would inject into the IV bag.

The calculated amount to be injected into the IV bag was 9 mL. Therefore, 9 mL should be drawn up as shown."

PRACTICE PROBLEM 5

Lasix 16 mg IM is ordered. How many mL's would you have to administer?

NDC 0517-5702-25

FUROSEMIDE

INJECTION, USP

20 mg/ 2 mL

(10 mg/mL)

2 mL Single dose vial

For IV or IM Use

R_x only

American Regent, Inc

Shirley, NY 11967

WARNING: USE ONLY IF SOLUTION IS CLEAR AND COLORLESS. PROTECT FROM LIGHT. Store at controlled room temperature 15'-30'C (59'-86'F) (See USP)

Directions for Use:

See Package Insert.

Rev. 1/05

Lot/exp

7206 MAR09

Identify the doctor's orders or given quantity by dragging and dropping it into the answer box.

Answer = 16 mg

What are the units wanted?

a. mg
b. tablets
c. mL

Answer c

Identify the DOH or what you have on the shelf by dragging and dropping it into the answer box.

– Answer = 20mg/2mL or 10mg/mL

DOH = 20mg/2mL or 10mg/mL.

This is the doctor's order or amount of drug (in weight) needed.

Now that you have identified the pieces of information needed in the problem, properly setup the problem to calculate the correct dose by dragging and dropping given quantity, DOH, and wanted quantity into the correct position. Include conversion factors and equivalents when needed.

Start out with the doctor's order or given quantity.

$$\frac{16mg}{1}$$

This is how it should look when you set it up $\frac{16mg}{1}$

Next, drag and drop the wanted quantity where it should be.

$$\frac{16mg}{1} \qquad = \_\_\_\_\_ mL$$

Next, multiply the given quantity by the DOH.

$$\frac{2mL}{20mg} \text{ or } \frac{1mL}{10mg}$$

$$\frac{16mg}{1} \times \frac{2mL}{20mg} = \_\_\_\_\_ mL \text{ or } \frac{16mg}{1} \times \frac{1mL}{10mg} = \_\_\_\_\_ mL$$

When you set up the problem, you want to be sure you have the units in the correct place for cancellation. You want the units to appear like this $\frac{1mL}{20mg}$, and not like this $\frac{20mg}{1mL}$ when you set it up. You need the unwanted units to cancel each other out from the starting point of the problem.

Next, cancel the unwanted units (but not their quantities).

$$\frac{16\cancel{mg}}{1} \times \frac{2mL}{20\cancel{mg}} = \_\_\_\_\_ mL \text{ or } \frac{16\cancel{mg}}{1} \times \frac{1mL}{10\cancel{mg}} = \_\_\_\_\_ mL$$

You now have mL on top (or in the numerator), which is the wanted quantity. Now solve for correct dose.

$$\frac{16\cancel{mg}}{1} \times \frac{2mL}{20\cancel{mg}} = 1.6 \text{ mL} \text{ or } \frac{16\cancel{mg}}{1} \times \frac{1mL}{10\cancel{mg}} = 1.6 \text{ mL}$$

1.6 mL will be administered for the correct dose of 16 mg.

Draw back the plunger on the syringe to indicate the amount of medication you would administer.

The calculated amount to be administered was 1.6 mL. Therefore, 1.6 mL should be drawn up as shown."

PRACTICE PROBLEM 6

Kytril 4 mg IV is ordered. How many mL's will you inject into the IV bag?

Identify the doctor's orders or given quantity by dragging and dropping it into the answer box.

Answer = 4 mg
Given quantity = 4 mg. This is the stock supply or dose on hand."

What are the units wanted?

a. mg
b. tablets
c. mL

Answer c

Identify the DOH or what you have on the shelf by dragging and dropping it into the answer box.

Answer = 1mg/1mL
DOH = 1mg/1mL.

Now that you have identified the pieces of information needed in the problem, properly setup the problem to calculate the correct dose by dragging and dropping given quantity, DOH, and wanted quantity into the correct position. Include conversion factors and equivalents when needed.

Start out with the doctor's order or given quantity.

$$\frac{4mg}{1}$$

This is how it should look when you set it up $\frac{4mg}{1}$

Next, drag and drop the wanted quantity where it should be.

$$\frac{4mg}{1} \qquad = \_\_\_\_\_ mL$$

Next, multiply the given quantity by the DOH.

$$\frac{1mL}{1mg}$$

$$\frac{4mg}{1} \times \frac{1mL}{1mg} = \_\_\_\_\_ mL$$

You want the units to appear like this $\frac{1mL}{1mg}$, and not like this $\frac{1mg}{1mL}$ when you set it up. You need the unwanted units to cancel each other out from the starting point of the problem.

Next, cancel the unwanted units (but not their quantities).

$$\frac{4\cancel{mg}}{1} \times \frac{1mL}{\cancel{1mg}} = \_\_\_\_\_ mL$$

After cancellation, only the units wanted should remain in the equation.

You now have mL on top (or in the numerator), which is the wanted quantity. Now solve for correct dose.

$$\frac{4\cancel{mg}}{1} \times \frac{1mL}{1\cancel{mg}} = \frac{4}{\text{-----}}\ mL$$

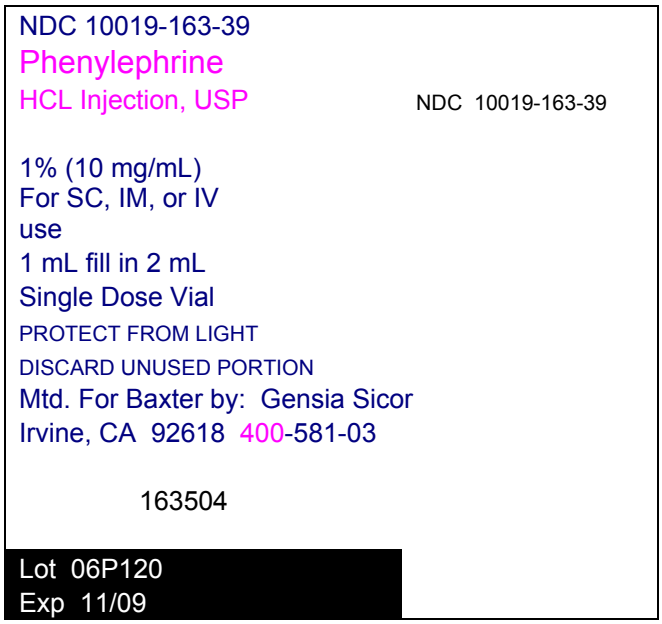
4 mL will be injected into the IV bag for the correct dose of 4 mg. How many vials of medication is needed for this dose?

correct answer is D

a. 1 vial
b. 2 vials
c. 3 vials
d. 4 vials

The required amount is 4 mL. Since each vial contains only 1 mL, you will need a total of 4 vials to obtain the needed amount.

PRACTICE PROBLEM 7



How many mL's are needed to reconstitute this medication?

correct answer is B

a. 1 mL
b. 2 mL
c. 3 mL
d. 4 mL

The indicates “fill in 2 mL. Therefore, 2 mL’s of diluent should be added to reconstitute this medication.”

Phenylephrine HCl 7 mg SC is ordered. How many mL’s will you need to administer for the correct dose?

Identify the doctor’s orders or given quantity by dragging and dropping it into the answer box.

Answer = 7 mg
Given quantity = 7 mg.

What are the units wanted?

a. mg
b. tablets
c. mL

Answer c

Identify the DOH or what you have on the shelf by dragging and dropping it into the answer box.

Answer = 10mg/mL

Now that you have identified the pieces of information needed in the problem, properly setup the problem to calculate the correct dose by dragging and dropping given quantity, DOH, and wanted quantity into the correct position. Include conversion factors and equivalents when needed.

Start out with the doctor’s order or given quantity.

$$\frac{7mg}{1}$$

This is how it should look when you set it up $\frac{7mg}{1}\ \frac{15mg}{1}$

Next, drag and drop the wanted quantity where it should be.

$$\frac{7mg}{1} \qquad = \_\_\_\_\_\ mL$$

This is needed so you can see what you are solving for.

Next, multiply the given quantity by the DOH.

$$\frac{1mL}{10mg}$$

$$\frac{7mg}{1} \times \frac{1mL}{10mg} = \_\_\_\_\_\ mL$$

When you set up the problem, you want to be sure you have the units in the correct place for cancellation. You want the units to appear like this $\frac{1mL}{10mg}$, and not like this $\frac{10mg}{1mL}$ when you set it up. You need the unwanted units to cancel each other out from the starting point of the problem.

Next, cancel the unwanted units (but not their quantities).

$$\frac{7\cancel{mg}}{1} \times \frac{1mL}{10\cancel{mg}} = \_\_\_\_\_\ mL$$

You now have mL on top (or in the numerator), which is the wanted quantity. Now solve for correct dose.

$$\frac{7\cancel{mg}}{1} \times \frac{1mL}{10\cancel{mg}} = \underline{0.7}\ mL$$

0.7 mL will be administered for the correct dose of 7 mg Draw back the plunger on the syringe to indicate the amount of medication you would administer.

The calculated amount to be administered was 0.7 mL. Therefore, 0.7 mL should be drawn up as shown.