Reconstitution of Powdered Drugs

Drugs that are unstable in liquid form are manufactured in powder form. These medications must be converted to liquid form (i.e., reconstituted) before they can be administered to patients. Information about the amount and type of solution (i.e., diluent) needed to reconstitute the drug can usually be found on the drug container label, in the manufacturer’s package insert and/or in the drug monograph (usually found in a facility’s drug manual) (we recommend using the drug monograph whenever possible). Examples of diluents include:

- sterile water for injection
- bacteriostatic water for injection
- 0.9% sodium chloride for injection

Strict aseptic technique must be used when reconstituting medications. Once the drug is reconstituted, any unused amount must be labeled and stored appropriately (either at room temperature or in the refrigerator). Take special notice of how long the drug is stable.

Using the following Basic Formula can help to simplify your drug calculations:

\[
\frac{D \times V}{H} = \text{amount to give}
\]

- **D** = desired dose (i.e., the drug dose ordered by the physician)
- **H** = on-hand dose (i.e., the drug dose on the label of the drug container)
- **V** = vehicle (i.e., the form and amount in which the drug comes)

When answering the following questions, be sure to:

- round off to 2 decimal points for mL and mg (where applicable)
- state the unit of measurement in each answer
1. The physician’s order reads: **Ampicillin 500 mg IV q6h**
   
   a. How many mLs are required for one dose?

   b. If there is medication left in the vial after you prepare your dose, how should you label the vial?

2. The physician’s order reads: **Kefzol 165 mg IV q8h**

   How many mLs are required for one dose?

3. The physician’s order reads: **Penicillin G 300,000 units IV q8h**

   How many mLs are required for one dose?
4. **CARBENICILLIN**
   - For I.V. use
   - **5g**
   - CAUTION: Federal law prohibits dispensing without prescription.
   - Add 9.5mL of sterile water for a final concentration of 500mg/ mL
   - Stable for 48 hours in the refrigerator.
   - Read accompanying circular.
   - **EXPIRES 09/09/09**

The physician’s order reads: Carbenicillin G 750 mg IV q6h

How many mLs are required for one dose?

5. **ERYTHROMYCIN**
   - For I.V. use
   - **250mg**
   - CAUTION: Federal law prohibits dispensing without prescription.
   - Add 19.2mL of sterile water for a final concentration of 250mg/ 20mL
   - Stable for 48 hours at room temperature or 7 days in the refrigerator.
   - Read accompanying circular.
   - **EXPIRES 09/09/09**

The physician’s order reads: Erythromycin 250 mg IV q8h

How many mLs are required for one dose?

6. **VANCOMYCIN**
   - For I.V. use
   - **500mg**
   - CAUTION: Federal law prohibits dispensing without prescription.
   - Add 10mL of sterile water for a final concentration of 500mg/ 10mL
   - Stable for 24 hours at room temperature or 3 days in the refrigerator.
   - Read accompanying circular.
   - **EXPIRES 09/09/09**

The physician’s order reads: Vancomycin 250 mg IV q12h

How many mLs are required for one dose?

7. **CEFOXITIN**
   - For I.V. use
   - **1g**
   - CAUTION: Federal law prohibits dispensing without prescription.
   - Add 3.2mL of sterile water for a final concentration of 300mg/ mL
   - Stable for 7 days in the refrigerator.
   - Read accompanying circular.
   - **EXPIRES 09/09/09**

The physician’s order reads: Cefoxitin 750 mg IV b.i.d.

How many mLs are required for one dose?
8. The physician’s order reads:  Zithromax 250 mg IV b.i.d.

How many mLs are required for one dose?

9. The physician’s order reads: 1,000,000 units of Pencillin G IV q8h

a. How many mL of NS would you use to reconstitute the medication? (give only one answer)

b. Based on how you answered Part “a” above, how many mLs are required for one dose?

10. The physician’s order reads: 750 mg of Mandol IV b.i.d.

a. How many mL of NS would you use to reconstitute the medication? (give only one answer)

b. Based on how you answered Part “a” above, how many mLs are required for one dose?
RECONSTITUTION OF POWDERED DRUGS ANSWER KEY

1a. \[
\frac{500 \text{ mg}}{250 \text{ mg}} \times 1 \text{ mL} = 2 \text{ mL}
\]

1b. Ampicillin 250 mg/mL
05/05/05 0600h km

(i.e. name of drug concentration of drug in vial today’s date time of reconstitution your initials)

2. \[
\frac{165 \text{ mg}}{330 \text{ mg}} \times 1 \text{ mL} = 0.5 \text{ mL}
\]

3. \[
\frac{300,000 \text{ units}}{1,000,000 \text{ units}} \times 10 \text{ mL} = 3 \text{ mL}
\]

4. \[
\frac{750 \text{ mg}}{500 \text{ mg}} \times 1 \text{ mL} = 1.5 \text{ mL}
\]

5. \[
\frac{250 \text{ mg}}{250 \text{ mg}} \times 20 \text{ mL} = 20 \text{ mL}
\]

6. \[
\frac{250 \text{ mg}}{500 \text{ mg}} \times 10 \text{ mL} = 5 \text{ mL}
\]

7. \[
\frac{750 \text{ mg}}{300 \text{ mg}} \times 1 \text{ mL} = 2.5 \text{ mL}
\]

8. \[
\frac{250 \text{ mg}}{100 \text{ mg}} \times 1 \text{ mL} = 2.5 \text{ mL}
\]

(cont’d on next page)
9a. It would be best to prepare the medication to the 1,000,000 units/mL concentration since that is the number of units that you have to give. However any of the 3 options is acceptable.

For the 250,000 units/mL concentration \( \rightarrow 20 \text{ mL} \)
For the 500,000 units/mL concentration \( \rightarrow 10 \text{ mL} \)
For the 1,000,000 units/mL concentration \( \rightarrow 5 \text{ mL} \)

9b. The answer to this question is dependent on how you answered 9a above.

If you added 20 mL of NS then:
\[
\frac{1,000,000 \text{ units}}{250,000 \text{ units}} \times 1 \text{ mL} = 4 \text{ mL}
\]

If you added 10 mL of NS, then:
\[
\frac{1,000,000 \text{ units}}{500,000 \text{ units}} \times 1 \text{ mL} = 2 \text{ mL}
\]

If you added 5 mL of NS, then:
\[
\frac{1,000,000 \text{ units}}{1,000,000 \text{ units}} \times 1 \text{ mL} = 1 \text{ mL}
\]

10a. None of the concentrations match the number of mg that you have to give so it doesn’t matter which of the 3 ways of preparing the medication that you choose.

For the 100 mg/mL concentration \( \rightarrow 20 \text{ mL} \)
For the 500 mg/mL concentration \( \rightarrow 4 \text{ mL} \)
For the 1 g/mL concentration \( \rightarrow 2 \text{ mL} \)

10b. The answer to this question is dependent on how you answered 10a above.

If you added 20 mL of NS then:
\[
\frac{750 \text{ mg}}{100 \text{ mg}} \times 1 \text{ mL} = 7.5 \text{ mL}
\]

If you added 4 mL of NS, then:
\[
\frac{750 \text{ mg}}{500 \text{ mg}} \times 1 \text{ mL} = 1.5 \text{ mL}
\]

If you added 2 mL of NS, then:
\[
\frac{750 \text{ mg}}{1000 \text{ mg}} \times 1 \text{ mL} = 0.75 \text{ mL}
\]