INTRAVENOUS CALCULATIONS, SOLUTIONS, AND EQUIPMENT

Calhoun Community College
What does the physician’s order look like for IV therapy?

- Name of IV solution
- Name of any medications added if any
- Amount (volume) to be administered
- Time period during which the IV is to infuse – *not always written*

Example:
- IV of NS @ 125 mL/hr
- IV of NS 125 mL/hr for 8 hours
- IV of 1000 mL NS in 8 hours
Calculating Percentage of Solute in IV Fluids

- Amount of each ingredient in an IV fluid in already calculated and on the label (so you don’t have to worry about memorizing or learning this)

- Solution strength expressed as a percentage means “gram of drug per 100 mL of fluid”
  - Ex: 5% dextrose solution will have 5 g of dextrose in each 100 mL
IV Flow Rate in mL/h

To regulate an IV volume by electronic infusion pump or controller calibrated in mL/h, calculate:

Total amount of solution ordered (mL) = ___mL/hr

Time in hours ordered to be administered

(Remember: always rounded to a whole number)

Order reads: D5W 250 mL IV over the next 2 h by infusion pump. Flow rate: ______ mL/h

Use formula: \[
\frac{\text{Total mL ordered}}{\text{Total h to infuse}} = \text{Flowrate}
\]

\[
\frac{250 \text{ mL}}{2 \text{ h}} = 125 \text{ mL/h}
\]
IV Flow Rate in mL/h

To regulate an IV volume by electronic infusion pump or controller calibrated in mL/h, calculate:

- **Order reads**: D$_5$LR 1000 mL IV over the next 8 h.
- How many mL/hr will you infuse? ______

- **Use the formula**: \[
\frac{\text{Total mL ordered}}{\text{Total h to infuse}} = \text{Flowrate}
\]

\[
\frac{1000 \text{ mL}}{8 \text{ hrs}} = 125 \text{ mL/hr}
\]
IV Flow Rate in mL/h

- *Order reads:* NS 0.9% 250 mL IV over the next 4 h.
- How many mL/hr will you infuse? ______

- Use the formula: \[ \frac{\text{Total mL ordered}}{\text{Total h to infuse}} = \text{Flowrate} \]

\[
\frac{250 \text{ mL}}{4 \text{ hrs}} = 62.5 \text{ mL/hr}
\]

Don’t forget to round… 63 mL/hr
IV Flow Rate in mL/h Practice Questions

- **Order reads:** SW 2000 mL IV over the next 24 h
  How many mL/hr will your IV infuse? ______

- **Order reads:** LR 600 mL IV over the next 6 h by
  How many mL/hr will your IV infuse? ______

- **Order reads:** NS 0.9% 250 mL IV over the next 2 h
  How many mL/hr will your IV infuse? ______

- **Order reads:** D₅LR 1250 mL IV over the next 8 h
  How many mL/hr will your IV infuse? ______

- **Order reads:** NaCl 0.45% 200 mL IV over the next 4 h
  How many mL/hr will your IV infuse? ______
IV Flow Rate in mL/h Practice Questions

**Order reads:** SW 2000 mL IV over the next 24 h
How many mL/hr will your IV infuse? 83.3 = 83 mL/h

**Order reads:** LR 600 mL IV over the next 6 h by
How many mL/hr will your IV infuse? 100 mL/h

**Order reads:** NS 0.9% 250 mL IV over the next 2 h
How many mL/hr will your IV infuse? 125 mL/h

**Order reads:** D₅LR 1250 mL IV over the next 8 h
How many mL/hr will your IV infuse? 165 mL/h

**Order reads:** NaCl 0.45% 200 mL IV over the next 4 h
How many mL/hr will your IV infuse? 50 mL/h
**IV Flow Rate in mL/h for Infusion Rate of 1 Hour or Less**

- When you need to calculate IV fluid *to be infused in less than one hour*, use the following formula:

  \[
  \text{Total mL ordered} \times 60 \text{ min/h} = \text{mL/h}
  \]

  \[
  \text{Total minutes ordered}
  \]

  *(Don’t forget to round to a whole number 😊)*

- **Order:** Ampicillin 500 mg IV in 50 mL D$_{5\frac{1}{2}}$NS in 30 min by IV pump

  \[
  \frac{50 \text{ mL}}{30 \text{ min}} \times 60 \text{ min/h} = \frac{100 \text{ mL/h}}{30^1 \text{ min}} = 100 \text{ mL/h}
  \]
IV Flow Rate in mL/h
for Infusion Rate of 1 hour or less

- Order: Ancef 2 gm IVPB in 100 mL D₅W in 1 hr
- How many mL/hr will your IV infuse? _____
- Use the formula: Total mL ordered X 60 min/h = mL/hr
  Total min ordered

\[
\frac{100 \text{ mL}}{60 \text{ min}} \times 60 \text{ min/hr} = 100 \text{ mL/hr}
\]
IV Flow Rate in mL/h
For Infusion Rate is 1 hour or less
Practice Questions

Order reads: Ancef 1 gm IVPB in 50 mL D₅W in 30 min
How many mL/hr will your IV infuse? ______

Order reads: Ceclor 250 mg IVPB in 100 mL D₅W in 30 min
How many mL/hr will your IV infuse? ______

Order reads: Ancef 2 gm IVPB in 100 mL D₅W in 45 min
How many mL/hr will your IV infuse? ______

Order reads: Rocephin 1 gm IVPB in 200 mL D₅W in 30 min
How many mL/hr will your IV infuse? ______

Order reads: PCN 500 mg IVPB in 100 mL D₅W in 20 min
How many mL/hr will your IV infuse? ______
IV Flow Rate in mL/h
For Infusion Rate is 1 hour or less

Answers

- Order reads: Ancef 1 gm IVPB in 50 mL D₅W in 30 min
  How many mL/hr will your IV infuse? **100**

- Order reads: Ceclor 250 mg IVPB in 100 mL D₅W in 30 min
  How many mL/hr will your IV infuse? **200**

- Order reads: Ancef 2 gm IVPB in 100 mL D₅W in 45 min
  How many mL/hr will your IV infuse? **133**

- Order reads: Rocephin 1 gm IVPB in 200 mL D₅W in 30 min
  How many mL/hr will your IV infuse? **400**

- Order reads: PCN 500 mg IVPB in 100 mL D₅W in 20 min
  How many mL/hr will your IV infuse? **300**
The formula method to calculate IV flow rate for manually regulated IVs ordered in mL/h or for a prescribed number of minutes is:

\[ \frac{V}{T} \times C = R \]

- **Volume (mL)**
- **Time (min)**
- **Calibration or drop factor (gtt/mL)**
- **gtt/min**
CALCULATING IV FLOW RATE IN gtt/min
RULES TO REMEMBER

- Carry calculations to one decimal. Round gtt/min to the nearest whole number, because you can watch/count only whole drops.

- Step one: id the type of tubing and its calibration (found on the tubing package)
  - **Macrodrop tubing** – standard tubing used for general IV administration. Delivers LARGE drops, thus administers large amounts of fluid (10, 15, or 20 gtts equal 1 mL)
  - **Microdrop tubing** – delivers tiny drops used in critical are, pediatrics and in the elderly. Each 60 gtts equals 1 mL, therefore the number of gtts/min is equal to the number of mL/h (ex: 100 mL/hr = 100 micro gtts/min)

- Don’t forget to label your answer... ___gtt/min
The physician orders: $D_5W$ IV @ 125 mL/h.
The infusion set is calibrated for a drop factor of 10 gtt/mL.
Calculate the IV flow rate in gtt/min. Notice that the mL cancel out, leaving gtt/min.

$$\frac{125 \text{ mL}}{60 \text{ min}} \times 10 \text{ gtt/mL} = \frac{125 \text{ mL}}{60 \text{ min}} \times \frac{10 \text{ gtt}}{1 \text{ mL}} = 20.8 \text{ gtt/min}$$

*Use your watch to count the drops and adjust the roller clamp to deliver 21 gtt/min.*
CALCULATION OF GTT/MIN

- The physician orders: D₅W IV @ 50 mL/h
- The infusion set is calibrated for a drop factor of 60 gtt/mL.
- Calculate the IV flow rate in gtt/min.

Use the formula:

\[
\frac{V}{T} \times C = R
\]

- \( \frac{50 \text{ mL}}{60 \text{ min}} \times 60 \text{ gtt/mL} = 50 \text{ gtts/min} \)
CALCULATE IV FLOW RATE IN GTT/MIN
PRACTICE QUESTIONS

Order reads: D 5 LR @ 100 mL/h
Drop factor is 15 gtt/mL
Calculate the IV flow rate in gtt/min ____

Order reads: LR @ 100 mL/h
Drop factor is 20 gtt/mL
Calculate the IV flow rate in gtt/min ____

Order reads: D 5 LR @ 30 mL/h
Drop factor is 15 gtt/mL
Calculate the IV flow rate in gtt/min ____

Order reads: D 5 W NS @ 150 mL/h
Drop factor is 10 gtt/mL
Calculate the IV flow rate in gtt/min ____
CALCULATE IV FLOW RATE IN GTT/MIN

ANSWERS

- **Order reads:** D 5 LR @ 100 mL/h  
  Drop factor is 15 gtt/mL  
  Calculate the IV flow rate in gtt/min  **25**

- **Order reads:** LR @ 100 mL/h  
  Drop factor is 20 gtt/mL  
  Calculate the IV flow rate in gtt/min  **33**

- **Order reads:** D 5 LR @ 30 mL/h  
  Drop factor is 15 gtt/mL  
  Calculate the IV flow rate in gtt/min  **7.5**

- **Order reads:** D 5 W NS @ 150 mL/h  
  Drop factor is 10 gtt/mL  
  Calculate the IV flow rate in gtt/min  **25**