

**COLLEGE OF
PHARMACY**



جامعة الأمير سطام بن عبدالعزيز
Prince Sattam Bin Abdulaziz University

**STERILE PRODUCTS
PHT 434**

CALCULATIONS INVOLVING

FLOW RATES IN LARGE VOLUME PARENTERALS

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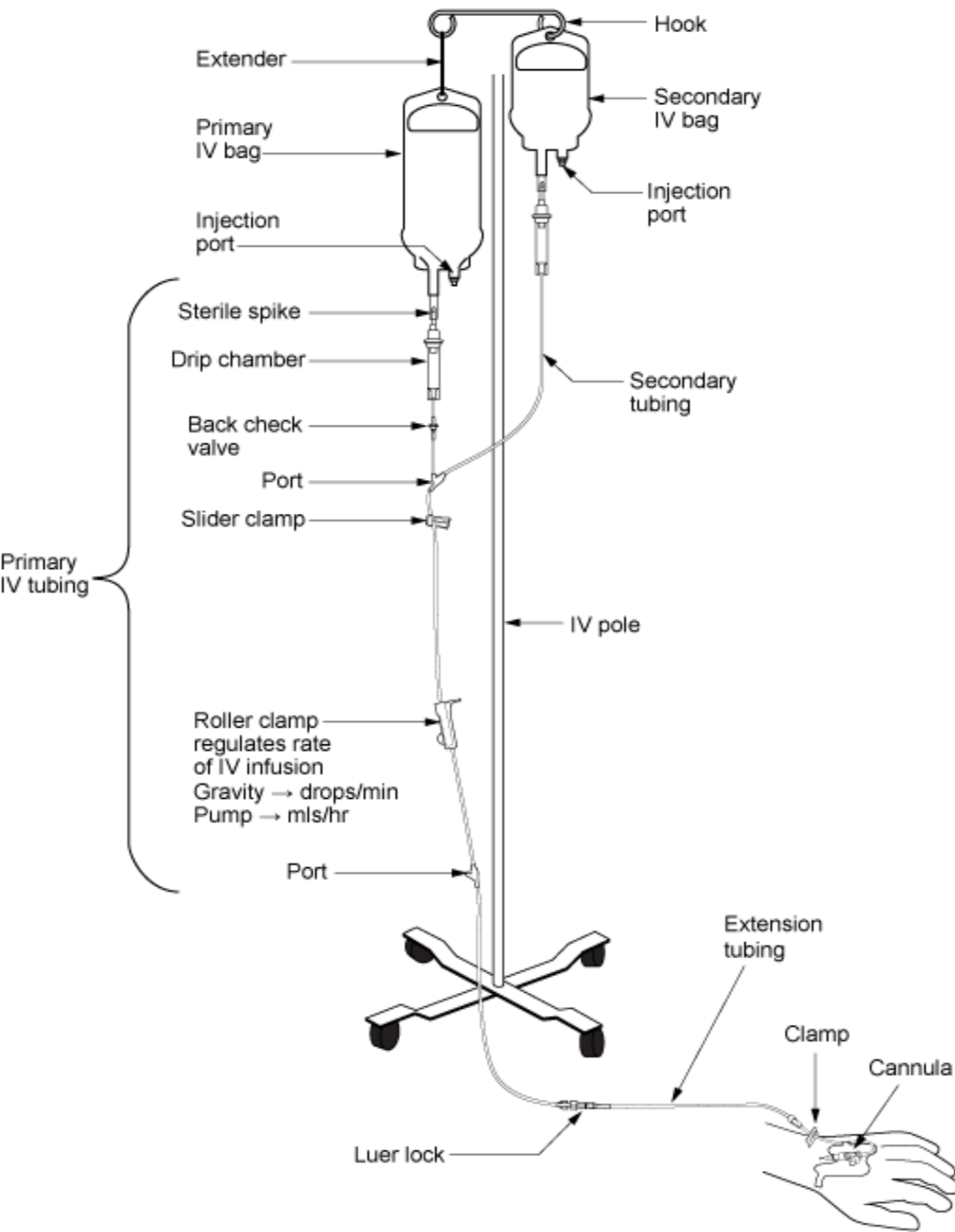
OBJECTIVE OF LABORATORY

- The present chapter deals with different calculations associated with parenteral medications which include rate of flow of intravenous fluids.

RATE OF FLOW CALCULATIONS

- Intravenous fluids must be precisely regulated to ensure adequate hydration of the patient.
- The large volume parenteral solutions such as normal saline, dextrose 5% etc are administered by allowing the solution to drip slowly into a vein by gravity flow.
- Medicated IV drips (IV solutions containing potent medications) require extreme care and meticulous observation to precisely deliver the medication therefore these are administered using infusion pump or a controlled volume chamber with a microdrip sets.

RATE OF FLOW CALCULATIONS



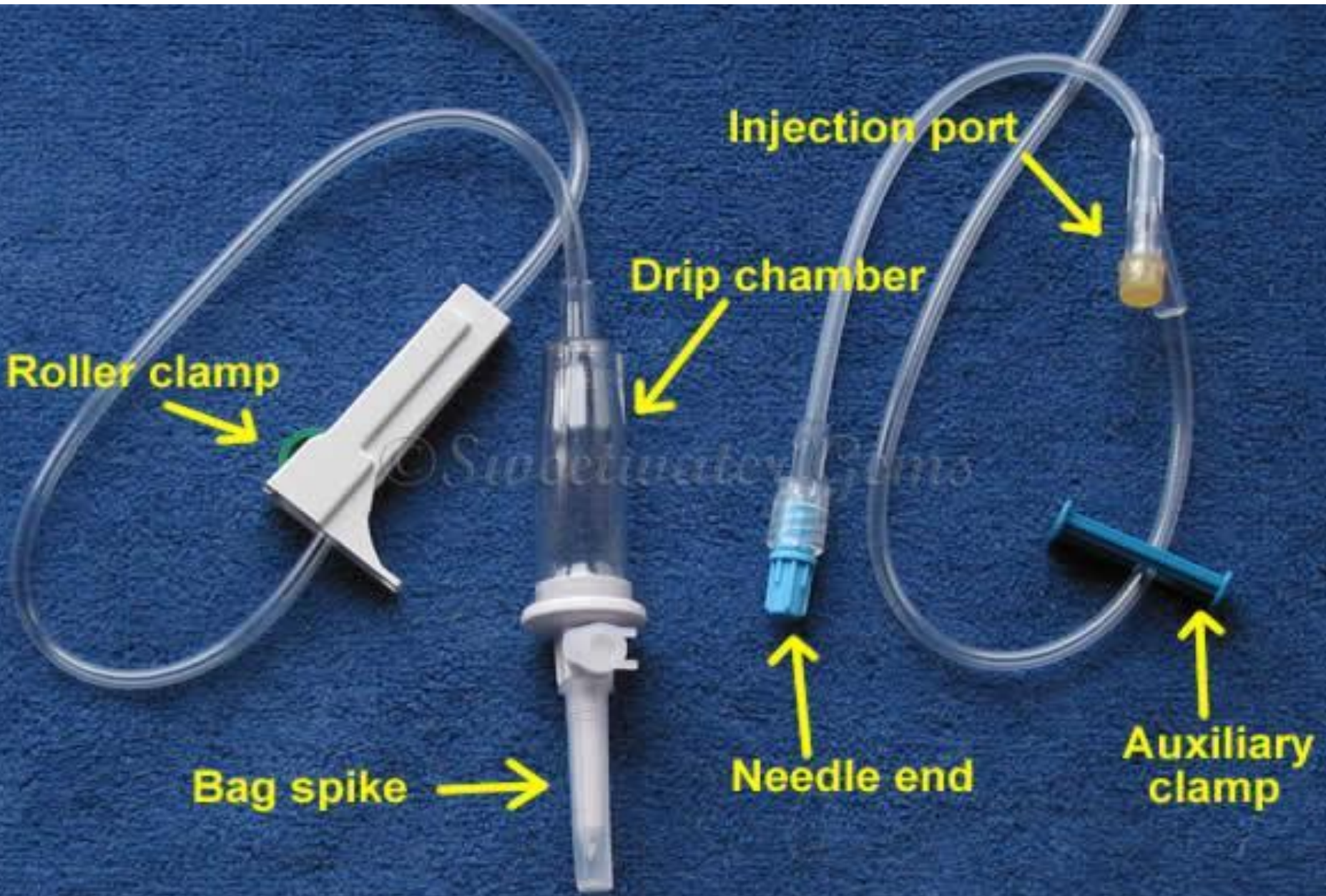
RATE OF FLOW CALCULATIONS

- Generally, the packaging of the solution administration equipment will state the drop factor (drops per milliliter) that the set delivers.
- Intravenous administration sets are commercially available that deliver 10, 12, 15, 20, 60, and other numbers of drops per mL.
- Standard IV solution administration sets deliver 10 gtt (drops) per mL.
- Blood administration sets deliver 15 gtt/mL.
- Microdrop (sometimes referred to as "minidrop") sets deliver 60 gtt/mL.

RATE OF FLOW CALCULATIONS



RATE OF FLOW CALCULATIONS



RATE OF FLOW CALCULATIONS



Macro
drip



Micro
drip



Blood transfusion
drip set

RATE OF FLOW CALCULATIONS



Micro & Macro Drip Sets



Micro



Macro

60 gtt/mL set

- 60 gtt/min = 1 cc

10 gtt/mL set

- 10 gtt/min = 1 cc

15 gtt/mL set

- 15 gtt/min = 1 cc

RATE OF FLOW CALCULATIONS

- Rate of flow of IV solutions can be calculated by-
- Formula method
- Proportion method.
- In formula method Rate of flow (R) i.e. # of drops /min can be calculated as follows:

$$= \frac{\text{Number of mL of solution to be infused} \times \text{Number of drops per mL (or Drop factor)}}{\text{Number of hours for adm.} \times 60 \text{ (minutes per hour)}}$$

- It can be re arranged as **$R = VD/T$**
- Where V is total volume in ml, D is drop factor and T is total time of administration in minutes.

RATE OF FLOW CALCULATIONS

- A patient need to be administered 400 ml of normal saline solution during 2 hours period. Calculate rate of flow if IV set delivers 15 drops / ml.
- $V = 400 \text{ ml}$
- $D = 15$
- $T = 2 \text{ Hrs i.e. } 2 * 60 = 120 \text{ minutes}$
- **$R = VD/T$**
- $R = 400 \times 15 / 120$
- $R = 6000 / 120$
- **$R = 50 \text{ drops / min}$**

RATE OF FLOW CALCULATIONS

- A patient need to be administered two units of whole blood (500 ml each) over a period of four hours. If the infusion set is calibrated to 15 drops per milliliter, calculate the IV flow rate in gtt/min?
- $V = 500 * 2 = 1000$ ml
- $D = 15$
- $T = 2$ Hrs i.e. $4 * 60 = 240$ minutes
- **$R = VD/T$**
- $R = 1000 \times 15 / 240$
- $R = 15000 / 240$
- **$R = 62.5$ drops / min**

RATE OF FLOW CALCULATIONS

- A patient need 1000 ml of D5% over a period of 24 hours. If microdrop infusion set deliver 60 drops/ml then calculate the IV flow rate in gtt/min?
- $V = 1000 \text{ ml}$
- $D = 60$
- $T = 24 \text{ Hrs i.e. } 24 * 60 = 1440 \text{ minutes}$
- **$R = VD/T$**
- $R = 1000 \times 60 / 1440$
- $R = 60000 / 1440$
- **$R = 41.66 \text{ drops / min} = 42 \text{ drops/min}$**

RATE OF FLOW CALCULATIONS

- A patient need 1000 ml of D5% over a period of 24 hours. If microdrop infusion set deliver 60 drops/ml then calculate the IV flow rate in gtt/min?
- $V = 1000 \text{ ml}$
- $D = 60$
- $T = 24 \text{ Hrs i.e. } 24 * 60 = 1440 \text{ minutes}$
- **1000 ml delivered in 24 hrs or 1440 min**
- **$1000 \text{ ml} / 1440 \text{ min} = X \text{ ml} / 1 \text{ min}$**
- $X = 1000 / 1440 = 0.69 \text{ ml}$
- $60 \text{ drops} / \text{ml} = X \text{ drops} / 0.69 \text{ ml}$
- **$X = 60 * 0.69 = R = 41.4 \text{ drops} / \text{min} = 42 \text{ drops} / \text{min}$**

RATE OF FLOW CALCULATIONS

- A patient is to receive 20000 units of HEPARIN in 500 ml of 5% dextrose. Calculate flow rate **ml/hour** to deliver 1200 units of HEPARIN.
- 20000 UNITS delivered in 500 ml D5%
- $20000 \text{ units} / 500 \text{ ml} = 1200 \text{ unit} / X$
- $X = 1200 * 500 / 20000$
- $X = 30 \text{ ml}$ will contain 1200 units of heparin.
- It means that rate should be **30 ml/hour**.
- **If drop factor is 15 then**
- $R = VD / T$
- $R = 30 * 15 / 60, = 7.5 \text{ DROPS} / \text{MIN} = 8 \text{ drops} / \text{min}$

*THANK YOU FOR
ATTENTION*

GOOD LUCK ..