

# Appendix A: Pharmaceutical Calculations

## 1. Diluting Pharmaceutical Grade Parenteral Medications

$$\text{Volume of undiluted drug needed} \times \text{Undiluted drug concentration} = \text{Final total volume} \times \text{Desired final drug concentration}$$

After volume of undiluted drug needed is calculated a sterile diluent should be added to reach the final volume desired. Only sterile diluents should be used (e.g., sterile normal saline)

### EXAMPLE:

Ketamine undiluted concentration = 100mg/mL

Ketamine desired final concentration = 10mg/mL

Final volume desired = 10mL

Plug into formula:

$$(\text{volume of undiluted ketamine needed}) \times (100\text{mg/mL}) = (10\text{mL}) \times (10\text{mg/mL}).$$

Volume of undiluted ketamine needed = 1mL, mix with 9mL of sterile saline in a sterile vial to get 10mL of 10mg/mL ketamine

## 2. IV Fluid Preparations

After volume of undiluted drug needed is calculated, this volume should be removed from the fluid bag prior to adding the additive. Thus, the final volume will be the starting volume of the fluid bag.

### EXAMPLE:

Dextrose starting concentration = 50% (0.5g/mL)

Dextrose desired final concentration = 5% solution in LRS (0.05g/mL)

Final volume desired = 1000mL of a 5% dextrose solution

Plug into formula:

$$(\text{volume of 50\% dextrose needed}) \times (0.5\text{g/mL}) = (1000\text{mL}) \times (0.05\text{g/mL}).$$

Volume of 50% dextrose needed = 100mL of 50% dextrose, remove 100mL of LRS from 1000mL bag prior to adding 100mL 50% dextrose.

**NOTE:** This method will give you a generalized concentration of medication in suspension, do not use if precise drug dosing is needed.

## 3. Combining Two or More Medications

$$(\text{volume of drug A needed}) \times (\text{starting concentration of drug A}) = (\text{final total volume of mixture desired}) \times (\text{desired final concentration of drug A}) + (\text{volume of drug B needed}) \times (\text{starting concentration of drug B}) = (\text{final total volume of mixture desired}) \times (\text{desired final concentration of drug B})$$

Use the formula above to determine the volume of drug A, B, C, etc. needed to reach the desired final concentration of drug A, B, C, etc. Once each drug volume is calculated they should be added, then a sterile diluent should be added to reach the final volume desired. Only sterile diluents should be used (e.g., sterile normal saline).

**NOTE:** Some medications cannot be mixed, please make sure that drugs are compatible prior to mixing.

### EXAMPLE:

#### Ketamine (drug A):

Ketamine starting concentration = 100mg/mL

Ketamine desired final concentration = 8.8mg/mL

Final total volume of mixture desired = 25mL

Plug into formula:

$$(\text{volume of drug A needed}) \times (100\text{mg/mL}) = (8.8\text{mg/mL}) \times (25\text{mL})$$

Volume of Ketamine needed for mixture = 2.2mL

#### Xylazine (drug B):

Xylazine starting concentration = 100mg/mL

Xylazine desired final concentration = 1.0mg/mL

Final total volume of mixture desired = 25mL

Plug into formula:

$$(\text{volume of drug A needed}) \times (100\text{mg/mL}) = (1.0\text{mg/mL}) \times (25\text{mL}).$$

Volume of Xylazine needed for mixture = 0.25mL

Ketamine 8.8mg/mL and Xylazine 1.0mg/mL (Total Volume = 25 ml): Mix 2.2mL of 100mg/mL Ketamine + 0.25mL 100mg/mL Xylazine + 22.55mL of sterile diluent.

0.2mL of this Ketamine-Xylazine mixture would deliver a dose 1.76mg of Ketamine and 0.2mg of Xylazine.

Compounded doses should be calculated to the animal's weight prior to administration.