

The Typical Thought Process of a Student Working an IV Flow Rate Problem using dimensional Analysis

A 59 y.o. male weighing 80 kb has been admitted to the ED and placed on a dopamine infusion at the rate of 45 mL/h. The IV bag contains 400mg of dopamine in 250 mL of D5W (5 g of dextrose/ 100 mL solution). The IV has been running for 20 minutes. How many mcg/kg of dopamine is the patient receiving each minute?

Student: Oh brother. Someone is trying to be cute by loading this problem up with a lot of crap. What are they asking? mcg/kg/min, ok, that is a rate so the the problem has to start with a rate. The only other rate is 45 mL/h. Glad I read somewhere that mcg/kg/min = mcg/(kg min). I hate those two line things.

$$\frac{45 \text{ mL}}{\text{h}} = \frac{\text{mcg}}{\text{kg min}}$$

Student: That was a fun party last night. Nice of Becky to invite me to her dog's tenth birthday party. Concentrate... I have to change mL to mcg, h to min and add kg to the answer. I will start with something easy.

$$\frac{45 \text{ mL}}{\text{h}} \left(\frac{1 \text{ h}}{60 \text{ min}} \right) = \frac{\text{mcg}}{\text{kg min}}$$

Student: I probably shouldn't have had that last beer. What is the maximum dose of ibuprofen? Concentrate... There is 400 mg of dopamine in 250 mL. mL will have to go on the bottom to cancel out the mL in 45 mL.

$$\frac{45 \text{ mL}}{\text{h}} \left(\frac{1 \text{ h}}{60 \text{ min}} \right) \left(\frac{400 \text{ mg}}{250 \text{ mL}} \right) = \frac{\text{mcg}}{\text{kg min}}$$

Student: Did I really fill the dog's bowl up with beer? Concentrate... mg to mcg is easy.

$$\frac{45 \text{ mL}}{\text{h}} \left(\frac{1 \text{ h}}{60 \text{ min}} \right) \left(\frac{400 \text{ mg}}{250 \text{ mL}} \right) \left(\frac{1000 \text{ mcg}}{\text{mg}} \right) = \frac{\text{mcg}}{\text{kg min}}$$

Student: He probably didn't drink it. What if he did? What if he got sick? Concentrate... Damn...I do stupid stuff when I drink. I just have to add the kg on the bottom. He weights 80 kg...that is easy.

$$\frac{45 \text{ mL}}{\text{h}} \left(\frac{1 \text{ h}}{60 \text{ min}} \right) \left(\frac{400 \text{ mg}}{250 \text{ mL}} \right) \left(\frac{1000 \text{ mcg}}{\text{mg}} \right) \left(\frac{1}{80 \text{ kg}} \right) = \frac{\text{mcg}}{\text{kg min}}$$

Student: mL, h, mg all cancel out. Smart of me to highlight the things I want. Looks good. Get out the calculator. 15 mcg/kg/min. I better use the two line thing so I don't confuse the instructor. I better call Becky and make sure her dog is ok.