Pharmacy calculations I: Solid trituration

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What is solid trituration?

Within pharmacy solid trituration can be used to describe two processes, the first is a pharmaceutical process of reducing the particle size of powders through grinding with a mortar and pestle to produce fine powders. The second is simply the dilution of a potent drug powder with a diluent powder such as lactose which is an inert substance. This leaflet focuses on the latter and explains how solid trituration calculations are performed.

Why is it used in pharmacy?

It is used in pharmacy as a means of producing products containing small weights of potent drugs, as amounts of less than 100mg cannot be weighed sufficiently accurately.

Method

The minimum weighable quantity of a drug powder, usually taken to be 50 mg or 100mg, is mixed with an inert substance to produce a 1:10 or 1:100 dilution. In practice, when making individual powders it is recommended to make in excess to allow for losses.

Example How many grams of a 1:10 trituration are required to obtain 50mg of drug?

Solution

In a 1:10 trituration 10g of trituration contains 1g of drug. Since $50\text{mg} = 0.05\text{g}$ to obtain 50mg of the drug requires $0.05 \times 10\text{g} = 0.5\text{g}$ of trituration.
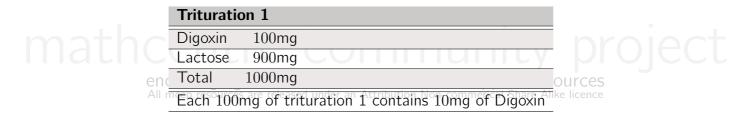
Example Calculate the amounts of the ingredients required to prepare five powders each containing 250micrograms (or mcg) of Digoxin.

Solution

In six (to allow for losses) of the required powders there will be $1.5\text{mg} = 6 \times 250\text{mcg}$ of Digoxin. To comply with the usual protocol for sachet weights of 120g, there needs to be $6 \times 120\text{g} = 720\text{g}$ of the final powder.

Following the method of the previous example, to obtain 250mcg of Digoxin would require only 2.5mg of a 1:10 trituration, too small to measure safely, so a 1:100 trituration is required. There are thus three steps: prepare a 1:10 trituration, use this to prepare a 1 : 100 trituration and finally use the 1:100 trituration to obtain 720mg of powder containing 1.5mg of Digoxin.

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Step 1

Trituration 1	
Digoxin	100mg
Lactose	900mg
Total	1000mg
Each 100mg of trituration 1 contains 10mg of Digoxin	

Step 2

Trituration 2		
Trituration 1	100mg	(100mg of the powder prepared in Step 1)
Lactose	900mg	
Total	1000mg	
Each 100mg of trituration 2 contains 1mg of Digoxin		

Step 3

Final trituration		
Trituration 2	150mg	to achieve the necessary 1.5mg of Digoxin
Lactose	570mg	to make up the final total of 720mg
		This is referred to as "Lactose to 720mg"
Total	720mg	
Finally 720mg of this trituration contains 1.5mg of Digoxin		

Exercises

1. Calculate how many grams of a 1:100 trituration are required to obtain 25mg of drug.

2. Calculate the amounts of the ingredients required to prepare 4 powders each containing 400 microgram (mcg) Tamsulosin hydrochloride.

Solutions

1. 2.5g

2. 200mg of trituration 2 contains 2mg of Tamsulosin hydrochloride; lactose to 600mg.