(3) Dilution - examples

- Have final concentration & volume need to find initial concentration

Additional calculation questions

1. George weighs 68 kg and requires drug H at a dose of 3 mg/kg per day in four divided doses. Drug H is available as 10 mg capsules. What is the total daily amount of drug H ideally required by George and how many capsules would he take for each dose in practice?

A 204 mg and 15 capsules

B 204 mg and 5 capsules

C 200 mg and 5 capsules

D 105 mg and 5 capsules

E 105 mg and 10 capsules

2. YHR pharmaceuticals produces a batch of compressed tablets every fortnight containing 450 mg active ingredient with a mean tablet weight of 0.9 g. Which of the following is the weight of active ingredient that will be required for a total batch size of 6000 kg?

A 6000 kg

B 4000 kg

C 3000 kg

D 2500 kg

E 1800 kg

3. You have in your pharmacy an unopened 30 g tube of Locoid Lipocream (hydrocortisone butyrate 0.1%). Which of the following is the amount of Lipobase cream required for diluting 10 g Locoid Lipocream to a concentration of 0.0025% hydrocortisone butyrate?

A 250 g

B 390 g

C 450 g

D 575 g

E 600 g

4. An ointment has the following formula:

Sulphur 4 %w/w

Salicylic acid 10 %w/w

Yellow Soft Paraffin, BP to 100 %w/w

Which of the following are the amounts of sulphur and salicylic acid required to produce 25 g of this ointment?

A 1 g sulphur and 2.5 g salicylic acid

B 2.5 g sulphur and 1 g salicylic acid

C 5 g sulphur and 1 g salicylic acid

D 8 g sulphur and 8 g salicylic acid

E 8 g sulphur and 16 g salicylic acid

5. The total amount of Drug G administered to an adult patient weighing 70.0 kg after 10 days' treatment if he requires a single intravenous daily dose of 0.9 mg/kg body weight of Drug G.

A 0.21 g

B 0.63 g

C 0.87 g

D 1.08 g

E 1.5 g

6. The weight of nabumetone in 3 capsules of an experimental analgesic formulation with the following formula for 100 capsules:

Nabumetone 50 g

Codeine phosphate 3 g

Lactose 20 g

A 0.21 g

B 0.63 g

C 0.87 g

D 1.08 g

E 1.5 g

1/10

7. You have in your pharmacy 400 mg potassium permanganate tablets. You are requested to prepare 2 L of a potassium permanganate solution such that the patient will dilute this 1 in 10 to obtain a 0.005% solution suitable for wound washing. How many of these tablets would you dissolve in a small amount of water before making the solution up to a final volume of 2 L with water?

A 2.5 tablets

B 3 tablets

→ dilution factor = $\frac{\text{Initial conc}^n}{\text{final conc}^n}$

$= \frac{0.1\%}{0.0025\%} = 40$

∴ original cream must be diluted 1 in 40

- 1 part locoid lipo cream
- 39 parts lipobase cream

∴ Quantity of lipobase cream required = 39 × 10g = 390 g

• Final concentration required

- 0.005% w/v × 10 - dilution factor to make more concentrated
- 0.05% w/v

= 0.05 g KMnO4 / 100ml

• need 2L of 0.05% w/v solution

- need to calculate amount in this 2L

• 0.05g per 100ml × 20 = 1g per 2000ml (2L) (1000mg)

- Number of tablets = 1000/400 = 2.5 tablets

11) – Finding Amount required of active ingredient in stock solution to make a final solution w/ certain concentration after dilution in question

12) – Volume required of a solution to make another solution at a certain volume & conc.

dilution examples

C 3.5 tablets

D 4 tablets

E 4.5 tablets

8. If 1200 mg potassium permanganate is dissolved in 4 L water, what is the percentage strength of the resulting solution?

A 0.003%

B 0.015%

C 0.03%

D 0.15%

E 0.3%

9. The recommended intravenous injection dose of gentamicin for the treatment of septicaemia for a child aged between 1 month and 12 years is 2.5 mg/kg every 8 h. What volume of gentamicin 40 mg/mL should be given every 8 h to a 10-year-old girl weighing 30 kg?

A 2.5 mL

B 2.225 mL

C 2.0 mL

D 1.875 mL

E 1.7 mL

10. A 1 in 5000 solution of copper sulphate contains which of the following concentrations?

A 50 mg copper sulphate in 500 mL solution

B 20 mg copper sulphate in 100 mL solution

C 5 mg copper sulphate in 500 mL solution

D 100 mg copper sulphate in 1000 mL solution

E 50 mg copper sulphate in 300 mL solution

11. Which of the following amounts of chlorhexidine gluconate is required to make 20 mL of a stock solution, such that, when the stock solution is diluted 30 times with water, a final solution of 0.2% w/v chlorhexidine gluconate is produced?

A 0.2 g

B 0.4 g

C 0.8 g

D 1.2 g

E 1.8 g

12. Given a 5% w/v solution of triclosan, what volume is required to make 250 mL of a 2% w/v solution?

A 20 mL

B 40 mL

C 80 mL

D 100 mL

E 140 mL

13. The formula for 100 tablets is:

Paracetamol 50 g

Codeine hemihydrate 800 mg

Caffeine 3 g

Lactose 20 g

Which of the following is/are correct?

1. 16 tablets contain 0.128 g codeine hemihydrate.

2. A patient taking two tablets four times daily for 3 days ingests 4.8 g lactose from these tablets.

3. 32 tablets contain 960 mg caffeine.

14. Which of the following is/are correct?

1. In order to make 300 g of 2.5% w/w calamine in emulsifying ointment BP, 7.5 g calamine are required.

2. 250 mL of a 1.14% w/v solution of povidone–iodine contains 2.85 g of the drug.

3. 4 × 250 mg nitrazepam tablets will be required to make 100 mL of a 50 mg/5 mL nitrazepam suspension.

11)

Work backwards:

- Final stock solution strength needed:
  - 0.2% w/v
    = 0.2 g chlorhexidine gluconate in 100ml solution.
- multiply by 30 to give the concentration of the original stock solution.
  - 6% w/v
    = 6 g in 100 ml
- Finding amounts of chlorhexidine gluconate in the starting w/ 20 ml stock solution.
  - 6 g in 100 ml
  - 20/100 = 0.2 × 6 g
    = 1.2 g of chlorhexidine gluconate.

12)

Final solution:
2% w/v solution
= 2 g in 100 ml
in 250 ml: 2.5 × 2 g
= 5 g in 250 ml

5 g needed

5% w/v triclosan
- 5 g in 100 ml
- 5 g is needed, therefore we need 100 ml of the 5% w/v triclosan