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Semester 1 - Practical Notes

General Pharmacy

Complete Subject Manual

17 practicals and activities. Use the PDF bookmarks to move between practicals. Page numbers restart within each practical; the page counts below exclude the promotion page.

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Pharmaceutical Calculations

Experiment 1 - Practical Notes

Name: _____ Roll no.: _____ Date: _____

Aim

To calculate formulation quantities by dilution and alligation and verify the units before compounding.

Principle

Dilution changes concentration without changing the amount of solute. Alligation gives the relative quantities of two compatible preparations needed to obtain an intermediate strength. Concentrations must be on the same basis: mass/mass, mass/volume or volume/volume.

Requirements

- Calculator, balance and calibrated volumetric glassware.
- Written formulation problem, notebook and purified water for a simulated dilution.

Procedure

1. Define the units

Write the starting strength, required strength and final amount. Convert all volumes to the same unit. A 1% w/v preparation contains 1 g in 100 mL of final preparation.

2. Calculate a dilution

Use $C_1 \times V_1 = C_2 \times V_2$ for compatible concentrations. Calculate V_1 , measure that amount of stock and add vehicle to the final volume; do not simply add V_2 mL of water.

3. Calculate by alligation

For high strength H, low strength L and target T: $\text{high:low} = (T - L):(H - T)$. Confirm $L < T < H$ before applying the ratio.

4. Scale a formula

Multiply every ingredient by desired batch amount $\div$ master batch amount. Keep the original basis; a mass formula must be scaled by mass.

5. Verify independently

Calculate the amount of solute contributed by each component and divide by final amount. Record significant figures appropriate to the glassware.

Observations and Record

Problem	Starting information	Calculated quantity
Dilution	C1: ____; C2: ____; V2: ____	V1: ____ mL
Alligation	H: ____; L: ____; T: ____	High:low = ____:____
Formula scaling	Master: ____; desired: ____	Scale factor: ____

Worked Example

The numbers below are illustrative; enter your own observations in the record.

- Dilution: prepare 100 mL of 2% w/v from 10% w/v. $V1 = (2 \times 100) \div 10 = 20$ mL; dilute 20 mL of stock to 100 mL.
- Alligation: combine 10% and 2% to make 200 mL of 5%. High:low = $(5 - 2):(10 - 5) = 3:5$. Use 75 mL and 125 mL, if volumes are additive.
- Check: $(10 \times 75 + 2 \times 125) \div 200 = 5\%$. Solute = 7.5 g + 2.5 g = 10 g per 200 mL.

Result

The required stock quantity is ____ mL and the alligation ratio is ____:____. The calculated final concentration is ____ on the stated basis.

Precautions

- Do not mix w/w with w/v without density information.
- Use final volume, not the sum of stock volume and a separately assumed water volume.
- For mixtures with volume contraction, prepare to final volume and verify the concentration by the assigned method.

Viva Questions and Answers

1. What does q.s. mean?

A sufficient quantity to reach the specified final mass or volume.

2. When is alligation unsuitable?

When the target lies outside the two starting strengths, units differ, or the components are incompatible.

3. Is 1:100 the same as 1%?

On an explicitly matching basis, yes; always state whether it is w/w, w/v or v/v.

Strong Solution of Ammonium Acetate

Experiment 2 - Practical Notes

Name: _____ Roll no.: _____ Date: _____

Aim

To prepare ammonium acetate solution by controlled neutralisation and explain how concentration and ingredient strength affect the batch.

Principle

Acetic acid reacts with ammonia to form ammonium acetate: $\text{CH}_3\text{COOH} + \text{NH}_3 \rightarrow \text{CH}_3\text{COONH}_4$. The neutralisation releases heat. Reagent strength and the prescribed endpoint determine the amount needed; a casual pH check cannot establish the official assay.

Formula Record

Use the college-prescribed IP composition and edition for this preparation. Enter the acetic acid strength, ammonia strength and final amount before compounding; the syllabus gives the preparation name, but no quantitative formula.

Requirements

- Prescribed IP master formula and ingredient assay information.
- Acetic acid, ammonia solution and purified water of the specified grades.
- Balance, measuring cylinder, beaker, stirring rod, thermometer and suitable closed bottle.

Procedure

1. Set the batch

Copy the prescribed ingredient quantities and strengths into a batch worksheet. Scale all quantities together and identify the specified final-volume or final-mass basis.

2. Combine carefully

Use the laboratory ventilation and addition order prescribed for the concentrated reagents. Add gradually with stirring and control the temperature; do not seal a warm reacting mixture.

3. Complete neutralisation

Check the endpoint by the prescribed test. Record reagent amount used and any adjustment rather than assuming equal volumes neutralise each other.

4. Make up and package

Allow the solution to reach the specified measuring temperature. Adjust to final amount, mix and transfer to a compatible, tightly closed bottle.

General Pharmacy**5. Evaluate**

Observe clarity and colour, record pH where required, and distinguish appearance tests from quantitative assay. Label the name, strength, batch and storage specified by the laboratory.

Observations and Record

Check	Expected record	Observation
Formula basis	Master formula and reagent strengths	_____
Appearance	Clear solution; note any particles	_____
Final amount / pH	Measured amount and prescribed pH test	_____

Worked Example

The numbers below are illustrative; enter your own observations in the record.

- Illustrative reaction calculation: 0.10 mol of acetic acid needs 0.10 mol of ammonia. Pure masses are approximately 6.01 g acetic acid and 1.70 g ammonia.
- If a master formula is for 1000 mL and the assigned batch is 100 mL, the scale factor is 0.10. Multiply every specified ingredient by 0.10.
- The reaction calculation explains stoichiometry; it does not replace the master formula for strong solution.

Result

Record the observed outcome and calculated value, with units. State whether the stated laboratory specification was met; do not copy the worked example as your result.

Precautions

- Use eye protection and the prescribed ventilation because concentrated acetic acid and ammonia are irritating.
- Do not make the final volume while the solution is warm.
- Keep reagent containers closed when not in use; volatilisation can alter strength.

Viva Questions and Answers**1. Why control temperature?**

Neutralisation produces heat, and warm liquid gives an inaccurate final-volume measurement.

2. Why is reagent assay needed?

Commercial acid and ammonia solutions contain variable proportions of active reagent.

3. Does a clear solution prove compliance?

No. Strength and prescribed quality tests still have to be checked.

Cresol with Soap Solution

Experiment 3 - Practical Notes

Name: _____ Roll no.: _____ Date: _____

Aim

To prepare a uniform cresol-with-soap solution and explain the solubilising role of soap.

Principle

Cresol is poorly miscible with water. A suitable soap system disperses and solubilises cresol in the aqueous vehicle. The soap composition, proportions and manufacturing sequence affect clarity, stability and dilution behaviour.

Composition

Use the prescribed IP master formula for the exact cresol concentration, soap ingredients and tests. Soap ingredients from different formulas are not interchangeable without reformulation.

Requirements

- Prescribed IP formula with cresol, soap-forming ingredients or specified soap and purified water.
- Balance, beakers, stirring equipment, controlled water bath and compatible bottle.

Procedure

1. Check the formulation

Identify whether the laboratory formula uses a prepared soap or forms soap from fatty material and alkali. Record strengths, quantities and final mass.

2. Prepare the soap phase

Prepare the prescribed soap system with controlled heating and mixing. Follow the stated endpoint; unreacted alkali is not an acceptable substitute for soap.

3. Incorporate cresol

Add cresol gradually to the soap phase with steady mixing in the prescribed ventilated area. Avoid splashing and uncontrolled heating.

4. Adjust the batch

Add the remaining vehicle as directed, cool, then adjust to final mass or volume on the formula basis. Mix until uniform.

5. Evaluate and package

Record appearance and separation after standing. Perform the specified dilution test and record observations. Use a tightly closed compatible container and the required external-use and dilution instructions.

Observations and Record

Test	What to observe	Record
Undiluted appearance	Uniformity, colour, clarity	_____
Standing / dilution	Separation or turbidity under stated conditions	_____
Yield	Final mass or volume on formula basis	_____

Worked Example

The numbers below are illustrative; enter your own observations in the record.

- Scaling example: a master batch is 1000 g and the practical batch is 50 g. Scale factor = $50 \div 1000 = 0.05$.
- If one ingredient is 200 g in that master batch, its calculated quantity is $200 \times 0.05 = 10$ g.
- Do not interpret this scaling example as the cresol concentration or as a complete official formula.

Result

Record the observed outcome and calculated value, with units. State whether the stated laboratory specification was met; do not copy the worked example as your result.

Precautions

- Cresol is hazardous by skin contact and inhalation; use the instructor-specified protection and ventilation.
- Do not taste, smell directly or use the laboratory preparation on a person.
- Record any separation; do not hide it by shaking immediately before inspection.

Viva Questions and Answers

1. Why is soap included?

It assists dispersion and solubilisation of cresol in the water-containing system.

2. Why perform a dilution test?

A preparation may appear uniform when concentrated but behave differently after adding water.

3. What can excess free alkali indicate?

An incorrect or incomplete soap-making stage and possible formulation non-compliance.

Lugols Solution

Experiment 4 - Practical Notes

Name: _____ Roll no.: _____ Date: _____

Aim

To prepare an aqueous iodine-potassium iodide solution and explain why iodine dissolves more readily in the presence of iodide.

Principle

Iodide forms soluble polyiodide species with iodine: $I_2 + I^- \rightleftharpoons I_3^-$. Dissolving potassium iodide first therefore helps incorporate iodine into water. The preparation is brown and must not be confused with tincture of iodine, which uses an alcoholic system.

Requirements

- Iodine, potassium iodide, purified water and the prescribed BPC formula.
- Balance, glass mortar or beaker, measuring cylinder and amber glass bottle.

Procedure

1. Calculate quantities

Check the assigned formula and final-volume basis. For the strong 5% iodine / 10% potassium iodide teaching composition below, calculate quantities for the batch.

2. Dissolve iodide

Dissolve potassium iodide in a small portion of purified water. Retain enough vehicle for final adjustment.

3. Incorporate iodine

Add iodine gradually and mix until dissolved. Use the prescribed ventilation and avoid unnecessary warming that could increase iodine loss.

4. Adjust and mix

Transfer quantitatively, rinse the working vessel with vehicle and make up to final volume. Mix thoroughly.

5. Evaluate and label

Observe the deep-brown solution for visible particles. Package in a tightly closed light-resistant container. Apply route and use instructions from the assigned formulation; iodine preparations are not interchangeable.

Observations and Record

Ingredient	Teaching quantity for 100 mL	Quantity for assigned batch
Iodine	5 g	_____
Potassium iodide	10 g	_____
Purified water	q.s. to 100 mL	_____

Worked Example

The numbers below are illustrative; enter your own observations in the record.

- For 20 mL of the stated teaching composition: iodine = $5 \times 20/100 = 1$ g; potassium iodide = $10 \times 20/100 = 2$ g; water q.s. to 20 mL.
- Iodine concentration = $1 \text{ g} \div 20 \text{ mL} \times 100 = 5\% \text{ w/v}$.
- This commonly used strong composition explains the method. Use the college-prescribed BPC formulation if its specified strength differs.

Result

Record the observed outcome and calculated value, with units. State whether the stated laboratory specification was met; do not copy the worked example as your result.

Precautions

- Do not add 100 mL water to the solids when the formula says q.s. to 100 mL.
- Keep the container closed to limit iodine loss and protect from light.
- Avoid skin contact and do not use the teaching preparation clinically.

Viva Questions and Answers

1. Why dissolve potassium iodide before iodine?

Iodide promotes the formation of more soluble iodine complexes.

2. Why use an amber bottle?

It limits light exposure; tight closure also limits loss of volatile iodine.

3. Is Lugols solution an alcoholic tincture?

No; it is an aqueous iodine-iodide preparation.

Simple Syrup

Experiment 5 - Practical Notes

Name: _____ Roll no.: _____ Date: _____

Aim

To prepare a sucrose syrup by the prescribed method and distinguish percentage by mass from percentage by volume.

Principle

Syrup is a concentrated aqueous solution of sucrose. Concentration affects viscosity, crystallisation and susceptibility to microbial growth. A 66.7% w/w teaching syrup means 66.7 g sucrose in 100 g of final syrup, not in 100 mL.

Requirements

- Sucrose, purified water and prescribed IP formula.
- Balance, beaker, stirring rod, controlled water bath and suitable clean bottle.

Procedure

1. Weigh ingredients

Use the final-mass basis in the assigned formula. Weigh the sucrose and an initial water quantity accurately.

2. Dissolve

Stir with gentle controlled warming if the prescribed method allows heating. Avoid prolonged boiling and scorching.

3. Cool and adjust

Cool to the measuring temperature. Replace evaporative loss by adjustment to the prescribed final mass, not by an estimated splash of water.

4. Inspect

Check for undissolved sugar, crystals, clarity and uniformity. Record the mass obtained and temperature when measured.

5. Package

Transfer to a tightly closed clean bottle. Label the preparation, batch and laboratory-specified storage and use period.

Observations and Record

Item	Teaching quantity for 100 g	Record
Sucrose	66.7 g	_____
Purified water	q.s. to 100 g final mass	_____
Appearance / final mass	Clear, uniform syrup / weighed mass	_____

Worked Example

The numbers below are illustrative; enter your own observations in the record.

- For a 30 g batch at 66.7% w/w: sucrose = $30 \times 0.667 = 20.01$ g. Water is adjusted so the final mass is 30 g.
- If the final mass before adjustment is 29.20 g, add water to obtain 30.00 g; required addition is 0.80 g.
- Do not convert this formula into % w/v without knowing the density. The prescribed IP edition remains the basis for official composition.

Result

Record the observed outcome and calculated value, with units. State whether the stated laboratory specification was met; do not copy the worked example as your result.

Precautions

- Avoid prolonged heat, which can cause sucrose inversion and colour changes.
- Do not assume concentrated syrup is sterile or indefinitely stable.
- Keep closures and utensils clean; dilution changes preservation behaviour.

Viva Questions and Answers

1. Why adjust after cooling?

Heating may evaporate water; final adjustment restores the intended mass concentration.

2. Why can crystals form?

Loss of water or an unsuitable concentration or temperature can produce supersaturation.

3. How does w/w differ from w/v?

w/w uses final preparation mass; w/v uses final preparation volume.

ORS Powder

Experiment 6 - Practical Notes

Name: _____ Roll no.: _____ Date: _____

Aim

To prepare the reduced-osmolarity oral rehydration salts powder and state the correct reconstitution volume.

Principle

ORS supplies glucose and electrolytes in proportions that support intestinal sodium-glucose absorption and replacement of fluid losses. It is a dry mixture that must be dissolved in the exact stated water volume. Changing the volume changes every component concentration.

Requirements

- Anhydrous glucose, sodium chloride, potassium chloride and trisodium citrate dihydrate.
- Balance, dry mortar, sieve if prescribed, mixing sheet and moisture-resistant packet.

Procedure

1. Check materials

Confirm the hydrate forms and grades. Use anhydrous glucose and trisodium citrate dihydrate for the quantities below; a different hydrate requires a different calculation.

2. Weigh separately

Accurately weigh all components for one complete packet. Keep utensils dry and avoid leaving materials exposed to humidity.

3. Mix uniformly

Break up permissible soft agglomerates and mix by geometric dilution. Add the smallest ingredient to a similar quantity of larger material, then progressively incorporate the remainder.

4. Pack

Transfer the entire mixed batch to one suitable moisture-resistant packet. Record net mass and confirm that powder has not been lost during transfer.

5. Label and evaluate

State that the whole packet is dissolved in 1 litre of safe drinking water. Inspect for uniform appearance and intact packaging. Do not divide a mixed packet by eye for smaller reconstitution volumes.

Observations and Record

Ingredient	Quantity for 1 litre	Purpose
Anhydrous glucose	13.5 g	Supports sodium-glucose absorption
Sodium chloride	2.6 g	Sodium and chloride
Potassium chloride	1.5 g	Potassium and chloride
Trisodium citrate dihydrate	2.9 g	Citrate and sodium

Worked Example

The numbers below are illustrative; enter your own observations in the record.

- Total powder mass = $13.5 + 2.6 + 1.5 + 2.9 = 20.5$ g for 1 litre.
- Glucose = $13.5 \div 180.16 \approx 0.0749$ mol/L, or approximately 75 mmol/L.
- The reduced-osmolarity formulation has nominal osmolarity 245 mOsm/L. For calculation practice only, a 200 mL formula scales all ingredients by 0.2; never obtain it by casually dividing a mixed retail packet.

Result

The calculated packet mass is 20.5 g. Actual packed mass: ____ g. The packet label states the required reconstitution volume: ____ litre.

Precautions

- Never add extra sugar, salt or flavouring to the prescribed reconstitution.
- The powder must be protected from moisture; clumping can affect uniform handling.
- A packet intended for 1 litre must not be dissolved in a smaller amount. Follow the product instructions for storage of the reconstituted liquid.

Viva Questions and Answers

1. Why does the water volume matter?

It determines sodium, glucose and other concentrations in the final solution.

2. Can a glucose hydrate be weighed at the anhydrous amount?

No; molecular mass and water of crystallisation affect the required quantity.

3. Why use geometric dilution?

It helps distribute ingredients with unequal amounts more evenly.

Effervescent Granules

Experiment 7 - Practical Notes

Name: _____ Roll no.: _____ Date: _____

Aim

To prepare free-flowing effervescent granules and relate moisture control to their stability.

Principle

An acid reacts with a carbonate or bicarbonate in water to release carbon dioxide. Citric acid, tartaric acid and sodium bicarbonate are commonly used in teaching formulations. Granulation improves handling, but moisture during manufacture or storage can start the reaction too early.

Requirements

- Prescribed acid-bicarbonate formula, with any assigned drug and vehicle.
- Balance, dry mortar, sieve, granulation tray, controlled drying equipment and moisture-resistant container.

Procedure

1. Check the formula

Identify the acid forms and bicarbonate quantity. Calculate the batch and verify that the selected method is suitable for any drug present.

2. Prepare powders

Reduce permitted lumps, sieve the dry materials separately and mix in the specified sequence. Avoid generating excessive dust.

3. Granulate

Use the prescribed fusion or solvent-assisted method. For a fusion method, controlled release of crystal water helps produce a coherent mass; do not overheat or allow vigorous premature reaction.

4. Size and dry

Pass the suitable damp mass through the assigned sieve. Dry under the prescribed conditions, cool in a dry environment and resieve if required.

5. Evaluate and pack

Record granule appearance, flow and behaviour when a measured teaching portion is added to water. Pack promptly in a tightly closed moisture-resistant container.

Observations and Record

Check	Record	Observation
Granulation / drying	Method, sieve and drying condition	_____
Appearance / yield	Granule size, final dry mass	_____
Effervescence test	Test portion and water volume	_____

Worked Example

The numbers below are illustrative; enter your own observations in the record.

- Reaction: $\text{H}^+ + \text{HCO}_3^- \rightarrow \text{CO}_2 + \text{H}_2\text{O}$. One mole of bicarbonate consumes one mole of acid equivalents.
- If a teaching formula assigns 1 part citric acid, 2 parts tartaric acid and 3.4 parts sodium bicarbonate, total parts = 6.4. For 32 g, the calculated masses are 5 g, 10 g and 17 g.
- That parts ratio is an illustrative scaling exercise, not a universal official formula. Hydrate form and acid equivalents must be considered.

Result

Record the observed outcome and calculated value, with units. State whether the stated laboratory specification was met; do not copy the worked example as your result.

Precautions

- Keep water and humid air away until the dissolution test.
- Do not use uncontrolled heat to force granulation.
- Record drying conditions and final mass; apparent good flow alone does not prove stability.

Viva Questions and Answers

1. What causes effervescence?

Carbon dioxide is released when acid and bicarbonate react in water.

2. Why package immediately after cooling?

The exposed granules can take up moisture and react prematurely.

3. Why use both citric and tartaric acids in some formulas?

They can improve granulation and handling compared with either acid alone, depending on the method.

Dusting Powder

Experiment 8 - Practical Notes

Name: _____ Roll no.: _____ Date: _____

Aim

To prepare a fine, uniform dusting powder and evaluate its suitability for the assigned external application.

Principle

Dusting powders are dry external preparations. Uniform particle size and mixing help produce smooth application. An ordinary compounded powder is not automatically sterile and must not be described as suitable for an open wound unless its specified formulation and processing support that use.

Requirements

- Prescribed IP powder formula and dry ingredients.
- Balance, mortar, assigned sieve and clean sifter container.

Procedure

1. Read the formula

Identify the intended site of application, ingredient quantities and required grade and fineness. Calculate the final mass.

2. Prepare individual powders

Reduce allowable agglomerates and sieve ingredients as prescribed. Handle fine powders to minimise airborne dust.

3. Mix

Use geometric dilution for low-level ingredients. Add powders of similar size progressively and mix consistently.

4. Evaluate

Check texture on a clean inspection surface, visible particles, uniformity and delivery through the assigned container. Do not test an unapproved preparation on skin.

5. Package and label

Transfer with minimal loss to a suitable sifter container. Record net mass and label external use and the prescribed application restrictions.

Observations and Record

Characteristic	Method of assessment	Record
Fineness / texture	Prescribed sieve and visual inspection	_____
Uniformity	Appearance across the mixed batch	_____
Net yield / delivery	Final mass and sifter operation	_____

Worked Example

The numbers below are illustrative; enter your own observations in the record.

- Illustrative 20 g teaching blend: 10% zinc oxide, 20% starch and 70% specified inert base gives 2 g, 4 g and 14 g.
- Check: $2 + 4 + 14 = 20$ g. If 19.4 g is recovered, $\text{yield} = 19.4 \div 20 \times 100 = 97\%$.
- This example demonstrates mixing calculations. Use the assigned IP composition and material grades for the actual practical.

Result

Record the observed outcome and calculated value, with units. State whether the stated laboratory specification was met; do not copy the worked example as your result.

Precautions

- Do not infer sterility from dryness or fine particle size.
- Avoid inhalation and contamination during mixing and filling.
- Do not substitute mineral powders or grades without instructor approval.

Viva Questions and Answers

1. Why is fineness important?

Coarse particles can make application unpleasant and non-uniform.

2. Why use a sifter container?

It supports controlled external distribution of the powder.

3. What is geometric dilution?

Progressively mixing a smaller quantity with comparable quantities of a larger component.

Divided Powders

Experiment 9 - Practical Notes

Name: _____ Roll no.: _____ Date: _____

Aim

To prepare individually weighed powder units with uniform composition and accurate mass.

Principle

A divided powder delivers one measured portion per packet. Total batch calculation must account for the number of units and all ingredients. Weighing individual units is more reliable than splitting a blend into visually equal piles.

Requirements

- Assigned formula, number of units and required mass per unit.
- Balance, dry mortar, powder papers or sachets and labels.

Procedure

1. Calculate the batch

Multiply each per-unit ingredient by the required number of units. Include only the excess explicitly allowed by the laboratory formula.

2. Mix

Prepare a uniform blend by geometric dilution. Keep the particle-size differences and any incompatibility in view.

3. Divide by weighing

Weigh each prescribed unit into its own paper or sachet. Recheck the tare and avoid transferring material between packets by eye.

4. Wrap or seal

Fold powder papers consistently or seal suitable sachets. Use a moisture-protective secondary container when required.

5. Evaluate and label

Record individual masses and total recovery. Label the preparation and unit instructions from the assigned exercise; an educational powder is not a patient prescription.

Observations and Record

Unit	Target mass	Measured mass
1	___ g	___ g
2	___ g	___ g
3	___ g	___ g

Worked Example

The numbers below are illustrative; enter your own observations in the record.

- For 10 teaching units, each with 100 mg ingredient A and 400 mg diluent: batch quantities are 1.00 g A and 4.00 g diluent. Each unit weighs 0.50 g.
- Illustrative measured masses 0.49, 0.50 and 0.51 g have mean 0.50 g. This small example does not establish batch compliance.
- Deviation (%) = (individual mass - target mass) ÷ target mass × 100. For 0.49 g against 0.50 g: -2%.

Result

Record the observed outcome and calculated value, with units. State whether the stated laboratory specification was met; do not copy the worked example as your result.

Precautions

- Do not use visual equal division when the exercise requires weighed units.
- Uniform mass does not prove uniform active-ingredient content if the blend was poorly mixed.
- Choose packaging compatible with moisture sensitivity and the intended use.

Viva Questions and Answers

1. Why multiply by the number of units?

It gives the total amount of each component needed before division.

2. Can mass uniformity prove content uniformity?

No; the ingredient distribution also matters.

3. Why record each unit?

It makes deviations visible and allows the required uniformity assessment.

Glycerogelatin Suppository

Experiment 10 - Practical Notes

Name: _____ Roll no.: _____ Date: _____

Aim

To prepare suppositories using a glycerogelatin base and relate mould calibration to unit mass.

Principle

A glycerogelatin base contains gelatin, glycerol and water. Gelatin forms the supporting network, glycerol contributes plasticity and humectancy, and water hydrates gelatin. The base differs from fatty bases in melting, dissolution and storage behaviour.

Requirements

- Prescribed BPC base formula: gelatin, glycerol and purified water.
- Calibrated mould, balance, controlled water bath, beaker, stirring rod and suitable packaging.

Procedure

1. Prepare the mould

Check cleanliness, mould capacity for this base and the prescribed mould treatment. Calculate the batch, including only the allowed processing excess.

2. Hydrate gelatin

Allow gelatin to hydrate in the specified water quantity before warming. Avoid adding dry gelatin directly to a hot viscous mass.

3. Prepare the base

Incorporate glycerol and warm gently as prescribed until uniform. Stir without introducing excessive air; avoid prolonged heating and water loss.

4. Fill

Fill the mould cavities with the homogeneous mass. Allow setting under the stated conditions before trimming and removal.

5. Evaluate and package

Record unit appearance, cracks, bubbles and individual masses. Wrap or pack to limit moisture exchange, and use the specified storage conditions.

Observations and Record

Check	Record	Observation
Mould calibration	Capacity with the selected base	___ g / cavity
Finished units	Number, appearance and bubbles	_____
Unit masses	Weighed after setting	___ g

Worked Example

The numbers below are illustrative; enter your own observations in the record.

- Teaching scaling example only: if an assigned base uses glycerol:gelatin:water = 70:20:10 by mass, a 30 g batch needs 21 g, 6 g and 3 g.
- If the calibrated cavity holds 3.0 g of plain base, 6 cavities require 18.0 g before any approved excess.
- The actual BPC formulation, product type and mould treatment must follow the prescribed laboratory formula.

Result

Record the observed outcome and calculated value, with units. State whether the stated laboratory specification was met; do not copy the worked example as your result.

Precautions

- Avoid excess heat and uncontrolled evaporation, which change the water content.
- Do not lubricate the mould with an arbitrary material; use the prescribed treatment.
- Protect finished units from unsuitable moisture and temperature conditions.

Viva Questions and Answers

1. Why hydrate gelatin first?

Hydration helps produce a uniform gel rather than undissolved lumps.

2. Can cocoa butter mould capacity be used directly?

No; different bases have different densities and require appropriate calibration.

3. Why record bubbles?

Voids can affect appearance, mechanical strength and unit mass.

Cocoa Butter Suppository

Experiment 11 - Practical Notes

Name: _____ Roll no.: _____ Date: _____

Aim

To prepare moulded suppositories with a cocoa butter base and explain the effect of temperature on setting.

Principle

Cocoa butter is a fatty suppository base with polymorphic behaviour. Excessive heating can produce forms that set or melt differently. Controlled melting and suitable cooling preserve a workable structure. Mould capacity depends on the particular base.

Requirements

- Prescribed cocoa butter formula, calibrated mould and any assigned ingredient.
- Balance, beaker, water bath, spatula and packaging.

Procedure

1. Calibrate

Use plain cocoa butter units to establish cavity capacity under the prescribed method. Calculate the required base and allowed processing excess.

2. Melt gently

Warm only sufficiently to obtain the prescribed workable melt. Avoid direct flame and unnecessarily high temperature.

3. Incorporate ingredients

For a plain-base exercise, mix to uniformity. If a drug is assigned, prepare and disperse it as prescribed and account for the base it displaces.

4. Fill and set

Pour uniformly into prepared cavities. Maintain suspension uniformity if solid material is present, then allow controlled setting.

5. Remove and assess

Trim if required, remove without damage, and weigh individual units. Inspect for cracking, exudation and visible sedimentation. Package under the assigned storage conditions.

Observations and Record

Measurement	Target / method	Record
Plain base cavity mass	Mean from calibrated units	___ g
Finished units	Appearance and number	_____
Individual mass	Weigh each unit	___ g

Worked Example

The numbers below are illustrative; enter your own observations in the record.

- Plain-base example: 8 cavities $\times$ 2.0 g per cavity = 16.0 g base before the allowed excess.
- For a medicated formula, define displacement value f as grams of drug displacing 1 g base. Base displaced = drug mass $\div$ f .
- If 1.0 g drug has $f = 2.0$, it displaces 0.50 g base. Subtract this from the calibrated base requirement; do not merely add drug to a full mould quantity.

Result

Record the observed outcome and calculated value, with units. State whether the stated laboratory specification was met; do not copy the worked example as your result.

Precautions

- Avoid overheating because polymorphic changes can alter setting and melting behaviour.
- Do not transfer a displacement value between different drug-base combinations without validation.
- Record the temperature and method used rather than claiming compliance from appearance alone.

Viva Questions and Answers

1. Why is cocoa butter heated gently?

Its crystal form can change with excessive heating.

2. What does displacement value describe?

The mass of drug that occupies the volume of a specified mass of base, under a stated convention.

3. Why calibrate the mould?

Cavity volume and base density together determine the mass that fits.

Zinc Oxide Suppository

Experiment 12 - Practical Notes

Name: _____ Roll no.: _____ Date: _____

Aim

To disperse zinc oxide uniformly in the assigned suppository base and calculate the base allowance.

Principle

Zinc oxide is an insoluble powder in a fatty base and is generally dispersed rather than dissolved. Particle fineness, mixing during filling and displacement correction affect the uniformity and mass of the units.

Requirements

- Prescribed IP formulation, zinc oxide and specified suppository base.
- Balance, mortar, spatula, water bath and calibrated mould.

Procedure

1. Calculate

Identify zinc oxide per unit, number of units, calibrated base capacity and the stated displacement-value convention.

2. Prepare the dispersion

Reduce permissible agglomerates and wet the powder with a small suitable portion of base or the assigned levigating material. Obtain a smooth dispersion.

3. Combine with base

Incorporate the remaining gently melted base. Mix uniformly without overheating or adding excess liquid.

4. Fill

Keep the mass mixed during filling to limit settling of zinc oxide. Pour into the prepared mould and allow controlled setting.

5. Assess

Compare units for visible distribution, integrity and mass. Record recovery and package with the assigned instructions.

Observations and Record

Item	Required information	Record
Base calibration	Mass per cavity	___ g
Drug / displacement	Drug total and displacement value	_____
Units	Appearance, number and mass	_____

Worked Example

The numbers below are illustrative; enter your own observations in the record.

- Illustrative calculation: 6 cavities hold 2.0 g plain base each; zinc oxide is 0.20 g per unit; total drug = 1.20 g.
- Assume, for this exercise only, $f = 4$ g zinc oxide displaces 1 g base. Base displaced = $1.20 \div 4 = 0.30$ g.
- Required base before authorised excess = $12.00 - 0.30 = 11.70$ g. Use the experimentally assigned f for the actual base.

Result

Record the observed outcome and calculated value, with units. State whether the stated laboratory specification was met; do not copy the worked example as your result.

Precautions

- Do not assume zinc oxide dissolves in the melt.
- Continue appropriate mixing during filling; sedimentation can produce unequal drug distribution.
- Do not claim content uniformity from mass uniformity alone.

Viva Questions and Answers

1. Why levigate the powder?

It helps break up agglomerates and distribute an insoluble solid smoothly.

2. Why mix during filling?

Dense solid particles can settle before all cavities are filled.

3. Why subtract displaced base?

Drug occupies part of the calibrated cavity volume.

Sulphur Ointment

Experiment 13 - Practical Notes

Name: _____ Roll no.: _____ Date: _____

Aim

To prepare a smooth sulphur ointment by incorporation and evaluate its uniformity.

Principle

Sulphur is dispersed as a solid in an ointment base. Levigation with a suitable portion of the base or prescribed levigating agent reduces grittiness; geometric incorporation distributes the powder through the remaining base.

Requirements

- Sulphur of the specified grade, prescribed IP ointment base and formula.
- Balance, mortar or slab, spatula and compatible ointment container.

Procedure

1. Calculate the formula

Identify sulphur concentration on the mass basis and the required final ointment mass. Check whether the base is supplied or must first be prepared.

2. Prepare sulphur

Reduce permissible agglomerates without exposing yourself to dust. Levigate with the prescribed compatible material to obtain a smooth paste.

3. Incorporate the base

Add the base in portions comparable to the paste amount, then progressively add the remainder. Scrape the working surface to recover all material.

4. Evaluate

Inspect colour and texture, spread a small portion on a clean inspection surface, and look for visible gritty particles or separated liquid.

5. Fill and label

Transfer to a suitable well-closed container. Record net mass and apply external-use, strength and storage details from the laboratory formula.

Observations and Record

Characteristic	Assessment	Record
Texture	Smoothness and visible particles	_____
Uniformity	Colour and consistency throughout	_____
Net mass	Weighed container minus tare	___ g

Worked Example

The numbers below are illustrative; enter your own observations in the record.

- Illustrative 10% w/w exercise: 25 g final ointment requires 2.5 g sulphur and enough prescribed base to make 25 g.
- If the base is the only other ingredient, calculated base = $25 - 2.5 = 22.5$ g.
- Yield: if 24.0 g is recovered, percentage recovery = $24.0 \div 25.0 \times 100 = 96\%$. The assigned IP formula determines the actual strength.

Result

Record the observed outcome and calculated value, with units. State whether the stated laboratory specification was met; do not copy the worked example as your result.

Precautions

- A levigating liquid must be compatible with the base and permitted by the formula.
- Avoid excess heating and uncontrolled addition of vehicle.
- Do not use fingers to inspect texture; use a clean surface or spatula.

Viva Questions and Answers

1. Is sulphur usually dissolved in the base?

No; it is dispersed as a solid in this type of ointment.

2. What is the purpose of levigation?

To obtain a smoother dispersion and reduce agglomerates.

3. Why fill by net mass?

Container tare must be excluded from the amount of preparation.

Non-staining Iodine Ointment with Methyl Salicylate

Experiment 14 - Practical Notes

Name: _____ Roll no.: _____ Date: _____

Aim

To prepare the assigned iodine-containing ointment and explain the roles of the iodine system, methyl salicylate and base.

Principle

A non-staining iodine formulation uses a specified iodine system and vehicle to reduce the staining associated with free iodine. The composition and sequence are essential: adding ordinary iodine solution to an arbitrary ointment does not reproduce the formulation. Methyl salicylate must be compatible with the selected base.

Formula Basis

The exact BPC composition is edition-dependent and is not supplied in the syllabus. The practical must use the college-issued master formula; retain its ingredient strengths and tests rather than substituting a different iodine ointment.

Requirements

- Prescribed BPC master formula, specified iodine ingredients, methyl salicylate and base ingredients.
- Balance, glass mortar or slab, spatula, controlled water bath if required and compatible container.

Procedure

1. Check composition

Enter each ingredient, grade and quantity from the prescribed BPC formula. Identify which stage forms or incorporates the iodine system.

2. Prepare the iodine phase

Use the order and conditions stated in the formula. Keep iodine-containing vessels closed when practical and avoid uncontrolled heating.

3. Prepare the base

Prepare or soften the prescribed base as directed. Cool to the specified incorporation condition before adding volatile or heat-sensitive ingredients.

4. Combine

Incorporate the iodine phase uniformly, then add methyl salicylate at the prescribed stage. Mix by gradual incorporation without adding unlisted vehicle.

5. Evaluate

Record colour, consistency, separation and the specified non-staining assessment on the assigned test surface. Fill, weigh and label using the formulation instructions.

Observations and Record

Stage	Required record	Observation
Iodine system	Ingredient strengths and preparation stage	_____
Finished ointment	Uniformity, colour and separation	_____
Test / yield	Assigned staining assessment and net mass	_____

Worked Example

The numbers below are illustrative; enter your own observations in the record.

- Formula-scaling exercise: for a master formula of 100 g and an assigned 20 g batch, multiply each quantity by 0.20.
- If methyl salicylate is 5 g in that illustrative master formula, the scaled quantity is 1 g; the remaining ingredients are also scaled together.
- This example explains arithmetic only. It does not assign the BPC methyl salicylate concentration.

Result

Record the observed outcome and calculated value, with units. State whether the stated laboratory specification was met; do not copy the worked example as your result.

Precautions

- Do not replace the prescribed iodine system with Lugols solution or tincture without a validated formula.
- Control warming to avoid loss of iodine or volatile ingredients.
- Use the assigned external-use wording; do not test the formulation on a person.

Viva Questions and Answers

1. Why must the iodine system be specified?

The chemical form and vehicle influence staining, stability and iodine availability.

2. Why add volatile components at an appropriate temperature?

Excess heat can cause ingredient loss and alter the composition.

3. Can appearance alone confirm a non-staining formulation?

No; the prescribed assessment must be performed.

Iodine Gargle

Experiment 15 - Practical Notes

Name: _____ Roll no.: _____ Date: _____

Aim

To prepare the prescribed iodine gargle and distinguish formulation strength from instructions for dilution before use.

Principle

Iodide assists iodine dissolution in an aqueous system. A gargle may be supplied as a concentrate, so the stock strength and any intended use dilution are separate facts. Lugols solution and iodine gargle must not be treated as interchangeable products.

Requirements

- Prescribed BPC formula, iodine, iodide and all specified vehicle ingredients.
- Balance, beaker, measuring cylinder, stirring rod and amber bottle.

Procedure

1. Read the formula

Identify the final-volume basis, iodine concentration and all co-solvents or other ingredients. Copy any use-dilution instruction separately.

2. Dissolve iodine system

Dissolve the iodide in the required vehicle portion, then incorporate iodine with mixing. Follow the prescribed incorporation sequence for other components.

3. Adjust

Transfer quantitatively and add vehicle to the stated final volume after the solution is at the specified measuring temperature.

4. Evaluate

Inspect clarity and particles, record final volume and perform the assigned quality tests. Do not infer iodine strength from colour alone.

5. Package and label

Use a tightly closed light-resistant container. State that it is a gargle, include any prescribed dilution instructions and use the assigned do-not-swallow wording.

Observations and Record

Item	Information to record	Record
Composition	Iodine / iodide strengths	_____
Appearance / volume	Clarity and final amount	_____
Label	Gargle name and prescribed dilution	_____

Worked Example

The numbers below are illustrative; enter your own observations in the record.

- Dilution exercise only: 5 mL of a 1% w/v concentrate is diluted to 100 mL. Final iodine strength = $1 \times 5 \div 100 = 0.05\%$ w/v.
- The amount of iodine is unchanged by dilution: $5 \text{ mL} \times 0.01 \text{ g/mL} = 0.05 \text{ g}$.
- These are illustrative numbers, not a recommended patient-use dilution; actual formulation and instructions come from the prescribed BPC formula.

Result

Record the observed outcome and calculated value, with units. State whether the stated laboratory specification was met; do not copy the worked example as your result.

Precautions

- Do not label a concentrate as ready to use when dilution is required.
- Use the specified route instructions and do not swallow the teaching preparation.
- Prevent iodine loss through unnecessary exposure and heating.

Viva Questions and Answers

1. Why separate stock and use strength?

The patient-facing dilution may produce a much lower concentration than the bottled stock.

2. What helps iodine dissolve?

Iodide promotes soluble polyiodide formation.

3. Why is colour insufficient for assay?

Colour is influenced by concentration, optical path and formulation; it is not a validated quantitative result.

Chlorhexidine Mouthwash

Experiment 16 - Practical Notes

Name: _____ Roll no.: _____ Date: _____

Aim

To prepare the assigned chlorhexidine mouthwash and calculate a dilution from a stated stock concentration.

Principle

Chlorhexidine is a cationic antimicrobial ingredient. Its salt form, concentration basis and compatibility with formulation components matter. Incompatible anionic materials can reduce availability or cause precipitation. A concentrated stock must not be mistaken for a finished mouthwash.

Requirements

- Prescribed IP formula, chlorhexidine stock with stated salt and concentration, and all specified vehicle ingredients.
- Calibrated glassware, beaker, stirring rod and compatible bottle.

Procedure

1. Verify the stock

Read the ingredient label and establish whether strength is expressed as chlorhexidine gluconate or another equivalent. Calculate on the same basis as the target formula.

2. Calculate volume

Use $C_1V_1 = C_2V_2$ only when both concentrations use a matching basis. Have the calculation checked before measuring stock.

3. Prepare vehicle

Prepare the specified vehicle and soluble ingredients in the prescribed order. Avoid substituting a detergent or flavouring with unknown compatibility.

4. Combine and adjust

Incorporate the measured stock, mix and adjust to final volume. Inspect for turbidity, precipitation or separation.

5. Package and label

Record final volume and intended mouthwash strength. Include the assigned use instructions, do-not-swallow wording and storage; the practical product is not for unsupervised use.

Observations and Record

Check	Value / observation	Record
Stock identity	Salt and concentration basis	_____
Dilution	Stock volume and final volume	_____
Finished product	Clarity, separation and label	_____

Worked Example

The numbers below are illustrative; enter your own observations in the record.

- Teaching dilution: make 100 mL of 0.2% w/v chlorhexidine gluconate from 20% w/v stock on the same basis. $V1 = 0.2 \times 100 \div 20 = 1 \text{ mL}$.
- Measure 1 mL stock and add the specified vehicle to a final volume of 100 mL. Do not add it to a premeasured full 100 mL of vehicle.
- The prescribed laboratory formula determines the actual mouthwash strength and other ingredients.

Result

Record the observed outcome and calculated value, with units. State whether the stated laboratory specification was met; do not copy the worked example as your result.

Precautions

- Confirm the chemical form and concentration basis before calculation.
- Do not add anionic soaps or unapproved excipients.
- Keep the concentrate clearly labelled and separate from the finished preparation.

Viva Questions and Answers

1. Why check compatibility?

Chlorhexidine is cationic and can interact with anionic formulation ingredients.

2. Why verify the stock label?

A percentage can refer to a particular salt or equivalent basis.

3. Does correct dilution prove quality?

No; identity, compatibility and required quality tests also matter.

Compendium of Marketed Dosage Forms

Experiment 17 - Practical Notes

Name: _____ Roll no.: _____ Date: _____

Aim

To compile and compare examples of marketed dosage forms using observed package information.

Principle

A dosage form is the physical presentation of a medicine; it is different from its brand, strength or therapeutic use. A compendium links dosage-form design to route, packaging, measurement and patient instructions. This is a recommended activity alongside the listed preparation practicals.

Requirements

- Instructor-approved product packs, package inserts or clear pack photographs.
- Notebook or record sheet; use anonymised information without patient identifiers.

Procedure

1. Select examples

Choose a spread of dosage forms: tablet, capsule, oral solution, suspension, emulsion, powder or granules, ointment or cream, suppository and another relevant form.

2. Record package facts

Transcribe generic ingredient, strength basis, dosage form, route and package size. Record the manufacturer and labelled storage without inventing missing facts.

3. Identify design features

Note measuring devices, moisture or light protection, reconstitution instructions, shake-before-use wording and any modified-release or enteric-coated description.

4. Compare

Compare two products of different forms containing the same ingredient only if suitable examples are provided. Describe physical and use differences; do not assume therapeutic interchangeability.

5. Present findings

Group entries by dosage form. Attach authorised pack images if available and explain one packaging or counselling point for each form.

Observations and Record

Dosage form	Package facts to capture	Design / counselling point
Oral liquid	Ingredient; mg/mL; measuring device	Solution versus suspension; measurement
Powder / granules	Mass; reconstitution volume	Moisture protection and correct dilution
Semisolid / suppository	Strength; route; container	Application route and temperature storage

Worked Example

The numbers below are illustrative; enter your own observations in the record.

- A fictional oral-liquid label states 100 mg in 5 mL: concentration = $100 \div 5 = 20$ mg/mL. Record the strength; do not create a dose instruction.
- A fictional pack contains 10 units at 2 g each: total net unit mass = 20 g. Net mass is not the same as active-ingredient content.
- Count covered categories separately from the number of brands; ten brands of tablets do not demonstrate ten dosage forms.

Result

The compendium contains ____ products covering ____ dosage-form categories. For each category, one relevant packaging and communication point has been recorded.

Precautions

- Do not open sterile products or handle medicines unnecessarily for this activity.
- Use current pack information and distinguish a missing fact from an assumed fact.
- Do not publish identifiable patient information or infer that different formulations can be substituted.

Viva Questions and Answers

1. How is a solution different from a suspension?

A solution has dissolved solute; a suspension contains dispersed solid particles.

2. Why record the concentration basis?

Strength can be per unit, per volume or per mass, and the basis affects interpretation.

3. Why can packaging matter?

It can protect from light, moisture or contamination and support accurate administration.

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