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Practical PHARMACOLOGY

for Undergraduates with MCQs



2nd Edition

Keshab Mukhopadhyay

JAYPEE

Contents

Chapter 1: Pharmacy Introduction 1

Chapter 2: Pharmaceutical Processes 5
- Size reduction *5*
- Separation *6*
- Heating operation *6*
- Extraction process *7*

Chapter 3: Pharmacy Practical 8
- Supply *9*
- General directions for pharmacy and dispensing *9*
- Precautions while weighing and measuring *9*
- Mixtures *10*
- Some practical points of mixtures *14*
- Ammoniated camphor liniment IP (liniment for painful visceral condition) *21*
- Methyl salicylate liniment NF (liniment for painful joint) *21*
- Precautions of preparing ointments *26*

Chapter 4: Incompatibilities 28

Chapter 5: Drug Interactions 30
- Therapeutically useful interactions *30*

Chapter 6: Prescription Writing 39

Chapter 7: Problem-based Learning in Clinical Pharmacology 47
- Problem 1 *47*
- Problem 2 *48*
- Problem 3 *48*
- Problem 4 *49*
- Problem 5 *49*
- Problem 6 *49*
- Problem 7 *50*
- Problem 8 *50*

- Problem 9 *51*
- Problem 10 *51*
- Problem 11 *51*
- Problem 12 *52*
- Problem 13 *52*
- Problem 14 *53*
- Problem 15 *53*
- Problem 16 *54*
- Problem 17 *54*
- Problem 18 *54*
- Problem 19 *55*
- Problem 20 *56*
- Problem 21 *56*
- Problem 22 *57*
- Problem 23 *57*
- Problem 24 *57*
- Problem 25 *58*
- Problem 26 *58*
- Problem 27 *58*
- Problem 28 *58*
- Problem 29 *59*
- Problem 30 *59*
- Problem 31 *59*
- Problem 32 *60*
- Problem 33 *60*

Chapter 8: Some Terminologies in Dental Pharmacology 61

Chapter 9: Experimental Animals 63

Chapter 10: Breeding Types in Experimental Animals 65

Chapter 11: Anesthetics for Laboratory Animals 66

Chapter 12: Different Instruments Used in Experimental Pharmacology 67

Chapter 13: Set up an Experiment of Isolated Perfused Frog Heart 71
- Experimental subject: Pithed-frog *71*

Chapter 14: To Study the Effects of Drugs on Isolated Rabbit Intestine 73

Chapter 15: Some Common Isolated Tissue Preparations 76
- Guinea pig *76*
- Rabbit *77*

- Rat *77*
- Hamster *77*
- Cat *78*
- Frog *78*

Chapter 16: To Demonstrate the Effect of Different Drugs on BP, Heart Rate on Dogs **80**

Chapter 17: Biostatistics and Bioassay **83**
- Summing up of data *83*

Chapter 18: Experiments **92**
- Object *92*
- Experiment 1 *92*
- Experiment 2 *93*
- Experiment 3 *94*
- Experiment 4 *96*
- Experiment 5 *96*
- Experiment 6 *97*
- Experiment 7 *98*
- Some evaluation techniques *101*
- Evaluation of anti-inflammatory drugs *102*
- Evaluation of drugs affecting intestinal motility *102*

Chapter 19: Some Common Instruments and Physiochemical Techniques **104**
- Photometry *104*
- Chromatography *105*
- Radioimmunoassay *105*
- Enzyme immunoassay *106*

Chapter 20: Prescription Criticism **107**
- Prescription criticism 1 *108*
- Prescription criticism 2 *109*
- Prescription criticism 3 *110*
- Prescription criticism 4 *111*

Chapter 21: Chart Interpretation **112**
- Chart 1 *112*
- Chart 2 *113*
- Chart 3 *113*
- Chart 4 *114*

Chapter 22: Instruments and Specimens **115**
- Instrument *115*

Chapter 23: Some Common Instruments Used in Experimental Pharmacology **118**

Chapter 24: Multiple Choice Questions with Answers **121**

Index *189*

3

Pharmacy Practical

Prescription (prae= before, scribo= I write): It is physician's written order for one or more medicinal agents along with directions to pharmacist for its preparation and to the patients for the use of the medicine to be taken in a particular time.

It has the following parts:

1. Name of the patients
2. Superscription (R_x) take thou
3. Inscription (body)
   - Basis (chief ingredient)
   - Adjuvant (assists the basis)
   - Corrective (corrects undesirable effect of the base)
   - Vehicle (added to dilute the preparation for dose forms).
4. Subscription (direction to pharmacist)
5. Signa (direction to patient)
6. Physician's signature and date.

A prescription should be written on a sheet of paper with ink. Doses should be in meter system. Each ingredient should be written in separate line.

The finished products should be transferred to a container of suitable size and labeled. A model for prescription blank is given below mixture/lotion, etc. Nowadays prescriptions are rarely written in such form as because pharmacy practice is rarely done. It should contain a brief history, provisional or final diagnosis at name, address, phone number, registration number of the prescribing doctors, should be written on the top of the prescription. Drugs preferably written in generic name in capital letter.

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SUPPLY

For	Date .....
Address	
Regd. No.	Signature Address

i. Mixture in flat white dispensing bottles.
ii. Linments and lotions in corrugated surface blue bottle.
iii. Powder in paper wrapper in envelops.
iv. Ointment in pots.
v. Pills in pill box.

GENERAL DIRECTIONS FOR PHARMACY AND DISPENSING

i. Dispensing room should be well-lighted, equipped with necessary furnitures, articles and apparatus.
ii. Pure drugs of best quality should be used for preparation according to official and recognized methods.
iii. Poisonous drugs should be under lock and key.
iv. Bottles should be properly labeled. Cork should be good.
v. Apparatus and the counter should be clean.
vi. Prescriptions should be read calmly, if required consult prescriber.
vii. Level should be neat and distinctly printed. Levels like **'Poison' "shake the bottle" or "not to be"** taken are best placed on the shoulder of the bottles because if written at the bottom, finger holding may cover it.
viii. Don't try to dispense two prescriptions simultaneously.
ix. Avoid stirring mixture with fingers or holding powder between lips.
x. Read the prescriptions finally before it leaves the hands of the dispenser.
xi. While dispensing the prescriptions it should be kept in such a position, so that it can be read properly.
xii. If the prescription contains commulative drugs like arsenic, digitalis, etc. it should be repeated with the sanction of the prescriber.

PRECAUTIONS WHILE WEIGHING AND MEASURING

i. Use upright fixed beam scale. If hand scale is used, hold it firm and don't lift it high. Delicate scale is used for minute quantities of powerful drugs viz. hyoscine, arsenic, etc. Don't do guess work. Sticky substance is weighed on the piece of paper.

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ii. Corroding substance should be weighed on glass pans.
iii. Always keep the level of the bottle upwards, while pouring liquids so that it is not spoiled by trickling down the drops.
iv. Small measures are made on minim glass.
v. Lip drops hanging from bottle, lip should be upon the bottom of the stopper before putting it back into the mouth.
vi. Allow few drops to fall into another vessel, till the dispenser is confident that perfect drop is falling.
vii. Volatile liquids should be measured not dropped.
viii. A perfect drop is 1ml of distilled water delivering 20 drops.
ix. Division of mixtures or grain is done by triturating or mixing the measured quantity of sugar of milk or liquid excipient and dividing the mixture.

MIXTURES

Mixtures are liquid medicine in several doses in a suitable container for internal use. The single dose mixture is called **draught**.

Types of Mixture

1. **Simple mixtures** with soluble ingredients, e.g. carminative mixture.
2. **Diffusible mixture** contain insoluble solid uniformly suspended when shaken, the bottles should be leveled as **"shake before use"**, e.g. bismuth carbonate.
3. **Mixture with indiffusable materials**, uniformly suspended when shaken and gets precipitated afterwards. It should be labeled **"shake before use"**. The indiffusable substances are made diffusible by increasing viscosity of the vehicle by adding suspending agent.

Mixture for a Case of Sudden Fainting (Stimulant Mixture)

℞

Spirit of ether	2.0 ml
Spirit of ammonia	2.0 ml
Tinct. orange	2.0 ml
Mentha oil	0.1 ml
Water to	15 ml

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M.ft. mixture send 4 such doses. One dose to be taken every two hourly.
Date ABC

Q. 1. How does this mixture act?
Ans. Spirit of ammonia, ether and volatile oils stimulate the stomach and reflexly stimulate CNS.

Mixture for Hypochromic Anemia (Ferrous Sulfate Mixture NF)

℞

i.	Ferrous sulfate	0.3 gm
ii.	Dextrose	1.2 gm
iii.	Tinct. orange	2.0 ml
iv.	Dilute hypophosphorous acid	0.3 gm
v.	Water to	15 ml

M. ft. mixture, send 4 such doses. One dose to be taken daily after meals.
Date ABC

Here $FeSO_4$ is hematinic. Dextrose and hypophosphorous acid act as reducing substance and preservative. Though iron is better absorbed in empty stomach, it is given after food to reduce gastric irritation.

Compound and Dispense SS Magnesium Sulfate

℞
SS magnesium sulfate 60 ml
Put two marks
One dose to be taken next morning in empty stomach.
Date ABC
Isotonic magnesium sulfate is 5.6%. It is 25%, i.e. hypertonic.

Mixture for a Case of Flatulent Dyspepsia

(Carminative mixture)
℞

Sodium bicarbonate	1 gm
Aromatic spirit of ammonia	2 ml
Tinct. cardamom compound	2 ml
Tinct. of ginger	0.5 ml
Camphor water to	15 ml

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M.ft. mixture, send 4 such doses. One dose to be taken thrice daily.

Date ABC

Q.2. What is the mechanism of action of this mixture?

Ans. $NaHCO_3$ by liberating CO_2 opens the cardiac end of stomach and helps eructation of gases. Ammonia, alcohol, volatile oils increase peristalsis by irritating stomach and evacuates stomach.

Q. 3. What is composition of aromatic spirit of ammonia?

Ans.

Ammonium bicarbonate	2.5%
Ammonia strong solution	7%
Lemon oil	0.5%
Nutmeg oil	0.3%
Alcohol	75%
Water to	100%

Q.4. What is the composition of Tinct. Cardamom Compound?

Ans.

Cardamom	1.4%
Caraway	1.4%
Cinnamon	2.8%
Amaranth red color	0.5%
Glycerine	5.0%
Alcohol 45% to	100%

Q. 5. What is tincture?

Ans. It is alcoholic solution of crude vegetable drugs obtained by percolation or maceration.

Salicylate Mixtures (Mixture for Rheumatic Fever)

Sodium salicylate	1 gm
Sodium bicarbonate	0.5 mg
Sodium metabisulfite	15 gm
Tinct. orange	2 ml
Chloroform water to	15 ml

M. ft. mixture, send 6 such doses. One dose to be taken 4 hourly.

Date ABC

Here sodium salicylate in high doses act as antirheumatic, $NaHCO_3$ reduces gastric irritation, sodium metabisulfite is preservative. Tinct. orange and chloroform water are flavoring agents.

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Iodine Solution for Thyrotoxicosis

℞

Iodine	1.25 gm
Potassium iodide	2.5 gm
Purified water to	25 ml

M.ft. solution, 5 drops to be taken thrice daily.

Date ABC

Iodine is antithyroid drug used for thyrotoxicosis.

Bitter Mixture (Mixture for Anorexia)

℞

Compound chirata infusion	2 ml
Mentha oil	0.1 ml
Chloroform water	15 ml

M. ft. mixture. One dose to be taken thrice daily before meals.

Date ABC

Here chirata acts as bitter appetizer. Mentha oil and chloroform acts as flavoring agents.

Mixture for Expectoration

℞

Potassium iodide	0.3 g
Potassium citras	1.0 g
Ammonium bicarbonate	0.2 g
Tinct. Ipecacuanha	0.6 ml
Syr. Tolu	4 ml
Water to	15 ml

M. ft. mixture, send 4 such doses. One dose to be taken three times daily.

Date ABC

Q.6. What is the mechanism of action of potassium and potassium citras?

Ans. These salts act as expectorant by virtue of their osmotic action—Iodide acts directly on bronchial glands.

Q.7. What is the mechanism of action of ipecacuanha?

Ans. Ipecacuanha acts as reflex expectorant in low dose. In higher doses it acts as emetics.

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SOME PRACTICAL POINTS OF MIXTURES

i. Avoid chemical decomposition taking place among its ingredient.
ii. Use distilled water in compounding.
iii. Mix according to order of prescription or judge your best method of combination. Poisonous drugs like mercuric chloride, arsenic, etc. should be separately dissolved and mixed at last before the bottle is corked.
iv. Don't use motor and paste if ingredient are soluble.
v. Shake briskly before leveling.
vi. Don't heat to make it soluble.
vii. Add few drops of alcohol if mixture froths on shacking if permissible.
viii. Mix volatile ingredient at last, and not in hot liquid.
ix. Some mixtures become gelatinous on keeping due to growth of organism called viscous ferment. 20% alcohol is added to it to prevent it.
x. Insoluble powders (diffusible or indiffusible) are sometimes used in mixtures. Diffusible powders are triturated with some water in mortar to produce paste, but, indiffusible powder requires suspending agent.

Q.1. How camphor water and chloroform water is prepared?

Ans. **Camphor water**: Dissolve 5 mg of camphor in 60 ml of water.

Chloroform water: Prepared by shaking chloroform in water.

Q.2. What is drops?

Ans. These are liquid preparation for external use. Instilled in drops.

Mydriatic Drops (Homatropine Eyedrop NF)

℞

Homatropine hydrobromide	0.2 gm
Sodium chloride	56 mg
Solution for eyedrops to	10 ml

M. ft. drops. One to two drops every 10 minutes till dilatation is complete.

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Date ABC

Q.3. What is the mechanism of homatropine?

Ans. It is antimuscarinic agent, prepared semisynthetically used as mydriatic, cycloplegic.

Prepare a Eyedrop for Glaucoma

(Pilocarpine eyedrops NF)

℞

Pilocarpine nitrate	0.1 gm
Sodium chloride	68.0 mg
Solution for eyedrops to	10 ml

M.ft. drops. One to two drops in each eye twice daily.

Date ABC

Q.4. What is the mechanism of action of pilocarpine?

Ans. It is natural cholinomimetic alkaloid, produces miosis and reduces intraocular tension.

Physostigmine Eyedrops NF

℞

Physostigmine salicylate	50 mg
Sodium chloride	80 mg
Sodium metabisulfite	4 mg
Solution for eyedrops to	10 ml

M. ft. drops. One drops to instill in each eye twice daily.

Date ABC

Physostigmine is natural alkaloid, obtained from calabar beans. Anticholinesterase crosses BBB (nonpolar), used to treat atropine or atropine-like poisoning and in glaucoma (as because it produces miosis).

Q.5. Why sodium metabisufite is added?

Ans. It acts an antioxidant and preservative for physostigmine.

Q.6. Why sodium chloride is added?

Ans. It is added to made the solution isotonic.

Precaution: As the contamination of eyedrops may produce ocular complications, it is prepared aseptically and dispensed in sterile container.

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Q.7. Name the eyedrops which is hypertonic?
Ans. Sulfacetamide eyedrops are hypertonic, causing smarting of eyes when used.

Q.8. Name some antiseptic preservatives?
Ans. Methyl paraben 0.0299%; propyl paraben 0.0144% in purified water; benzalkonium chloride, chlorheximidine acetate, phenyl mercuric nitrate.

Eyedrops of Conjunctivitis

(Sulfacetamide eyedrops strong NF)
℞

Sulfacetamide sodium	3 gm
Solution for eye drops	10 ml

M.ft. drops. Two drops to instill twice daily.
Date ABC
10–30% of sulfacetamide acts as antiinfective.

Ephedrine Nasal Drops NF

(nasal decongestant drops)

Ephedrine hydrochloride	0.15 gm
Sodium chloride	75.0 mg
Chlorbutol	75.0 mg
Water to	15 ml

M. ft. drops. Three drops to instill twice daily in each nostrils.
Date ABC

Q.9. How does ephedrine act?
Ans. It is indirectly acting sympathomimetic, produces vasoconstriction.

Q.10. Why chlorbutol is used?
Ans. It acts as local anesthetic and preservative.

Boric Acid Ear Drop NF

(drops for otitis external)
℞

Boric acid	0.3 gm
Specially denatured spirit	3 ml
Purified water to	15 ml

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M. ft. drop: 3 to 4 drops to three times a day.
Date ABC
Spirit acts as preservative and boric acid as antiseptic.

Q.11. What is Paint?

Ans. These are simple solution of medicines in viscid or other suitable solvents for application in skin or mucous membrane.

Mandl's paint IP or (paint for pharyngitis)

℞

Iodine	0.31 gm
Potassium iodide	0.62 gm
Water	0.62 ml
Mentha oil	0.10 ml
Alcohol 90%	0.94 ml
Glycerine	25.0 ml

M. ft. paint, shake well before use.
To be used twice to daily in between meals.
Date ABC

Q.12. Mention the action of different ingredients of Mandl's paint.

Ans. Iodine is antiseptic, potassium iodide helps in dissolving iodine. Mentha oil and alcohol gives cooling sensation to mucous membrane and glycerine is demulcent and vehicle.

Boro Glycerine Paint IP (Paint for Glossitis)

℞

Borax	3 gm
Glycerine	22 ml

M.ft. paint. Apply it twice over affected area in between meals.
Date ABC
Borax is weak antiseptic. Glycerine acts as demulcent and vehicle.

Tincture Iodine (Strong) IP (Solution for use as Antiseptic Skin Paints)

℞

Iodine	2.5 gm
Potassium iodide	1.5 gm

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Purified water 2.5 ml
Alcohol 90% to 25.0 ml
M. ft. solution. To be applied over skin.
Date ABC

Here iodine is oxidizing antiseptic. KI helps dissolving I_2. Alcohol is vehicle cum antiseptic.

Tincture Benzoin Co IP or (Protective Adhesive Paints for cuts)

℞

Benzoin crushed 10 gm
Prepared storax 7.5 gm
Balsam of tolu 2.5 gm
Aloes 2.0 gm
Alcohol 90% to 100 ml

M.ft. solution. Apply as a thin layer of cotton soaked in the solution over abraided or cut skin.

Date ABC

Benzoin, storax and tolu are resin. Resin also acts as adhesive and protective. Alcohol is antiseptic and acts as dissolving agent.

Powder

The powder are dosage from when one or more solid drugs are given in finely divided state. When it contains only one ingredient, it is simple powder but when contains more than one ingredient it is compound powder. It is generally meant for internal use. Some common powder for external use are boric acid powder, tooth powder, posterior pituitary snuffs, insufflation powder, insufflation powder (isoprenaline).

Dispense ORS Powder

℞

- Sodium chloride 2.6 gm
- Trisodium citrate dihydrate 2.9 gm
- Potassium chloride 1.5 gm
- Glucose 13.5 gm

M. ft. powder. Dissolve the powder in one liter of drinking water and drink as directed.

Date ABC

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Compound Acetylsalicylic Acid Powder IP

for Mr X

℞

Acetylsalicylic acid	200 mg
Phenacetin	150 mg
Caffeine	30 mg

M.ft. powder send 6 such. One or two powders to be taken when necessary.

Date ABC

(Acetylsalicylic acid and phenacetin are analgesic antipyretic and caffeine potentiates the action of other ingredients).

Powder for Gastric Hyperacidity

℞

Magnesium trisilicate	0.5 gm
Aluminium hydroxide	0.25 gm

M. ft. powder send such. One powder to be taken 30 minutes after meal twice daily.

Date ABC

Here magnesium trisilicate and $Al(OH)_3$ both are non-systemic demulcent, antacids combined together for smooth bowel. Magnesium causes diarrhea and aluminium causes constipation.

Seidlitz Powder NF

℞

Powder A	Powder B
Sodium potassium tartrate 7.5 gm	Tartaric acid 2.5 gm
Sodium bicarbonate 2.5 gm	

M. ft. pulv. wrap powder A and B separately.

Add powder B to a solution of powder A in a tumbler of water and drink it while it is in effervescence.

Date ABC

Sodium bicarbonate and tartaric acid react to form sodium tartrate and CO_2.

Both the tartrate acts as osmotic bulk purgative. CO_2 relieves gastric flatulence and mask bad taste of tartrates.

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Practical PHARMACOLOGY

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The book covers the different undergraduate practicals of medical pharmacology taught in various Indian universities and medical colleges of Nepal.

As practical examination of medical pharmacology syllabus has been changed in the last couple of years, new practicals like charts, prescription criticism, some drug delivery system devices, etc. are included as per requirements.

At the end, MCQs are given which may help the students to judge their standing on the subject. It may also help the postgraduate entrance aspirants.



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