



Unit 4

Gastrointestinal Agents & Radiopharmaceuticals



ANALYSIS



ACCURACY



QUALITY



RELIABILITY



TARGETED
THERAPY



PRECISION
DOSING

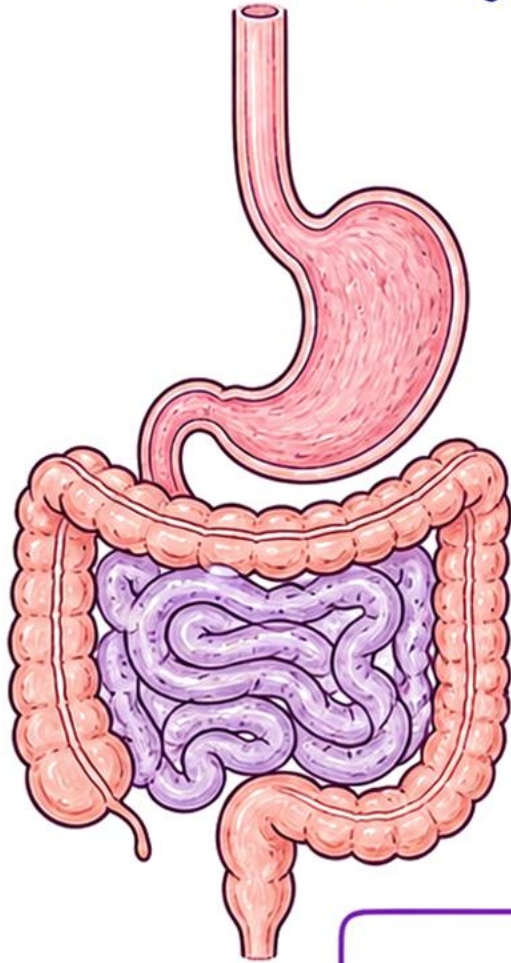


SAFE &
EFFECTIVE

GASTROINTESTINAL AGENTS

GI agents treat disorders from the oesophagus to the colon by altering acid, motility, nausea, secretion, stool water, or transit.

MAJOR GROUPS



Antacids - neutralize existing acid: CaCO_3 , $\text{Al}(\text{OH})_3$, $\text{Mg}(\text{OH})_2$.

H₂ antagonists - reduce acid secretion: famotidine, cimetidine.

PPIs - inhibit parietal-cell H^+/K^+ -ATPase: omeprazole, pantoprazole.

Laxatives - bulk-forming, osmotic, stimulant, stool-softening.

Antidiarrhoeal care - oral rehydration first; selected loperamide or bismuth.

Antiemetics - ondansetron, metoclopramide, dimenhydrinate.

Prokinetics - enhance coordinated GI motility.

Antispasmodics - reduce smooth-muscle spasm.

KEY DISTINCTION

- Antacids neutralize acid; H₂ antagonists and PPIs suppress secretion.
- Bulk-forming agents are laxatives, not a separate ninth class.

CAUTION

Severe, persistent, bloody, febrile, dehydrating, or painful illness needs assessment.

ACIDIFIERS: PURPOSE-SPECIFIC

Acidifiers lower pH or supply acidifying species; their action depends on where they are used.

FUNCTIONAL CLASSES

Gastric – selected hypochlorhydria/achlorhydria; historical dilute HCl or betaine HCl, under supervision.



FUNCTIONAL CLASSES

Urinary – lowers urine pH for a specific indication; acidic urine enables methenamine action. Not a general treatment for UTI or every urinary calculus.



FUNCTIONAL CLASSES

Systemic – ammonium chloride may correct selected metabolic alkalosis. Strong mineral acids are not routine systemic medicines.



FUNCTIONAL CLASSES

Formulation – citric, acetic, phosphoric, or hydrochloric acid adjusts pharmaceutical pH.



CHEMICAL VIEW

Brønsted-Lowry acid = proton donor;
Lewis acid = electron-pair acceptor.

Strong acids ionize almost completely in water;
weak acids ionize partially.

Organic: acetic, citric, lactic.
Mineral: HCl, H₂SO₄, H₃PO₄.

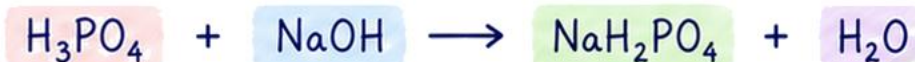
Purpose-specific – not interchangeable.

SODIUM ACID PHOSPHATE

IDENTITY

Sodium dihydrogen phosphate, NaH_2PO_4 ;
state anhydrous or hydrate before using molar
mass or assay factor.

PREPARATION



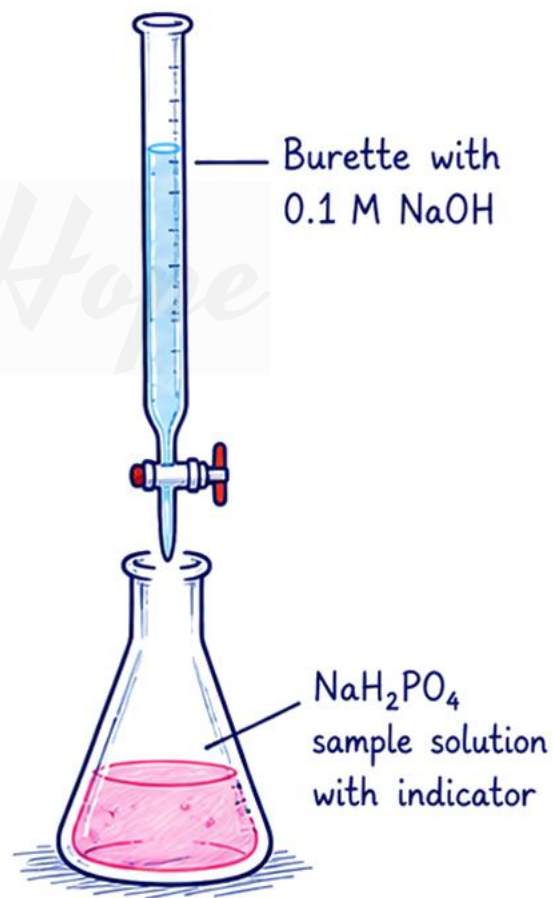
Alternative:



PROPERTIES & USES

- ▶ White, odourless crystals; freely soluble in water; practically insoluble in ethanol.
- ▶ Aqueous solution is acidic. Store well closed and dry.
- ▶ Used in phosphate buffers, pH adjustment, suitable phosphate formulations, and laboratories.
- ▶ Phosphate laxative products require fluid, electrolyte, and renal caution.

ASSAY WITH STANDARDIZED 0.1 M NaOH



- Phenolphthalein or prescribed potentiometric endpoint; stoichiometry 1:1.

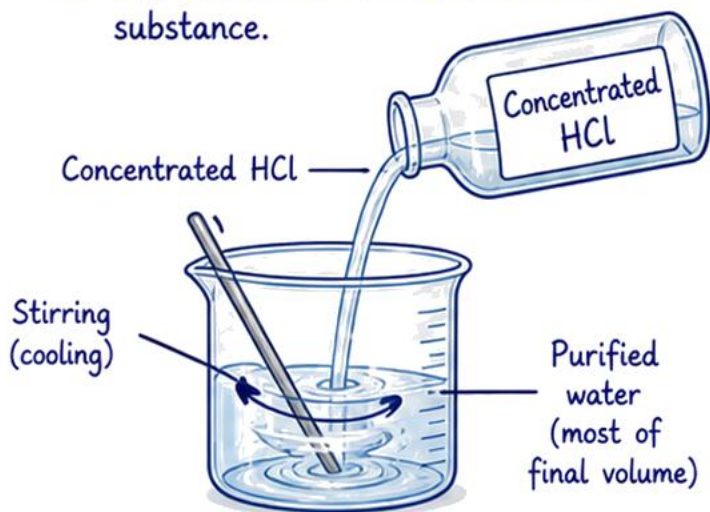
- 1 mL $\equiv$ 12.00 mg anhydrous;
- 13.80 mg monohydrate;
- 15.60 mg dihydrate.

- Use only the factor matching the labelled form.

DILUTE HYDROCHLORIC ACID

PREPARATION - EXOTHERMIC DILUTION

1. Place most purified water in a corrosion-resistant vessel.
2. Add concentrated HCl slowly to water with stirring; cool.
3. After cooling, dilute to final volume and mix.
4. Dilution forms no new chemical substance.



PROPERTIES & USES



Clear, colourless, pungent, strongly acidic, corrosive, and miscible with water.



Used for pH adjustment, chloride preparation, reagents, and acid-base analysis.



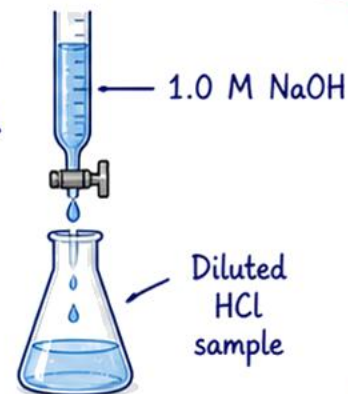
Store tightly closed, cool, ventilated, and in a compatible container.

ASSAY OPTIONS - DO NOT MIX FACTORS

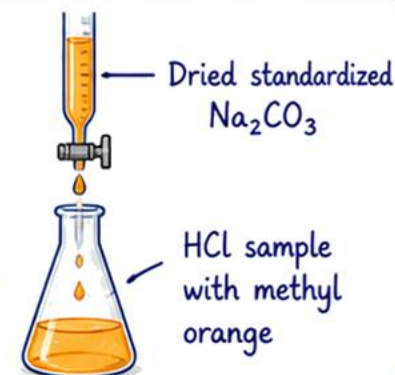
Preferred direct assay: titrate diluted sample with standardized 1.0 M NaOH.



1 mL of 1.0 M NaOH $\equiv$ 36.46 mg HCl.



Source-aligned alternative: titrate HCl with dried standardized Na_2CO_3 using methyl orange.



SAFETY



Always add acid to water - never water to concentrated acid.



Use goggles, gloves, ventilation, stirring, and cooling.





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