PHARM.D • YEAR 1

Pharmaceutical Inorganic Chemistry

CHAPTER 11

Medicinal Gases

PPT CHAPTER COVER



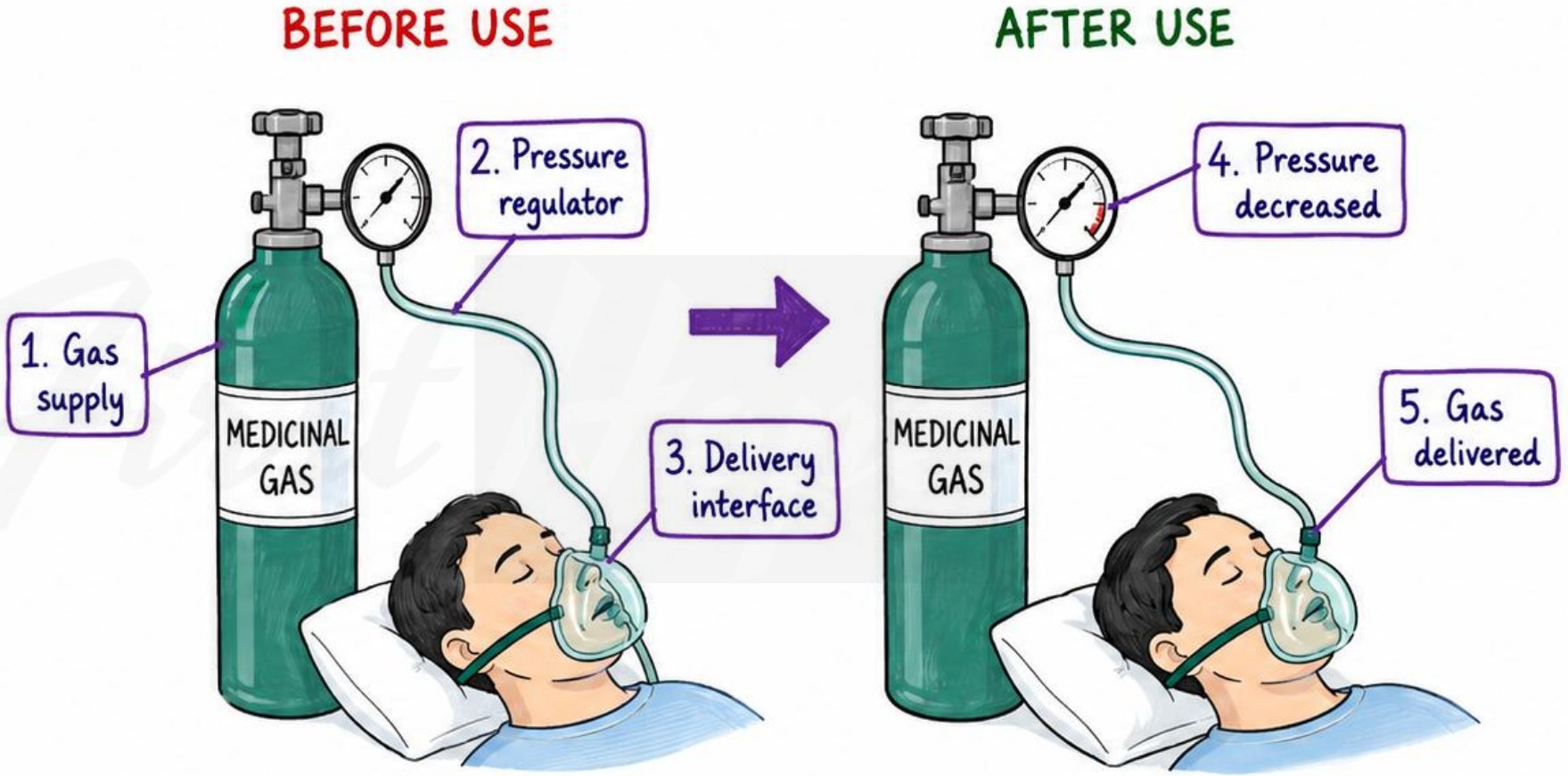
Medicinal Gases: Overview

Definition:

Medicinal gases are gases used for therapeutic, diagnostic, or anesthetic purposes, administered inhalationally or via insufflation in clinical settings.

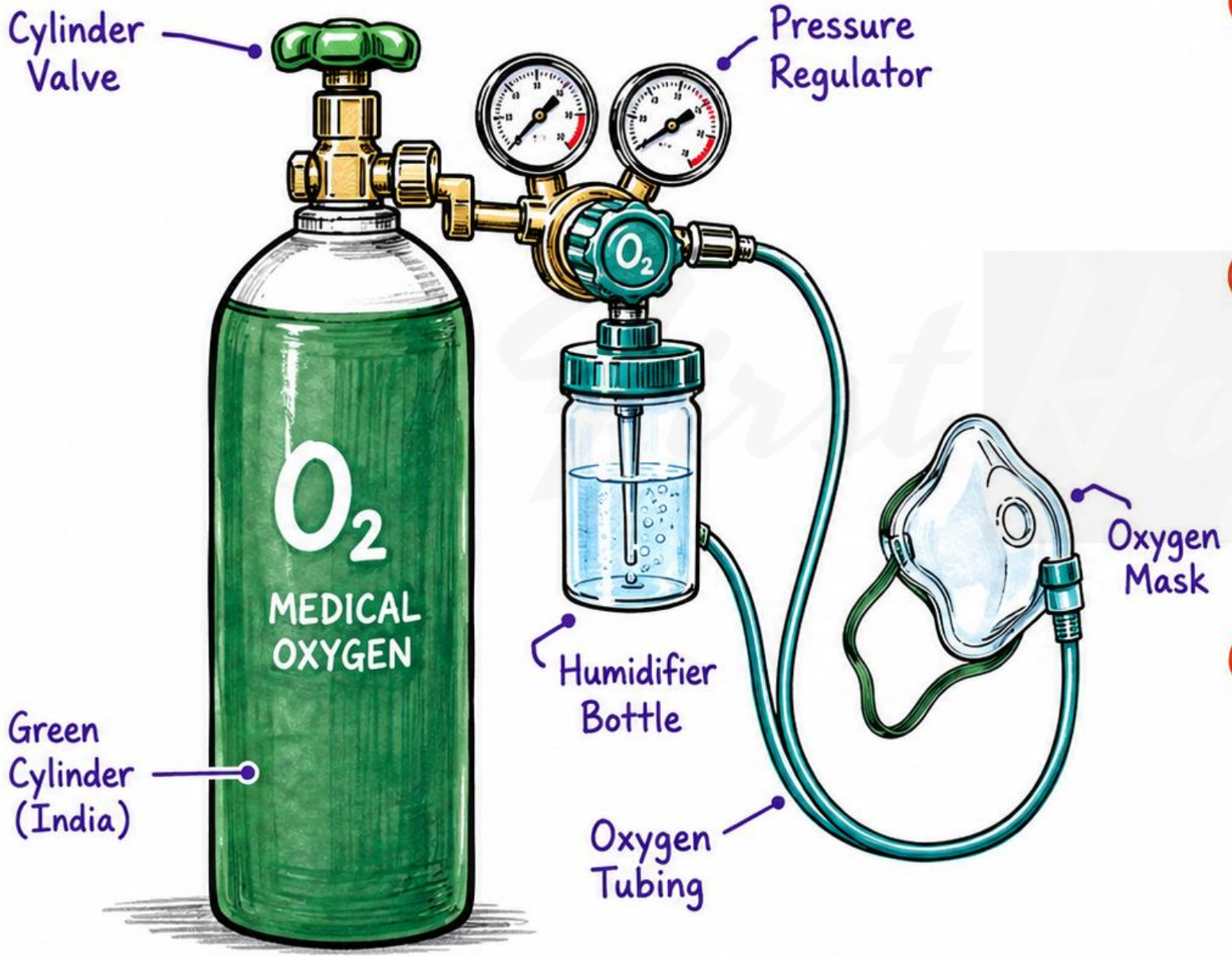
Common Medicinal Gases:

- Oxygen (O_2)
- Nitrous oxide (N_2O)
- Medical air
- Carbon dioxide (CO_2)



→ Medicinal gases are supplied under pressure, regulated, and delivered via an interface for therapeutic, diagnostic, or anesthetic use in clinical settings.

Medical Oxygen: Properties and Role



1 Properties

- Chemical formula: O_2
- Boiling point: −183°C
- Slightly soluble in water; supports combustion and life.

2 Chemical Role

- Strong oxidizing agent
- Combines with carbon and hydrogen to form oxides.

$$C + O_2 \rightarrow CO_2$$

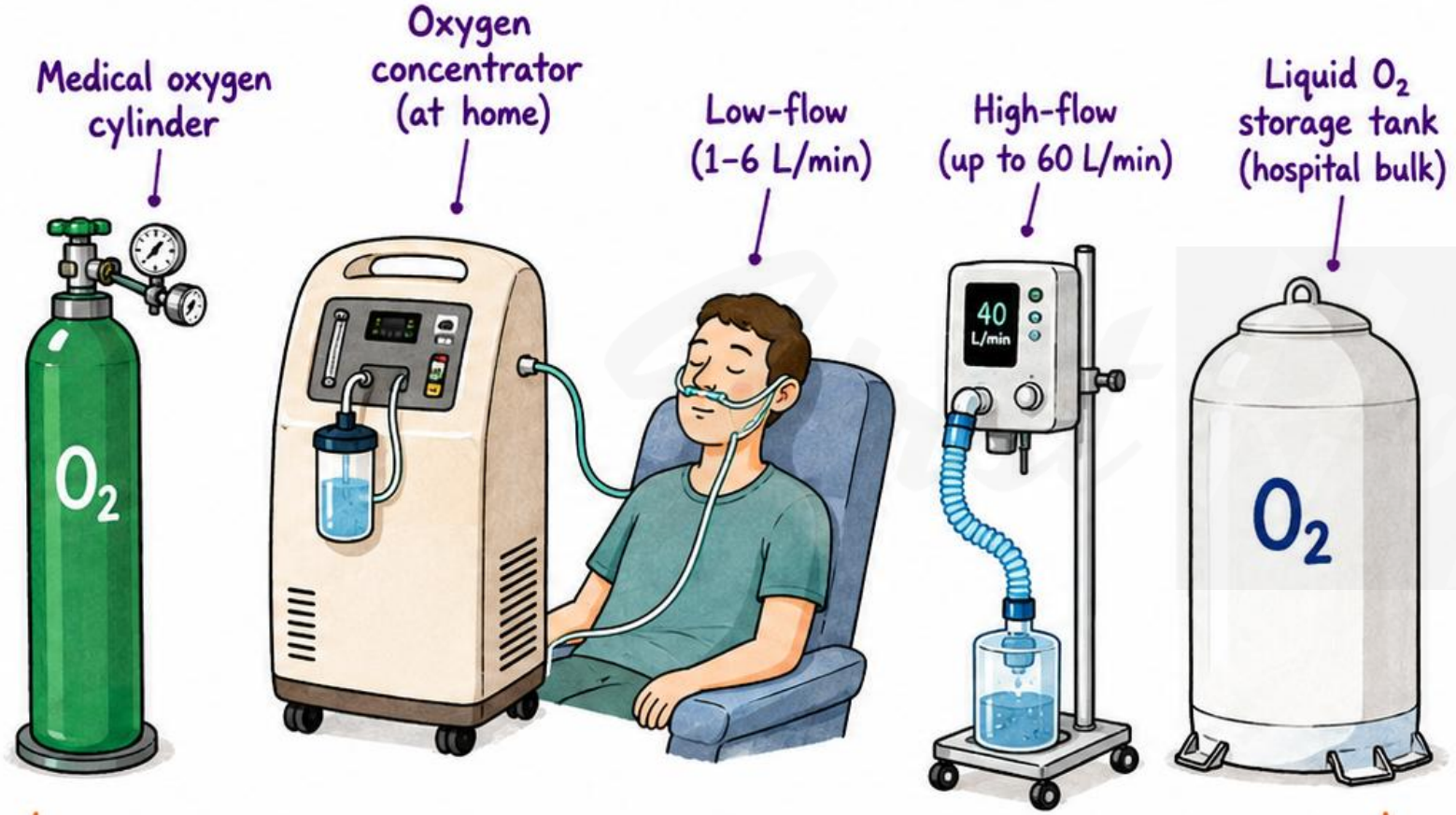
$$2H_2 + O_2 \rightarrow 2H_2O$$

- Essential for aerobic respiration in cells.

3 Pharmaceutical Use

- Pure medical oxygen (≥99.5% purity) in green-colored cylinders (India).
- Anesthetic adjunct; dental anesthesia (conscious sedation).
- Used in ambulances and emergency rooms.

Oxygen Supply Systems



Liquid oxygen (for bulk hospital use) & oxygen concentrators (at home)

- **Availability:**
  Available in low-flow (1–6 L/min) or high-flow (up to 60 L/min) delivery systems.
- **Storage & Safety:**
  Store cylinders vertically, secured. Dry, well-ventilated areas, away from oils or flammable substances. Oxygen is non-flammable but supports combustion.
- **Uses:**
  Treatment of hypoxia or hypoxemia. Used in resuscitation, anesthesia, ICUs, & emergencies (asthma, COPD, pneumonia, COVID-19). Hyperbaric therapy & mixed with other gases (e.g., N_2O) for procedural sedation.

Oxygen Cylinder and Fire Safety

1 Verify & Handle



- Check "Medical Oxygen" label and contents.
- Use only compatible regulators, valves and equipment.

2 Store Securely



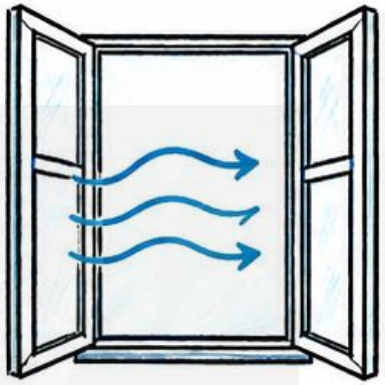
- Keep cylinders vertical and secured.
- Store in dry, well-ventilated areas.

3 Keep Away from Hazards



- Keep away from oils, grease, flammable substances and heat.
- Control ignition sources; no smoking or open flame.

4 Ventilate Well



Ensure adequate ventilation to prevent oxygen accumulation in enclosed spaces.

5 Use Safely



- Use as prescribed for hypoxia and respiratory care.
- Oxygen supports combustion—follow all safety steps.



Key Principle: Oxygen is non-flammable but supports combustion. Remove fuel (oils, grease) and heat sources to prevent fires.

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