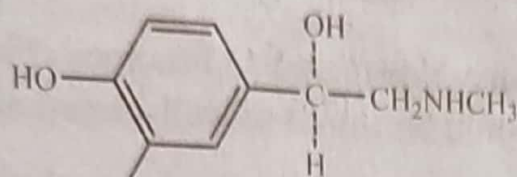


15.1.3.1. Adrenaline

Adrenaline (or epinephrine) is secreted by medulla of adrenal glands and increases cardiac output for raising the glucose levels in the blood.

Chemical Structure



Adrenaline

Molecular Formula: $C_9H_{13}NO_3$

IUPAC Nomenclature: 4-[(1R)-1-hydroxy-2-(methylamino)ethyl]benzene-1,2-diol

Properties: Adrenaline occurs as a white or creamy white coloured sphaerocrystalline powder. It gets dissolved in mineral acids, potassium hydroxide, and sodium hydroxide solutions. It is sparingly soluble in water; and insoluble in ethanol and ether.

Uses: Adrenaline is used for stimulating the heart, enhancing the heart rate, toning up blood pressure, and relaxing the musculature of intestine and bronchi. It is the preferred drug for acute allergic disorders and histamine reactions. It is also used as a sympathomimetic, broncholytic, and anti-asthmatic. It is used for preventing inner organ bleeding or for preventing bleeding during surgery. It is used for treating heart block or circulatory collapse and open-angle glaucoma.

Stability and Storage Conditions: Adrenaline is light-sensitive and contains a catechol ring system, as a result it gets easily oxidised when exposed to air. Appearance of pink to brown colour shows oxidative breakdown. For minimising oxidation, a reducing agent such as sodium bisulphite is added to the drug solution. It should be stored in nitrogen filled, light-resistant, well-closed, and airtight containers.

Types of Pharmaceutical Formulations: Injections and eye drops.

Brand Names: Adrin and Epipen.

15.1.3.2. Noradrenaline

Noradrenaline (or norepinephrine) is released from the ends of sympathetic nerve fibres and increases the force of skeletal muscle contraction and the rate and force of contraction of the heart.

Molecular Formula: $C_8H_{11}NO_3$.

IUPAC Nomenclature: 4-[(1R)-2-amino-1-hydroxyethyl]benzene-1,2-diol.

Properties: Noradrenaline occurs as a white or brownish-white coloured crystalline powder. It is little soluble in ethanol; and soluble in water. It is different from adrenaline as it lacks methyl substitution on the amino ethanol.

Uses: Noradrenaline is used for treating patients having vasodilatory shock states like septic shock and neurogenic shock. It is also used as a vasopressor in patients having critical hypotension, as a vasoconstrictor in some local anaesthetic solutions for dental use, and controls blood pressure in various acute hypotensive states, especially in myocardial shock.

Stability and Storage Conditions: Noradrenaline becomes coloured when exposed to air and light. Therefore, it should be stored in well-closed airtight containers.

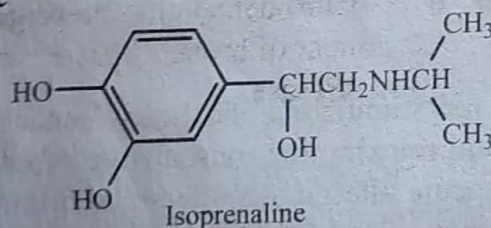
Types of Pharmaceutical Formulations: Injection and solution.

Brand Name: Levophed.

15.1.3.3. Isoprenaline

Isoprenaline (or isoproterenol) is an isopropyl analogue of adrenaline. It is a β -sympathomimetic acting upon heart, bronchi, skeletal muscle, alimentary tract, etc. It is predominantly used as a bronchodilator and heart stimulant.

Chemical Structure



Molecular Formula: $C_{11}H_{17}NO_3$

IUPAC Nomenclature: 4-{1-hydroxy-2-[(propan-2-yl)amino]ethyl}benzene-1,2-diol

Properties: Isoprenaline is a sympathomimetic β -adrenergic agonist drug. Structurally, it is similar to adrenaline but acts selectively on all β -receptors and activates β_1 and β_2 receptors.

Uses: Isoprenaline is used as a bronchodilator and is preferred for treating bronchial asthma. It is used for treating acute myocardial infarction and severe left ventricular failure. It is also used for curing premature labour and is effective for ocular hypotension by topical application.

Storage Conditions: Isoprenaline should be stored at room temperature and can be stored for up to 12 months.

Types of Pharmaceutical Formulations: Injection, solution, and aerosol.

Brand Names: Isolin, Isoprin, and Isosol.

15.1.3.4. Phenylephrine

Phenylephrine is a sympathomimetic amine which mainly acts on α -adrenergic receptors.

Molecular Formula: $C_9H_{13}NO_2$

IUPAC Nomenclature: 3-[(1R)-1-hydroxy-2-(methylamino)ethyl]phenol

Properties: Phenylephrine occurs as a white or almost white coloured crystalline powder. It is readily soluble in ethanol and water.

Uses: Phenylephrine is used for treating nasal congestion, but can also be used for treating hypotension and shock, hypotension during spinal anaesthesia, paroxysmal supraventricular tachycardia, prolongation of spinal anaesthesia, symptomatic relief of external or internal haemorrhoids, and for increasing blood pressure as a help in diagnosing heart murmurs.

Stability and Storage Conditions: Phenylephrine should be stored in tightly-closed containers, in a cool, well-ventilated area, not above $25^{\circ}C$.

Types of Pharmaceutical Formulations: Solution, drops, injection, sprays, and tablets.

Brand Names: Sudafed PE, Neo-synephrine, and 4-Way Nasal Spray.