**Drug** (Medicinal pharmaceutical product) is a complete dosage form that is mostly formulated with one or more excipients including active substance or substances, and used in the prevention, diagnosis, or treatment of disease or to enhance or change a function of humans.

According to another definition, drug is a pure chemical substance which is used in medicine and has biological efficiency; or it is an equivalent mixture including a standard amount of active agents from plant or animal origin.

The number of mixtures which are known as plant and animal origin drugs is lower than chemical drugs in the form of pure substance.

In medicine, pure bioactive substances and drugs are not used the way they are in principle because it is difficult to dose them, and it is difficult for the patient to buy them; and sometimes, it is even impossible.

And sometimes, if the drug is used the way it is, it has lower efficiency. For these reasons, the bioactive substance, that is the drug, is transformed into pharmaceutical forms (dosage forms in other words) by being mixed with inactive excipients (inactive ingredients), so that it can be administered easily to humans.

The mixing of active substance with appropriate excipients is done according to particular formulas, this is called drug formulation.

WHO defines medicine as “a substance or product which is used or assigned for changing or studying physiological systems or pathological conditions in the interests of the person who takes it.”

What is expected from medicines in medical treatment of diseases is that they will change the physiological systems or pathological conditions for the benefit of the recipient.

**Drugs function for the benefit of the recipient in three main ways:**

**i)** they affect the conditions or functions related to somatic and psychic activities

**ii)** they replace the active substances, salts and fluids that are produced in human body or must be taken from outside, and which cause diseases when they are absent.

**iii)** they make it possible for the body to remove or eject germs and parasites which get into the body and cause diseases, or the harmful substances that appear within the body

In medicine drugs are used for treatment, prevention, diagnosis and some other medical purposes (prevention of pregnancy). The treatment which resolves the cause of the disease is called radical treatment, while the treatment which relieves the symptoms without resolving the cause of the disease is called symptomatic treatment or palliative treatment.

The properties and general concepts related to the preparation and formulas of drugs are stated in the codex, pharmacopoeias and national formularies of each country.

The preparation, preservation, governance and distribution of drugs are under investigation of the Ministry of Health. In care of the Ministry of Health, drugs are subject to “[pharmaceuticals and medical preparations law](http://tureng.com/tr/turkce-ingilizce/pharmaceuticals%20and%20medical%20preparations%20law)” dated 14 May 1928 and numbered 1262, and the laws and regulations introduced following this.

**The structure and basic features of drugs**

**Structure of drugs**

Each drug consists of mainly two parts.

Part 1: active substance or substances

Part 2: excipient

**Active substance:**is the effective substance of the drug that makes the drug diagnose and treat. Drugs may contain one or more substances. Drug raw materials are mostly categorized in two main groups according to their sources.

1) Natural origin drug raw materials

2) Synthetic-based drug raw materials

**1)** Natural origin drug raw materials**:**

The discipline which is concerned about natural-origin drug raw materials is called pharmacognosy. The natural-origin drug raw materials are called “drug”.

The natural origin drug raw materials taken from plants are called plant-origin drugs and the ones taken from animals are called animal- origin drugs. Apart from these, the drugs obtained from microorganisms and minerals, and the raw materials obtained through recombinant DNA technology are also natural origin drug raw materials.

Natural origin drug raw materials

* Plant origin drugs
* Animal origin drugs
* Mineral(organic-anorganic) -based natural drugs
* Microorganisms
* DNA recombinations

**Plant-origin drugs:** The active substance of these drugs is typically found in a particular part (juice, leaf, rhizome, root, seed or rind etc.) of plants. They are obtained through extraction. Chemically, plant-origin active substances have particular structures like basic substances, fixed oils, gums, carbohydrates, glycosides and others.

Sometimes, it is not practically and economically possible to isolate the active substance of the plant in pure state; in such cases, the part of the plant that is prepared to contain a standard amount of active substance is used the way it is; or like it is usually done, extractive forms (extract, liquid extract, tincture etc.) including concentrated active substance are prepared. These preparations are called galenical preparations.

**Animal-origin drugs:** Just like plant-origin drugs, animal-origin drugs are either obtained in pure state or their extractions including concentrated active substance are prepared. The main of these are some hormones and enzymes.

**Mineral-origin (organic- inorganic) natural drugs:** Several limited number of drugs (sodium chloride, magnesium salts, potassium chloride and kaolin) are obtained from the minerals in nature through purification.

**Micro-organisms:** Some micro-organisms form the source of drugs, particularly of antibiotics.

**DNA recombinations:** They are the drugs prepared using DNA technology. Human interferons, interleukins, insulin, growth hormone, colony stimulating factors and some vaccines are obtained using recombinant DNA technology.

**2)** Synthetic-based drug raw materials**:**

Another way of obtaining drugs is to synthesize these compounds in laboratories using chemical methods. The use of synthetic organic drugs on humans as medicine dates back probably to the first half of 19th century when ether and chloroform entered into the treatment. These chemical substances were then followed by p-amino benzoic acid (1890) and aspirin (1899). Since then, hundred thousands of organic compounds have been subjected pre pharmacological tests by being synthesized. The clarification of enzyme and receptor structures of biochemical analysis has helped medicinal chemists by shedding light onto rational drug design.

New therapeutic compounds are synthesized by studying an active substance in nature, or sampling a compound which has been synthesized before and has become pharmaceutically active, or designing them by the help of computer with the consideration of the effect mechanism of the drug. After each synthesis stage, the structure of the compound needs to be determined.

In Turkey, where drug raw materials have been produced since 1965, tetracycline, oxytetracycline and its derivatives have been manufactured through fermentation starting from 1971. After that, ampicillin and amoxicillin have been manufactured. Today, 48 types of drug active substance including the ones used in painkillers, antibiotics, stomach and cardiovascular diseases and the ones composed of the opioid substances such as codeine, morphine are manufactured to be used inside the country and exported.

**Excipient**: ***(carrier substance, vehicle, excipient):*** The excipient of drugs is the mixture of one or several substances. There are also flavour, odour and taste corrective substances (adjuvants) that are put into the drug formulas in order to make them easy to measure, comfortable to use, and operate rapidly and as required. An active substance of a drug can remain and operate as required only if the appropriate excipients and adjuvants are chosen and if the active substance is formularized with them.

**Primary features drug effect**

* **Selectivity:** Drug operates only on particular cells and structures or biological incidents that require it.
* **Temporary effect:** Another important feature of drug effect is that the effect is temporary and disappears when discontinued.
* **Dose dependent manner:** Dose is an amount of drug which is delivered at a time. The amount that is recommended to be delivered a day long is called daily dose. When taken overdose, the drug does more harm than good.

**Nomenclature of drugs**

A particular drug has at least three types of names:

* **Proprietary Name** **(Generic name):** In order to ovoid misunderstandings and misconceptions about medicine, pharmaceutics and health in scientific journals, education, pharmaceutical and medical activities; and to make communication easier at national and international level, proprietary names of drugs are used. They are determined by WHO.
* **Brand, Commercial or Proprietary Name:** It is the name given to a drug by the firm that first discovered the drug, or it is a name that other firms which produce preparations including that drug give their own products.
* **Chemical name:** It is the name that defines the chemical structure confirmed by International Union of Pure and Applied Chemistry (IUPAC). As it is long and complex, it is difficult to use in practice.

**Classification of drugs**

Drugs are classified two ways: according to their pharmaceutical forms and their treatment features.

**Classification of drugs according to their pharmaceutical form:**

1. Solid drug forms
2. Liquid drug forms
3. Two phase systems
4. Semi-solid drug forms
5. Aerosols
6. Parenteral Preparations
7. [Radiopharmaceutical](http://tureng.com/tr/turkce-ingilizce/radiopharmaceutical)s
8. Controlled release systems
9. Other preparations
10. Dressing and surgical materials

**Classification of drugs according to their pharmaceutical form:**

1. solid drug forms

* Powders
* Granules
* Micro-pellets
* Micro-particles
* Lozenges
* Tablets
* Coated tablets
* Uncoated tablets
* Effervescent tablets
* Sugar-coated pills
* Capsules
* Hard gelatine capsules
* Soft gelatine capsules

1. liquid drug forms

Solutions

* Aromatic waters
* Syrups
* Potions
* Elixirs
* Collutories

1. Two phase systems:

* Suspensions
* Emulsions
* Glycerols
* Liniments
* Mucilages

1. semi-solid drug forms

* Ointments
* Suppositories
* Ovules
* Gels

1. Aerosols

* Solution
* Suspension
* Emulsion
* Semi-solid systems
* Solid systems

1. Parenteral Preparations

* The ones administered by injection
* Solutions (single dose, multi dose, large volume
* Suspension
* Emulsion
* Dry powder
* Implants, pellets

1. [Radiopharmaceutical](http://tureng.com/tr/turkce-ingilizce/radiopharmaceutical)s
2. Controlled release systems

* Nano and micro-particles
* Liposomes
* Transdermal systems
* Vaginal systems
* Tablets (matrix, distention-controlled, muco-adhesive)
* Mini pumps
* Ocular systems
* Nasal systems
* Buccal systems
* Rectal systems

1. Other preparations

* Eye preparations
* Ear preparations
* Nose preparations

1. Dressing and surgical materials

* Plasters
* Plasters with active substance
* Plasters without active substance
* Heat patches

**Classification of drugs according to treatment groups (pharmacological effects)**

* Antibiotics and chemotherapeutics
* Cardiovascular system drugs
* Drugs affecting water-salt and acid-base balance and diuretics
* Respiratory system drugs
* Drugs affecting central nervous system
* Drugs affecting endocrine system
* Autacoids and antihistamines
* Vitamins, minerals and combinations
* Anti-anemic drugs
* [Digestive system](http://tureng.com/tr/turkce-ingilizce/gastrointestinal%20tract) drugs
* Dermatologic drugs

**Antibiotics and chemotherapeutics**

* Beta-lactam antibiotics, penicillins, cephalosporins , carbapenems , monobactams
* Macrolide and lincosamide antibiotics
* Tetracyclines
* Amphenicols
* Aminoglycoside
* Antistaphococcal drugs
* Antianaerobic drugs
* Polypeptide antibiotics
* [Sulfonamide](http://tureng.com/tr/turkce-ingilizce/sulfonamide)s, [cotrimoxazole](http://tureng.com/tr/turkce-ingilizce/cotrimoxazole), [trimethoprim](http://tureng.com/tr/turkce-ingilizce/trimethoprim)
* Fuoroquinolones
* [Antituberculosis drugs](http://tureng.com/tr/turkce-ingilizce/resistance%20to%20antituberculosis%20drugs)
* Drugs used for leprosy
* Drugs used in urinary infection
* Antiamoebic and other [antiprotozoal](http://tureng.com/tr/turkce-ingilizce/antiprotozoal) drugs
* Antimalarial drugs
* Antihelmintic drugs
* Drugs used for [ectoparasite](http://tureng.com/tr/turkce-ingilizce/ectoparasite)s
* Antiviral drugs
* Antiseptics and disinfectants
* Antineoplastic drugs
* [Immunomodulator](http://tureng.com/tr/turkce-ingilizce/immunomodulator) drugs

**Cardiovascular system drugs**

* [Antihypertensive](http://tureng.com/tr/turkce-ingilizce/antihypertensive) drugs
* [Peripheral vasodilator](http://tureng.com/tr/turkce-ingilizce/peripheral%20vasodilator)
* Antianginal drugs
* [Antiarrhythmic drugs](http://tureng.com/tr/turkce-ingilizce/antiarrhythmic%20drugs)
* Drugs used for heart failure
* [Hyperlipidemic](http://tureng.com/tr/turkce-ingilizce/hyperlipidemic) drugs
* Antithrombotic drugs: [anticoagulants](http://tureng.com/tr/turkce-ingilizce/anticoagulants), antithrombocytic drugs, [thrombolytic](http://tureng.com/tr/turkce-ingilizce/thrombolytic) drugs
* Hemostatic drugs and hemostatic blood products used for replacement
* Solutions that expand plasma volume, blood and plasma products

**Drugs affecting water-salt and acid-base balance and diuretics**

**Respiratory System Drugs**

* Antitussive drugs
* Expectorant drugs
* Surfactants
* Bronchodilator drugs and other anti-asthmatic drugs
* Oxygen and other treatment gases

**Drugs affecting central nervous system**

* General anaesthetics
* Local anaesthetics
* Neuromuscular blocking drugs
* Central acting muscle relaxant drugs
* Hypnosedatives
* Neuroleptic drugs
* Antidepressant and antimanic drugs
* Narcotic analgesics
* Non narcotic analgesics (Nonsteroidal Anti-inflammatory drugs)
* Antiepileptic drugs
* Drugs used to treat Parkinson’s Disease and other movement disorders

**Drugs affecting endocrine system**

* Insulin, oral antidiabetics and others
* Corticosteroids, corticosteroid antagonists and ACTH
* Thyroid drugs: thyroid hormones, anti-thyroid drugs, thyrotropin and protirelin
* Calciotrophic drugs: parathyroid hormone, vitamin D, calcitonin, bisphosphonates and others
* Androgens, anabolic steroids and anti-androgenic drugs
* Oestrogens, progestin and antagonists and hormonal contraceptives
* Pituitary and hypothalamus hormones

**Autacoids and antihistamines**

**Vitamins, minerals and combinations**

**Anti-anemic drugs**

[**Digestive**](http://tureng.com/tr/turkce-ingilizce/gastrointestinal%20tract) **system drugs**

* Drugs used for peptic ulcer treatment
* Laxative and purgatives
* Antidiarrheal drugs
* Antiemetic drugs
* Digestants
* [Choleretic](http://tureng.com/tr/turkce-ingilizce/choleretic) and cholagogue drugs
* Antispasmodics
* Anticholinesterases

**Dermatologic drugs**

**Drugs according to the route of administration**

**Types of drugs used orally**

Aromatic water, emulsion, capsule, lozenge, drop, magma, pellet, decoction, glyseride, effervescent granule, granule, mixture, solution, syrup, mucilage, effervescent powder, extract, suspension, infusion, oleoresin, tablet, elixir, gel, oral powder preparations, tincture.

**Types of drugs used externally**

Eye, nose, ear drugs, [medicated plaster](http://tureng.com/tr/turkce-ingilizce/medicated%20plaster)s, creams, enemas, elixirs, lotions, ointments, pads, suppositories, transdermal drugs

**Drugs used parenterally**

Ampoule, dialysis solution, vial, injection, perfusion solution, sterile suspensions, sterile emulsions, sterile solutions, sterile waters

Besides this overall classification, drugs are categorized in two groups according to the number of active substances they include:

**a)** **Simple drug forms:** with only one active substance

**b) Compose drug forms**: with more than one active substance

They are also categorized according to the amount of the active substance they include. Drugs are prepared with the same active substances but with different doses or pharmaceutical forms. A drug can be prepared both for children and adults. In literature, the drugs that are prepared for children are called paediatric drugs.

**Based on their usage, drugs are separated into two groups:**

Internally used and

Externally used drugs

**Drugs are classified as:**

Ophthalmic drugs for eye

Nasal drugs for nose

Otic drugs for ear

Vaginal drugs for vagina

Rectal drugs for rectum

Based on the zones they are administered to.

**In terms of pharmaceutical technology, drugs are grouped according to preparation techniques and physical properties as follows:**

Drugs prepared in the cold and hot

Pharmaceutical formulas prepared as solutions

Two phase Pharmaceutical formulas

Semi-solid form Pharmaceuticals

Solid form Pharmaceuticals

**Drugs are grouped according to availability n pharmacy and their forms on prescription:**

[**Magistral Drug**](http://tureng.com/tr/turkce-ingilizce/magistral%20drug)**s**: are the forms of drugs written on the prescription and prepared by the pharmacists in pharmacy according to the formula provided by the doctor.

**Officinal Drugs**: are the drugs which are prepared and given to the patient immediately according to the formulas written on codex and pharmacopoeias, or stocked and given to the patient after being formulated into drug form according to the prescription submitted to the pharmacy.

**Preparations**: are the drugs which are prepared in a drug laboratory or factory after their licences are obtained from the Ministry of Health, and kept available and sold in pharmacy with and without prescription.