

# Chapter-9 | P. Chemistry

## Hypoglycemic Agents

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### In Syllabus:

Study of the following category of medicinal compounds with respect to classification, chemical name (IUPAC Name), chemical structure (compounds marked with\*) uses, stability and storage conditions, different types of formulations and their popular brand names:

### Hypoglycemic Agents:

Hypoglycemic agents are medications that lower blood sugar levels.

They are used to treat type 2 diabetes, a condition in which the body does not produce or use insulin effectively. There are several different types of hypoglycemic agents, each with its own mechanism of action.

### Type of Hypoglycemic Agents

- **Sulfonylureas:** These drugs work by stimulating the pancreas to release more insulin.
- **Meglitinides:** These drugs work similarly to sulfonylureas, but they have a shorter duration of action.
- **Biguanides:** These drugs work by making cells more sensitive to insulin.
- **Thiazolidinediones:** These drugs work by increasing the number of insulin receptors on cells.
- **Alpha-glucosidase inhibitors:** These drugs work by slowing down the absorption of glucose from the intestines.

### Example:

Insulin and Its Preparations, Metformin\*, Glibenclamide\*, Glimepiride, Pioglitazone, Repaglinide, Gliflozins, Gliptins



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## Insulin and Its Preparations:

- Insulin is a hormone that plays a crucial role in regulating blood sugar (glucose) levels in the body.
- It is produced by the beta cells of the pancreas and is responsible for facilitating the uptake and utilization of glucose by cells for energy production. Insulin also helps in storing excess glucose in the liver and muscles for later use.

## Preparations:

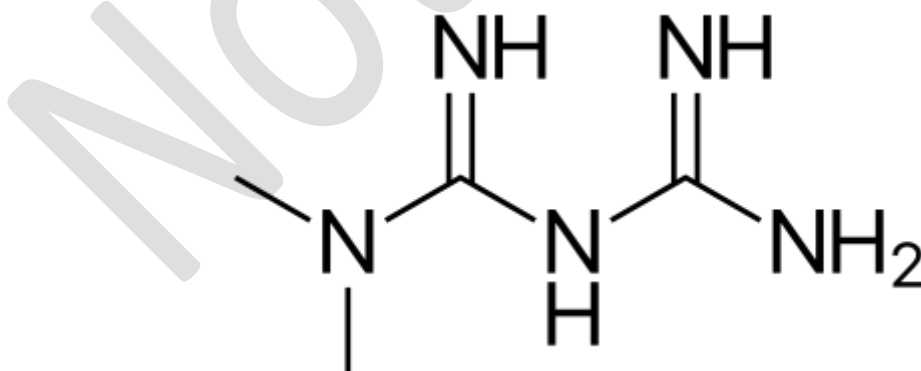
Insulin preparations are used to treat diabetes. They come in a variety of forms, including:

- **Short-acting insulin:** This type of insulin starts working quickly and has a short duration of action. It is typically used before meals to help control blood sugar levels after eating.
- **Intermediate-acting insulin:** This type of insulin starts working within 1-2 hours of injection and has a duration of action of 4-12 hours. It is typically used once or twice a day to help control blood sugar levels throughout the day.
- **Long-acting insulin:** This type of insulin starts working slowly and has a long duration of action. It is typically used once a day to help control blood sugar levels overnight.
- **Premixed insulin:** This type of insulin is a combination of short-acting and intermediate-acting insulin. It is typically used once or twice a day to help control blood sugar levels throughout the day.

## Metformin\*

**Chemical Name:** N,N-Dimethylimidodicarbonimidic diamide

**Chemical Structure:**



## Uses:

Metformin is used to treat high blood sugar levels that are caused by a type of diabetes mellitus or sugar diabetes called type 2 diabetes.



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## Stability and storage conditions:

- It should be kept in a cool, dry place and stored at room temperature. Direct sunlight is prohibited.

## Types of formulations:

- Tablets

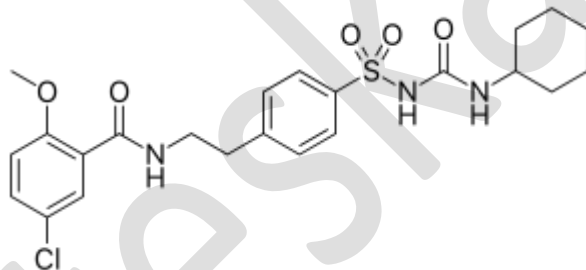
## Popular brand names:

- Fortamet
- Glumetza

## Glibenclamide\*

**Chemical Name:** 5-chloro-N-[2-[4-(cyclohexylcarbamoysulfamoyl) phenyl]ethyl]-2-methoxybenzamide

## Chemical Structure:



## Uses:

- Glibenclamide is used to lower the blood sugar level in patients with type 2 diabetes mellitus that is not controlled by diet and exercise alone. .
- It is used along with diet and exercise to improve blood sugar control in adults with type 2 diabetes. Glibenclamide is an antidiabetic medication.

## Stability and storage conditions:

- It should be kept in a cool, dry place and stored at room temperature. Direct sunlight is prohibited.

## Types of formulations:

- Tablets

## Popular brand names:

- Gliben-J,
- Daonil,
- Diabeta



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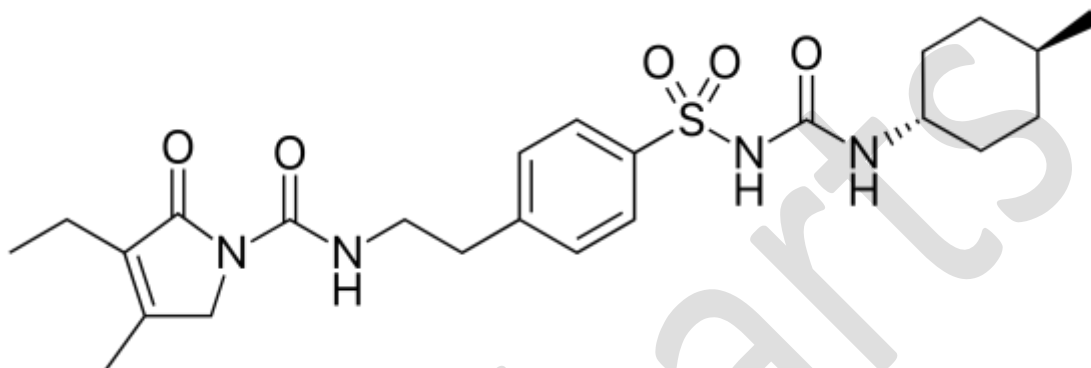
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## Glimepiride

### Chemical Name:

3-Ethyl-4-methyl-N-[2-(4-[[trans-4-methylcyclohexyl]carbamoyl]sulfamoyl}phenyl)ethyl]-2-oxo-2,5-dihydro-1H-pyrrole-1-carboxamide

### Chemical Structure:



### Uses:

- Glimepiride is used to treat high blood sugar levels caused by type 2 diabetes.
- It may be used alone, or in combination with insulin or another oral medicine such as metformin.

### Stability and storage conditions:

- It should be kept in a cool, dry place and stored at room temperature. Direct sunlight is prohibited.

### Types of formulations:

- Tablets

### Popular brand names:

- Amaryl

### Important Point:

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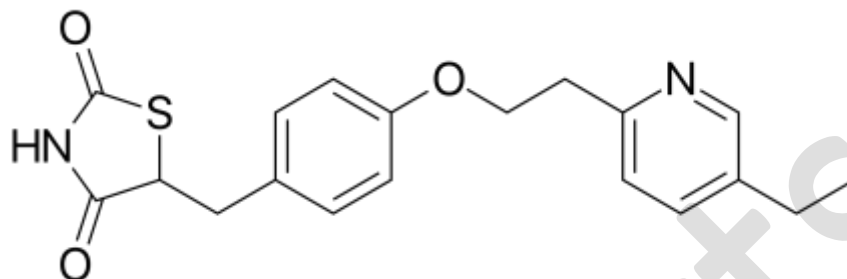
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## Pioglitazone

**Chemical Name:** (RS)-5-(4-[2-(5-ethylpyridin-2-yl)ethoxy]benzyl)thiazolidine-2,4-dione

**Chemical Structure:**



**Uses:**

- Pioglitazone is used with proper diet and exercise to treat high blood sugar levels caused by type 2 diabetes.
- It may be used alone or with other medicines such as insulin, metformin, or sulfonylurea agents.
- Pioglitazone works by helping your body use insulin better.

**Stability and storage conditions:**

- It should be kept in a cool, dry place and stored at room temperature. Direct sunlight is prohibited.

**Types of formulations:**

- Tablets

**Popular brand names:**

- Actos

**Important Point:**

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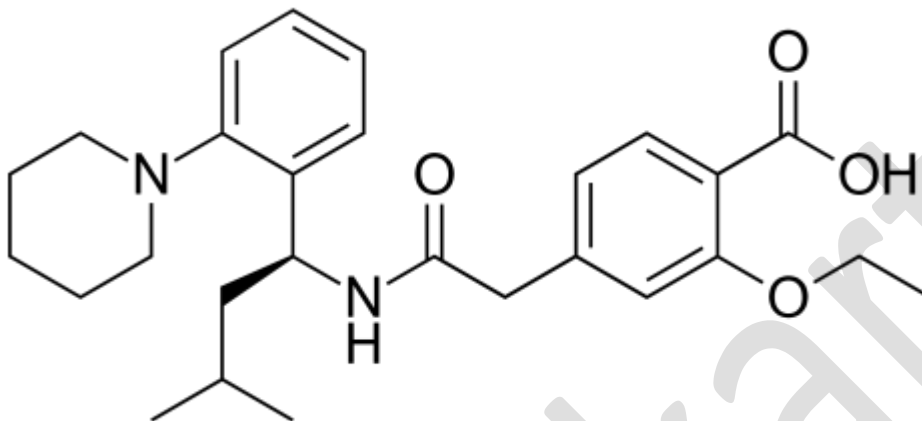
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## Repaglinide

### Chemical Name:

(S)-2-Ethoxy-4-(1-[2-(piperidin-1-yl)phenyl]-3-methylbutylcarbamoylmethyl)benzoic acid

### Chemical Structure:



### Uses:

- Repaglinide is a drug used in the treatment of diabetes mellitus type 2.
- It belongs to a class of antihyperglycemic agents known as meglitinides, along with nateglinide.
- Meglitinides work to reduce blood glucose levels by stimulating endogenous insulin production.

### Stability and storage conditions:

- It should be kept in a cool, dry place and stored at room temperature. Direct sunlight is prohibited.

### Types of formulations:

- Tablets

### Popular brand names:

- PRANDIN

### Important Point:



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## Gliflozins

### Uses:

- Gliflozins are effective drugs for the treatment of type 2 diabetes.
- They inhibit sodium glucose cotransporter 2 in the proximal renal tubule, leading to increased glucose excretion.

### Stability and storage conditions:

- It should be kept in a cool, dry place and stored at room temperature. Direct sunlight is prohibited.

### Types of formulations:

- Tablets

### Popular brand names:

- Forxiga

## Gliptins

### Chemical Name:

### Uses:

- Gliptins represent a novel class of agents that improve beta cell health and suppress glucagon, resulting in improved post-prandial and fasting hyperglycemia.

### Stability and storage conditions:

- It should be kept in a cool, dry place and stored at room temperature. Direct sunlight is prohibited.

### Types of formulations:

- Tablets

### Popular brand names:

- Januvia
- Galvus

