

# **Purified Bee Venom**

**Chem Sources Ltd., part**

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# I . Bee venom

## 1. What is Bee Venom?

Honey bee venom is an aromatic bitter colorless liquid. It evaporates fast in room temperature and leaves 30 to 40 percent of crystal remaining. Dried bee venom is quite stabilized with heat. For instance, it doesn't lose its property in boiling water. However, it is destroyed without difficulty when it comes to easily oxidizable materials.

## 2. Composition of Bee Venom

Bee venom is consisted of more than 40 substances mainly including peptide, amino acid and active amine. Among those, melittin, apamin, phospholipase A2 and MCD-peptide are important substances that are known for painkilling, anti-inflammation, antibacterial function as well as boosting the pituitary hormone and blood circulation (Figure 1).

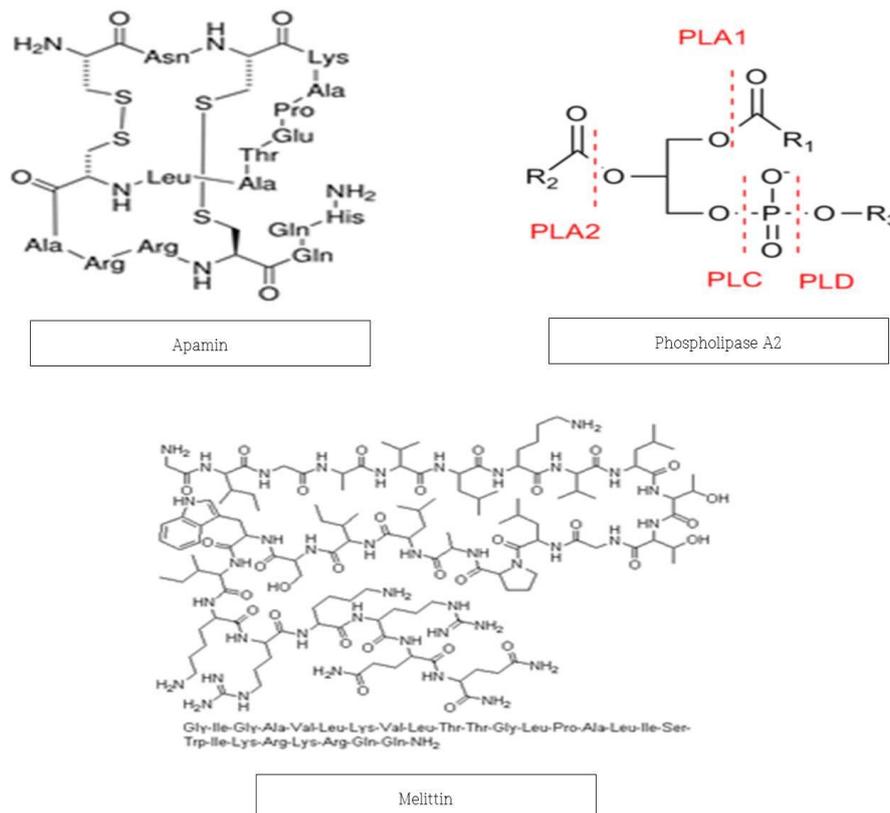


Figure 1. Main Components of Bee Venom

### 3. Effect of Bee Venom

The complete action mechanism of bee venom on the human body has not precisely been discovered yet; however its effectiveness has been working on treatments and preventions for several symptoms.

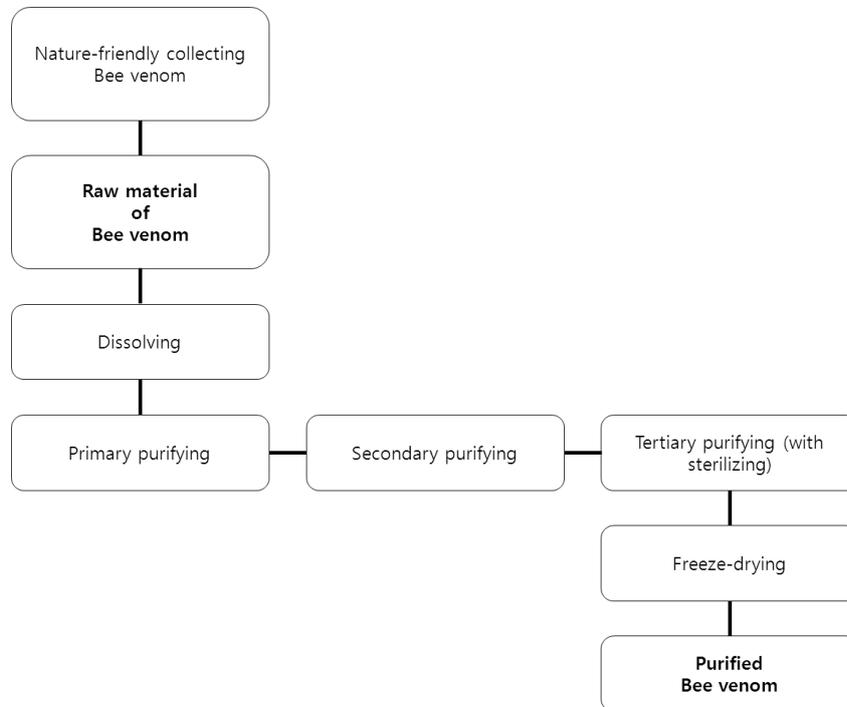
- Treatment for immunological disease: Bee venom has effects on most of immunological disease treatments by stimulating the immune system of mammals and its ability to fight diseases successfully. There are two immunological functions of bee venom: biostimulating the organism's biological systems and epiphyllaxis.
- Anti-inflammatory action: The main component of bee venom works very effectively in suppressing inflammation. Especially, in case of arthritis, when apamin and melittin is injected, it significantly inhibits edema. Edema has also decreased 15 to 40 percent after proteinase inhibitor and alolapin were treated.
- Neurotoxic effect: The substance which induces pain and inflammation in bee stings is being used effectively when it comes to researching and developing pain medicines in mammal. Especially, amapin among the component of bee venom has strong therapeutic effects on various neuralgia, arthritis, as well as rheumatoid arthritis, gout, and muscle pain.
- Hemolytic action: The most effective part of bee venom. By the action of melittin and phospholipase, extravasated blood from bruising or internal bleeding is absorbed and excreted. They also supply new blood, oxygen and nutrients to the tissues of humans, and work on hemolytic action.
- Vasodilator action: The histamine substance lowers the blood pressure which is quite a strong function of bee venom. The antihypertensive effect takes place at the concentration of 1/250000000.
- Autonomic nerve regulation: When the human body is under constant stress, an autonomic nervous system of sympathetic nervous system and parasympathetic nerve is thrown into disorder and becomes the main cause of many diseases. Bee venom contains the substances catecholamine and acetylcholine that are needed in order to normalize an autonomic nerve. Also catecholamine and acetylcholine works well for symptoms of psychosomatic disorders, and menopausal disorders because these substances are a neurotransmitter of the brain cells.
- Antibacterial function: Bee venom is known for its antibacterial and antifungal function and is quite effective for virus-induced tumor. Especially, they have a great curative power for periodontitis, tonsillitis, sty and purulent diseases.

#### 4. Components and Pharmacological effect of bee venom

Component		Pharmacological Effect	References
Peptides	Melittin	Anti-inflammatory in very small doses, immunostimulatory and immunosuppressive, Higher doses are inflammatory and haemolytic	Jentsch(1969)
	Apamin	neuralgia relief action, acting analgesic, Anti-inflammatory stimulating the release of cortisone, antiserotonine action	Herbermann <i>etc.</i> (1965)
	MCD-peptide 401	Anti-inflammatory action	Hanson <i>etc.</i> (1974)
	Adolapin	Anti-inflammatory action, acting analgesic, alleviate a fever	Shkenderov (1982)
	Protease inhibitor	Inhibits the activity of different proteases like trypsin, chymotrypsin, plasmin, thrombin, thus decreasing inflammation	Shkenderov (1973)
	Secapin	Anti-hypothermy, sedative action	Gauldie <i>etc.</i> (1976)
	Tertiapin	Mast cell degranulation action	Gauldie <i>etc.</i> (1978)
	Procamine A, B	radiation protection	Peck <i>etc.</i> (1976)
Enzymes	Hyaluronidase	histolysis, dilates blood vessels and increases their permeability, causing an increase of blood circulation	Baker (1966)
	Phospholipase A <sub>2</sub>	Destroys phospholipids and dissolves the cell membrane of blood bodies, hemolytic action, catalysis	Jentsch (1972)
	$\alpha$ - glucosidase	promote antibody	Shkenderov (1979)
	Acid phosphomonoesterase	promote antibody	Benton (1965)
	Lysophospholipase	Inhibit action of Phospholipase A <sub>2</sub>	Doery (1964)
Amines	Histamine	Strengthen blood pressure, intestinal contraction, stimulatory action of gastric acid secretion.	Owen (1974)
	Dopamine	neurotransmitter	Owen (1971)

## II. Production Process

### 1. Diagram of Production Process



- ◇ Raw material of bee venom: Bee venom is a complex mixture of proteins, peptides and low molecular components. It is collected by a bee venom collector that we developed. It would obtain impurities such as pollen, propolis, wax, small insect, dust and so on.
  
- ◇ Purified bee venom: To eliminate impurities, raw material goes through 3 step filtrations. Through the process, we get rid of water-insoluble substances (propolis, wax, small insect, etc.), micro substances (pollen, micro dust, etc.) and microorganism. The finished product is manufactured by freeze-drying.

### 2. Collection of raw material

To collect bee venom from honey bees, we operate the Bee Venom Collector that we developed. This way of nature-friendly collection minimizes the damage to bee. Bee venom is a bitter colorless liquid and aromatic substance. It becomes 30~40% dry material after being drained rapidly in room temperature.

To take dry bee venom, we perform the following steps.

- Venom collector frame is placed at the entrance of the hive (Figure 2).
- The main switch is turn on and then the shock time for 6 seconds and pause time for 3 seconds with 12 volt is set up (MUST KEEP level of optimal time and voltage consistant for minimizing the damage to the bees and maximizing collect rate.).
- All the bees entering the bee hive are irritated by the electric discharges and sting on the glass plate, where the bee venom is collected and drained (Figure 3)
- After removing the glass plate from the collector frame, the bee venom is drained in a cool, dark place.
- The substance is scraped off the glass, and the bee venom is gathered (Figure 4).
- The bee venom is stored in an airtight container and kept in cold storage to prevent activation or deterioration of peptides.

The best season to collect bee venom is around June to September in Korea. Because bees make honey during the morning, it limits the time of collection to afternoon. A difference is shown between normal bee venom and venom collected from a bee that is born under 15days.



Figure 2. Installation of Bee Venom Collector



Figure 3. Process of Collection

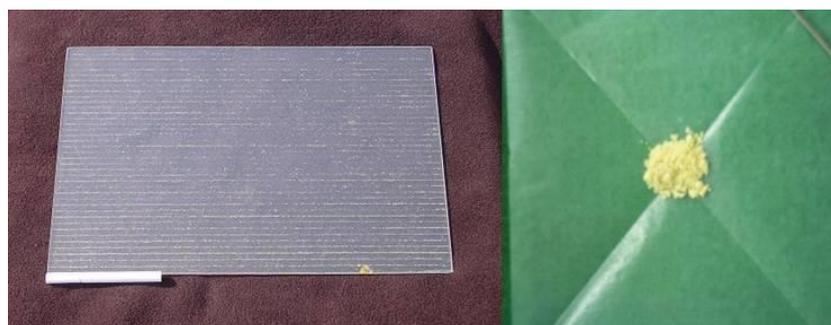


Figure 4. Bee Venom on Glass Plate and Dry Bee Venom

