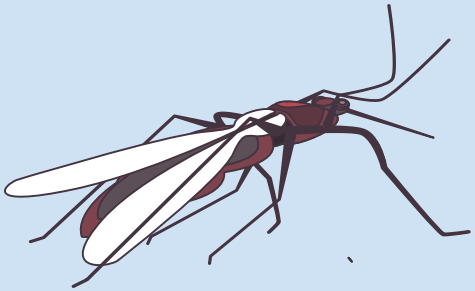
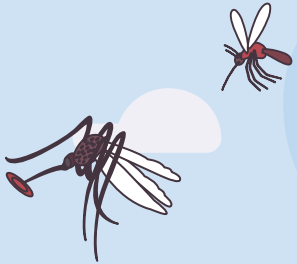
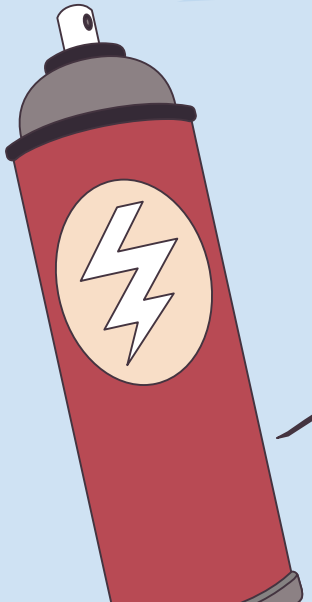
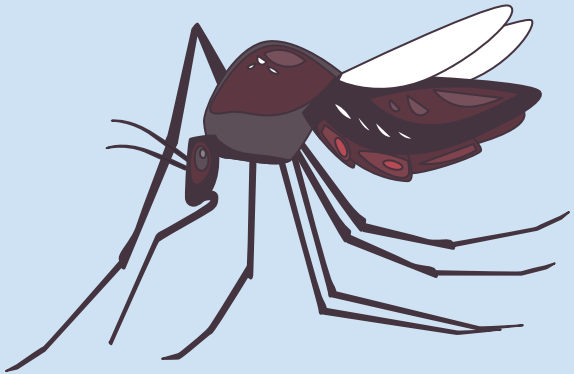




Mosquito Repellent

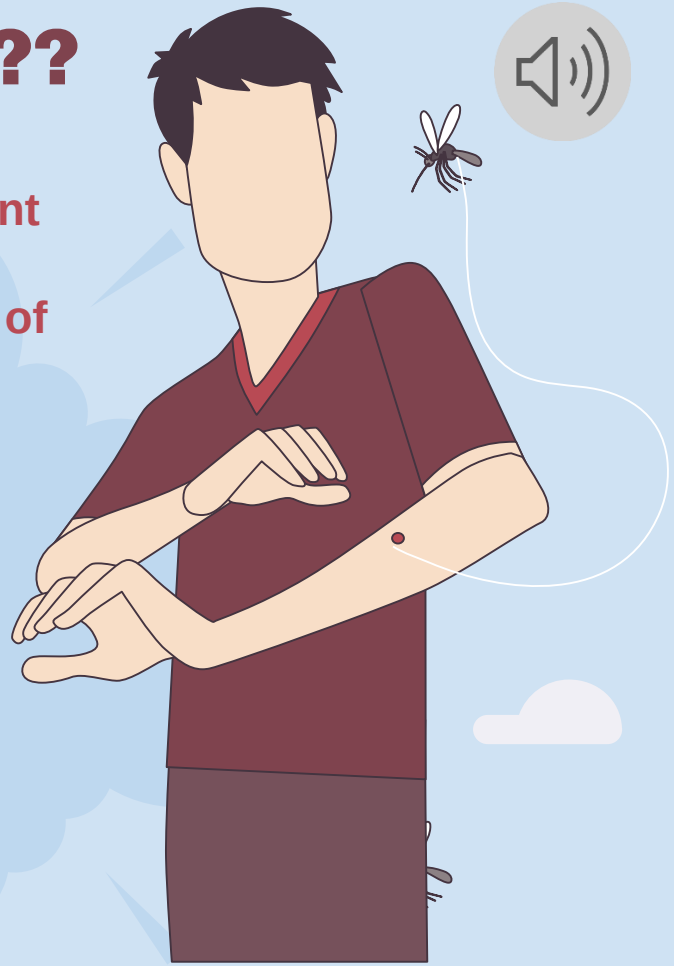




Presented by:
Prathamesh Pathak 190108064
Saurabh S Kamble 190107069

What is Mosquito repellent ??

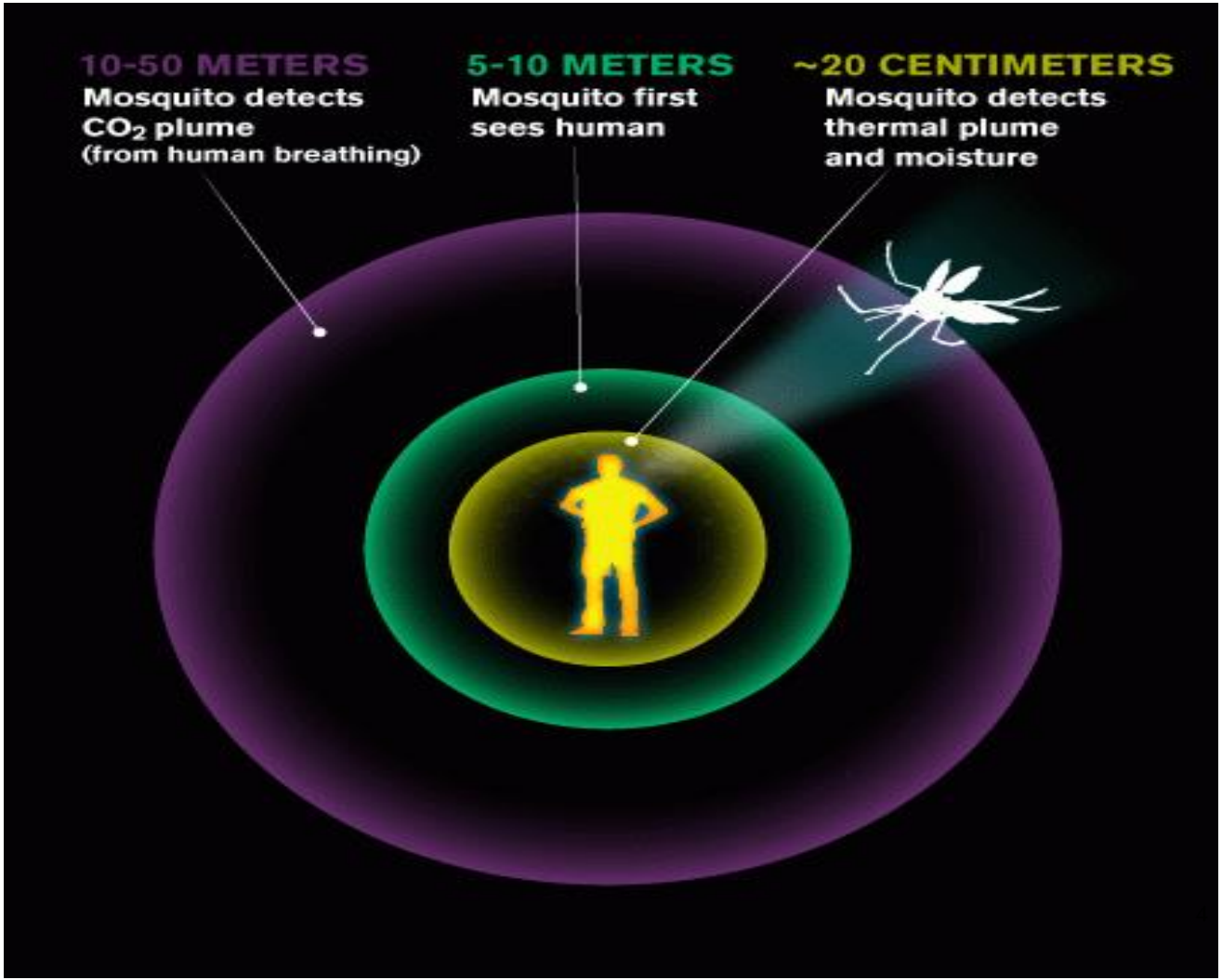
The mosquito repellents are substances that are applied to skin, clothes, or other surfaces to prevent insects from biting people and feasting on their blood. Hence, aiding in the prevention and control of Mosquito-borne diseases outbreaks.

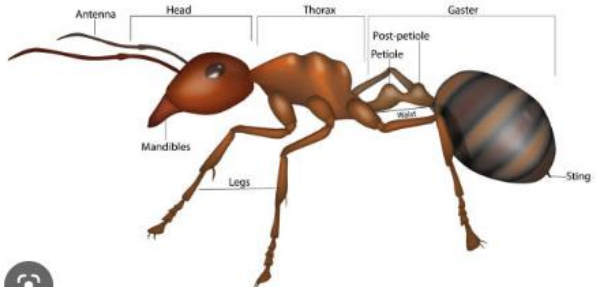


Need

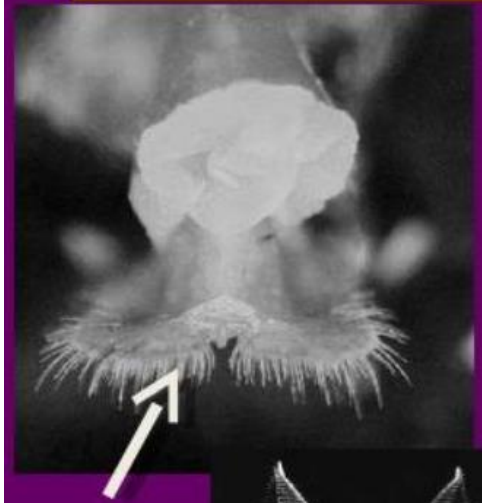
According to WHO, nearly 700 million people get infected by mosquito-borne diseases each year resulting over one million deaths including ~60% from children under 5 years.

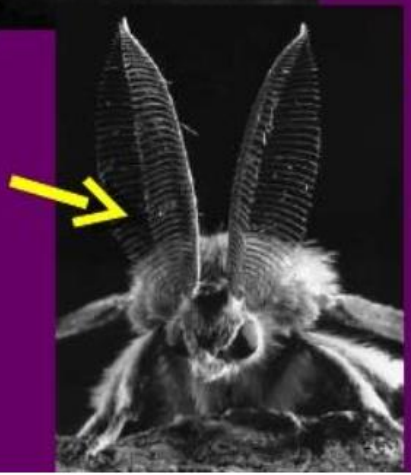
Inspiration from Mosquitoes


10-50 METERS
Mosquito detects
CO_2 plume
(from human breathing)
5-10 METERS
Mosquito first
sees human
~20 CENTIMETERS
Mosquito detects
thermal plume
and moisture

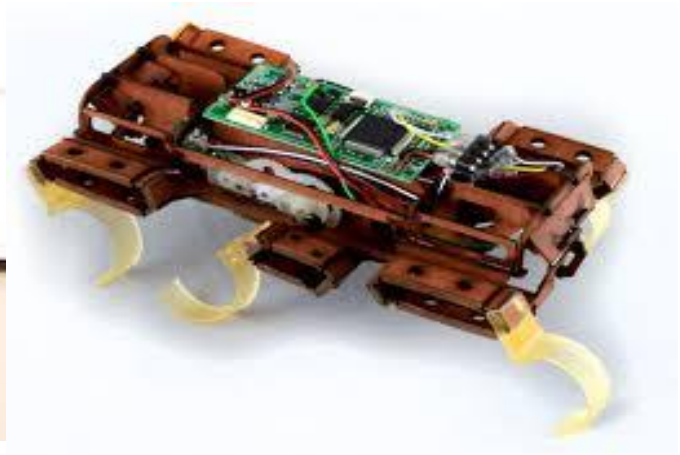

Antenna
Head
Thorax
Gaster
Post-petiole
Petiole
Waist
Mandibles
Legs
Sting

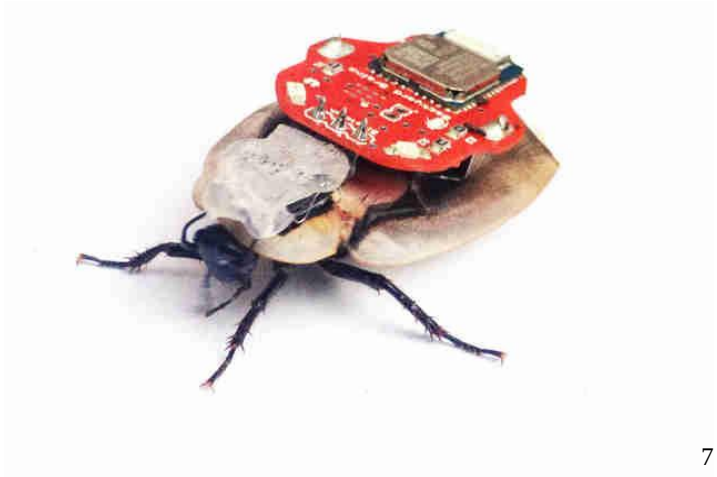
What are insect pheromones?





- Pheromones are chemicals released into environment in small amounts by special abdominal glands in insects.
- Pheromones are species specific, may stimulate one gender or all genders.
- Male moths detect pheromones with antennae.
- Synthetic sex pheromones are manufactured & used as lures.





History

The Pharaoh Sneferu, reigned from around 2613–2589 BCE and the founder of the fourth dynasty of Egypt, the last pharaoh of ancient Egypt, used bed nets & essential oils (EOs) as protection against mosquitoes.

Mosquito-repellent plants have been used in various forms by different civilizations, including hanging bruised plants in houses, crude fumigants in which plants were burned to drive away mosquitoes, and oil formulations applied to the skin or cloth.

Smoke is unquestionably the most widely used method of mosquito repellent, often by burning plants in rural tropics in spiral-shaped incenses like Katori.

Repelling action

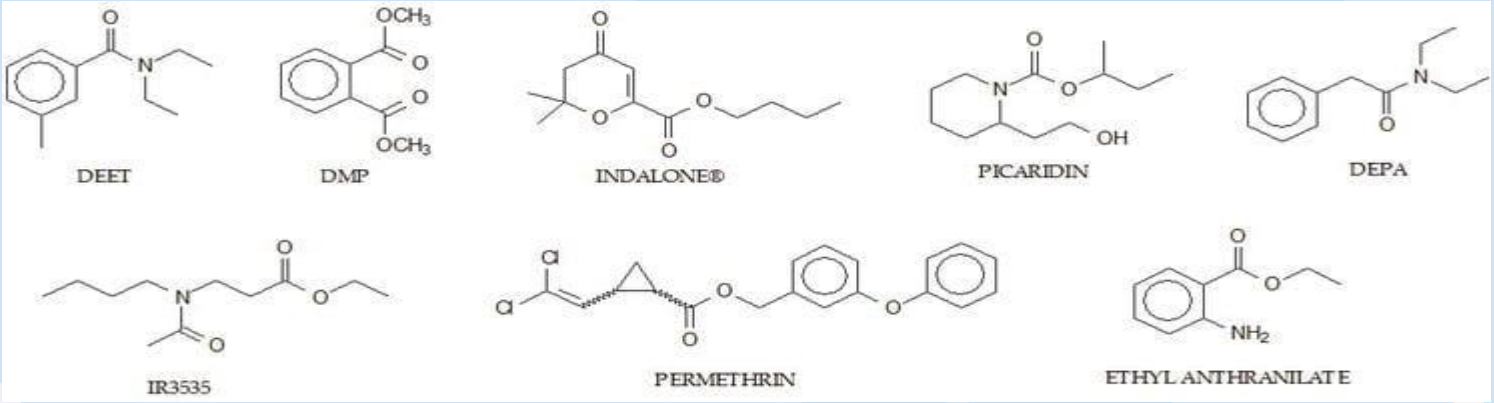
Mosquito repellents work by interfering with the insect's homing system. This homing system, located in the antennae, consists of chemical receptors. The chemical receptors are stimulated by lactic acid that naturally evaporates from the skin of warm-blooded animals. When a repellent ingredient, such as DEET, is applied to the skin, it evaporates, forming a barrier around the skin. The mosquito, therefore, is unable to "find" the person to bite.

Synthetic repellents

Before World War II, three main repellents in the market: dimethyl-phthalate discovered in 1929, Indalon patented in 1937, and Rutgers 612 discovered in 1939.

The event of World War II was the primary catalyst for the development of new repellent technologies because the Pacific and North African theatres posed significant disease threats to allied military personnel.

Over 6000 chemicals were tested in a variety of research institutions between 1942 and 1947, resulting in the identification of multiple successful repellent chemistries.

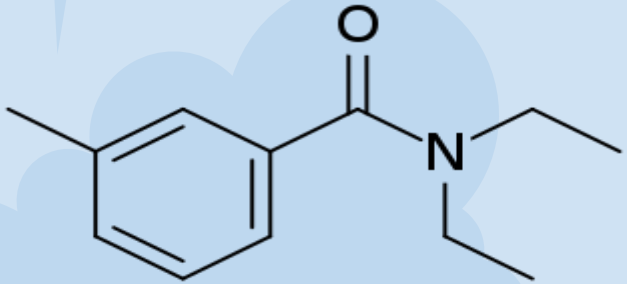


Chemical Structures of some Synthetic repellents

Types of Synthetic repellents

DEET

- DEET (N,N-diethyl-3-methylbenzamide) Standard and most effective broad-spectrum insect-repellent component with a long lasting effect



- DEET discovered by the US Department of Agriculture and patented by the US Army in 1946. Allowed for public use in 1957

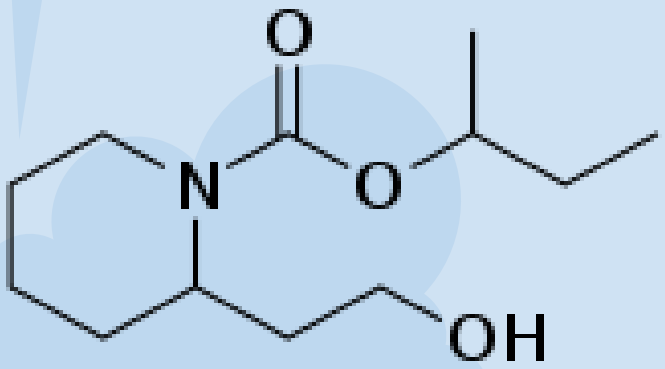
- The major limitation of DEET is high cost, unpleasant odor, and inconvenience of the continuous application on the exposed skin at high concentrations.

Picaridin

- Picaridin (1-piperidinecarboxylic acid 2-(2-hydroxyethyl)-1-methylpropyl ester) a colorless, odorless developed by Bayer in the 1980s

- Picaridin's efficacy is superior to DEET's, and a 20% picaridin spray and cream can provide 12 hours of mosquito protection.

- Picaridin can be applied to the skin or clothing of humans using Pump sprays, liquids, aerosols, and wipes.



Natural repellents

- **PMD and lemon-scented eucalyptus**

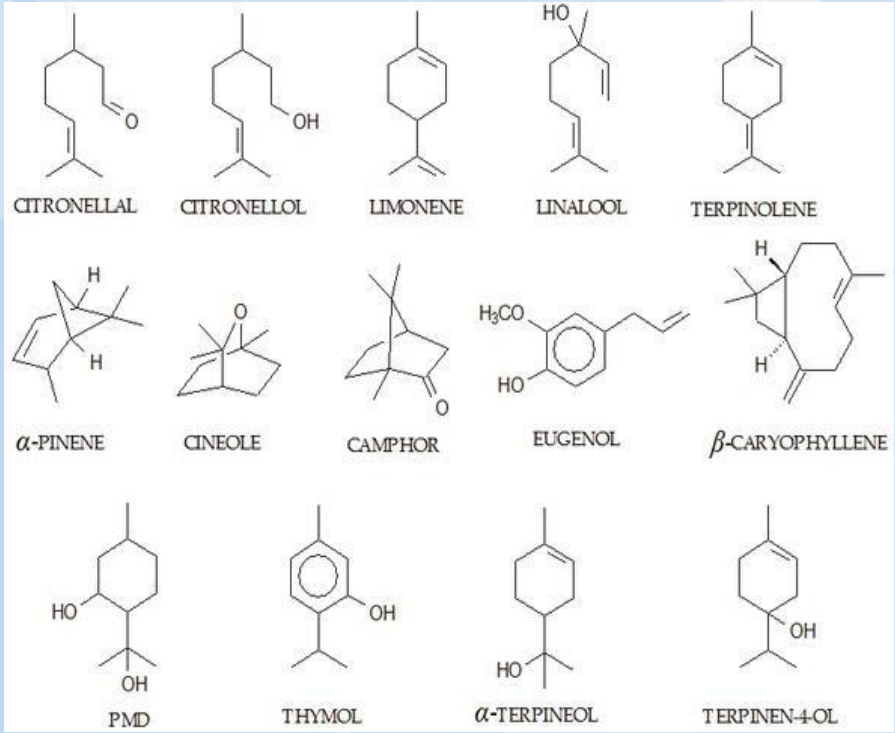
  PMD (*p*-menthane-3,8-diol) derived from lemon-scented eucalyptus (Eucalyptus citriodora, Myrtaceae) leaves, and with good efficiency profile.

  A longer protection time compared to other plant-derived compounds because it is a monoterpene with low volatility.

- **Neem and methyl jasmonate**

  The aromatic plants of the Meliaceae family contain substances of the limonoid group and insecticidal and repellent effects on mosquito

  The major Advantages of Neem and methyl jasmonate are low cost, pleasant odor, and very high efficiency of neem-based repellents.



Commercial mosquito repellent products

- Mosquito coil

  A mosquito-repelling incense commonly spiralled and manufactured with dried pyrethrum powder as the active component.

  - Advantages
    1. Low Cost
    2. Widely available
    3. Long lasting life period

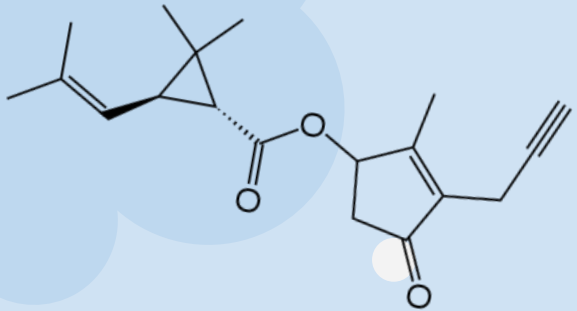
  - Disadvantages
    1. Health Implications due to smoke emissions
    2. Irritation and breathing issues
    3. Chance of Physical Accidents

• Liquid Repellent

A Liquidator repellent has a graphite rod in the middle and the bottle is filled with Insecticides, Stabiliser/Anti-oxidant & perfume. The insecticide vaporize and attack the nervous system of mosquitoes.

- Advantages
  1. All-round protection
  2. Immediate Effect

- Disadvantages
  1. Need Power backup
  2. Exposure to smoke may cause Health Implications
  3. Use of Insecticides can cause long term side effects



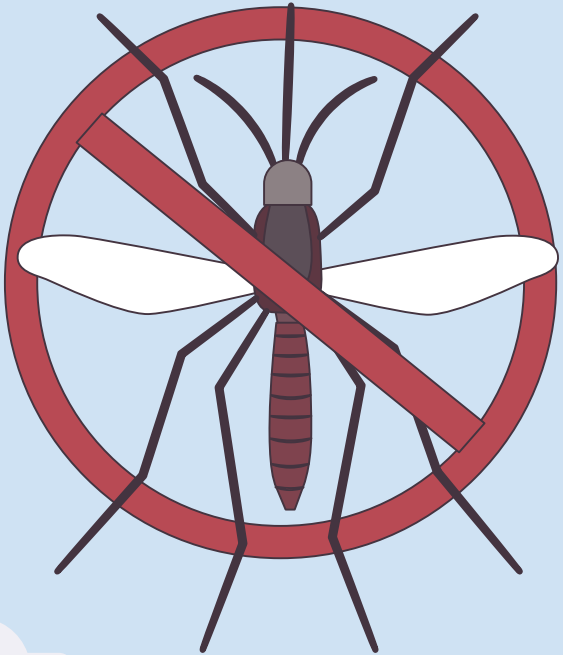
• Creams, lotions, oils

Repellents majorly contains DEET, Picaridin & PMD. Repellents works by confusing and interfering with mosquito antennae receptors, preventing mosquitoes from landing on the skin and biting.

- Advantages
  1. All-round protection
  2. Immediate Effect
  3. 8-10 hours protection

- Disadvantages
  1. Costlier compared to other alternatives
  2. Extensive use may cause skin rashes, irritation or redness
  3. Chance of having allergies for childrens below age 2

Safety/Precautions



1. Do not apply over cuts, wounds, or irritated skin & under clothing
2. After returning indoors, wash treated skin with soap and water
3. Avoid children's eyes and mouth and use it sparingly around their ears
4. Products with Oil of lemon eucalyptus should not be used on children less than 3 years old
5. Do not apply repellent to children's hands. (Children tend to put their hands in their mouths.)

Thanks

Stay Safe
Stay Healthy
Stay away
From mosquitoes


Moth Balls

Wikipedia

Tineola bisselliella - Wikipedia

Entomology - University of Kentucky

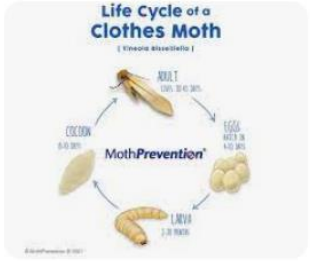
Clothes Moths | Entomology

National Pesticide Information Center - Oregon Stat…

Clothes Moths

Country Living Magazine

Clothes Moths: 6 Simple Solutions + 5 ...



Moth-Prevention.com

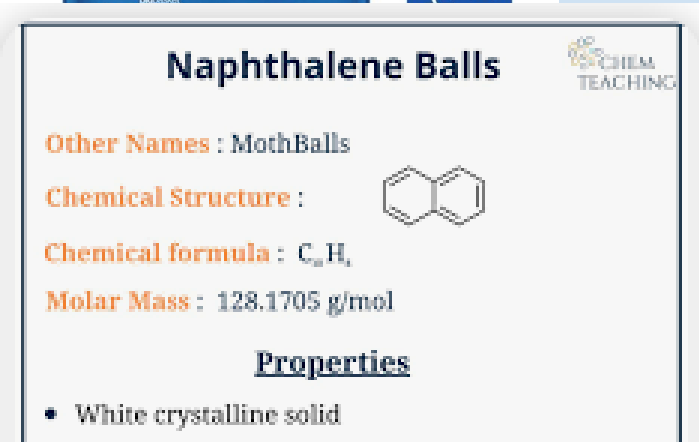
Agric Wa Gov Au

UC ANR

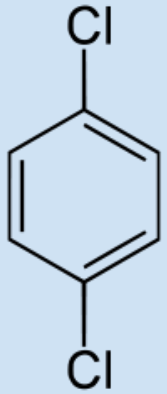
Natural History Museum

What are Moth Balls?

Mothballs are small balls of chemical pesticide and deodorant, sometimes used when storing clothing and other articles susceptible to damage from mold or moth larvae.



What are they made of?



Para-dichlorobenzene

- Primarily naphthalene, but due to naphthalene's flammability, many modern mothball formulations instead use 1,4-dichlorobenzene.

- The latter formulation may be somewhat less flammable, although both chemicals have the same NFPA 704 rating for flammability.

- Both of these formulations have the strong, pungent, sickly-sweet odor often associated with mothballs.

Working

- Both naphthalene and 1,4-dichlorobenzene undergo sublimation, meaning that they transition from a solid state directly into a gas; this gas is toxic to moths and moth larvae.[1]
- Due to the health risks of 1,4-dichlorobenzene, and flammability of naphthalene, other substances like camphor are sometimes used.

Dhela Kapoor Camphor Pure...

₹299

Amazon.in

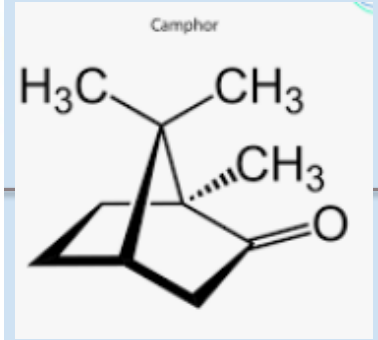
Free shipping

Bhimseni Camphor Jar - 500g | House...

₹1,200

House of Mangalam

Free shipping



Storage and Uses

- Mothballs are stored in air-tight bags made of a non-reactive plastic such as polyethylene or polypropylene (other plastics may be degraded or softened).
- The clothing to be protected should be sealed within airtight containers; otherwise the vapors will tend to escape into the surrounding environment.

- Manufacturer's instructions regularly warn against using mothballs for any purpose other than those specified by the packaging, as such uses are not only harmful and noxious, they are also frequently considered illegal.
- Although occasionally used as snake repellent, mothball use as a rodent, squirrel, or bat repellent is illegal in many areas, and tends to cause more annoyance and hazard to humans than to the target pest.
- However, mothballs continue to be advertised as squirrel repellent and are an ingredient in some commercial vermin and snake repellent products.

- If you smell mothballs, you are being exposed to these chemicals.
- Children or pets make mistake by consuming mothballs as if it is food or candy, which can cause serious effects.

Urinal deodorizer blocks

Alternatives

Alternatives to mothballs to control clothes moths include:

- Dry cleaning
- Freezing
- Thorough vacuuming
- Washing in hot water.

- Camphor is also used as a moth repellent, particularly in China.
- Unlike naphthalene and dichlorobenzene, camphor has medicinal applications and is not regarded as a carcinogen, though it is toxic in large doses. Red cedar wood and oil is also used as an alternative moth repellent.
- Pheromone traps are also an effective diagnostic tool and can sometimes be an effective control tool to protect valuable clothing.

Using specific pheromones, traps can be used to **monitor target pests in agriculture or in residential areas**. By constantly monitoring for insects, it may be possible to detect an infestation before it occurs. Early detection of pest insects using pheromone traps can also lessen damage to agriculture and other plants.

29-Apr-2021

Pheromone traps use chemical signals (pheromones) emitted by females to attract a mate (therefore **pheromone traps only catch males of that species**).

Pheromone moth traps are very effective at killing the adult male clothes moths attracted to them. However, clothes moth larvae are the ones that eat your fabrics, so killing adults doesn't stop infestation. Pheromone traps slightly reduce the breeding rate, but the effect is barely worth mentioning.

THANK YOU