How to Treat Mosquito Nets with Insecticide


### Efficacy of pyrethroid insecticides for use on nets

<table>
<thead>
<tr>
<th>Active Ingredient</th>
<th>Formulations</th>
<th>Brands</th>
<th>Duration of protection (months)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Alpha-Cypermethin SC 10%</td>
<td>Suspension concentrate</td>
<td>Fendona</td>
<td>6-9</td>
</tr>
<tr>
<td>Cyfluthrin EW 0.05%</td>
<td>Water emulsion</td>
<td>Solfac</td>
<td>6-9</td>
</tr>
<tr>
<td>Deltamethrin 400 mg</td>
<td>Tablet</td>
<td>K-O Tab</td>
<td>12</td>
</tr>
<tr>
<td>Deltamethrin SC 1%</td>
<td>Suspension concentrate</td>
<td>K-Orthrine</td>
<td>12</td>
</tr>
<tr>
<td>Lambda-Byhalothrin CS 2.5%</td>
<td>Capsule suspension</td>
<td>Icon</td>
<td>9</td>
</tr>
<tr>
<td>Permethrin EC 55%</td>
<td>Emulsified concentrate</td>
<td>Peripel</td>
<td>6</td>
</tr>
</tbody>
</table>

These products are presented as examples only and are not endorsements.

### Directions:

- Clean and dry all nets
- Always wear protective gloves when soaking a net in insecticide.
- Always use metric measurements: centimeter (cm), metre (m), millimeter (mm), milliliter (mL), and litre (L).

1. **Calculate the area of the net in square metres**
   
   How to measure a mosquito net:
   
   Consider a conical net as a triangle and a rectangular net as two rectangles.
   
   a) Conical net
   
   Lay the net flat to:
   
   - Measure the total distance around the curved base of the net (m)
   - Measure the height (m)
   - Multiply base x height = area of net
   
   b) Rectangular net
   
   Hang up the net to:
   
   - Measure the area of the top = width x length
   - Measure the area around the sides = height x total distance around base of net
Add the two measurements together to obtain the total area of the net.

**Calculate the amount of water absorbed by the net, in milliliters or litres**

Using a bucket and a measuring container, measure two litres of water into the bucket. Soak the net until it is totally wet. Carefully wring out the net over the bucket. When the net has stopped dripping, measure the water remaining in the bucket.

For example:

- Original water in bucket (2 L) minus remaining water in bucket (1.3 L) = water absorbed by the net (0.7 L or 700 mL)

3. **Calculate the amount of insecticide required**

- Obtain the highest quality product, in original packaging, specifically designed for use on mosquito netting. Avoid using products that have not undergone meticulous quality control. Avoid using substitute products.
- Check the recommended dosage of insecticide. Read the instructions on the bottle, or see Table 1.
- Check the concentration of the insecticide. This follows the name of the insecticide. For example, permethrin EC 50 contains 500g of insecticide in each litre; this is also known as a 50% solution.

<table>
<thead>
<tr>
<th>Compound and formulation</th>
<th>Dose (mg of active ingredient/square metre)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Alpha-cypermethrin SC</td>
<td>20</td>
</tr>
<tr>
<td>Cyfluthrin EW</td>
<td>30-50</td>
</tr>
<tr>
<td>Deltamethrin SC</td>
<td>15-25</td>
</tr>
<tr>
<td>Deltamethrin tablet</td>
<td>1 tablet per net</td>
</tr>
<tr>
<td>Lambda-cyhalothrin CS</td>
<td>10-15</td>
</tr>
<tr>
<td>Permethrin EC</td>
<td>200-500</td>
</tr>
</tbody>
</table>

Table 1. Doses of commonly used insecticides in mg per square metre of material (polyester)

To calculate the amount of insecticide use the following formula:

- Dosage (mg/unit metre) x Area of Net (in square metres) to determine the amount of insecticide required in mg. (Note: there are 1,000 mg per gram, 1,000 mL/L, and 1 gm per mL.)
- Take amount of insecticide required divided by the amount in mg of insecticide per mL of product (for example, a product that contains 50% permethrin will contain 500 g permethrin/L and therefore 500 mg permethrin/mL = amount of insecticide required in mL).

For example:

If you want a dosage of 200 mg/square metre on an 11 square metre net, using a product containing 50% permethrin w/w, calculate the amount required as follows:

- 200 mg/square metre x 11 metres squared = 2,200 mg permethrin required
- 50% permethrin = 500 mg permethrin/mL
- 2,200 mg divided by 500 mg/mL = 4.4 mL insecticide required to treat the net
If the net absorbs 0.7 L (700 mL) of water, add this amount of water to the insecticide to make a final mixture.

4. **Wear protective gloves when treating nets with insecticide.**

5. **Measure the amount of water an insecticide needed.**
   Wide-mouth containers, such as an empty margarine container (1 kg = approximately 1 L), are best for measuring large amounts of water. Measure insecticide using a 250 mL empty container that can be scored inside at 50 mL intervals. For small amounts of insecticide, use a syringe.

6. **Add the insecticide to the water an mix well.**
   Perform treatment outdoors or in a well-ventilated area. Alternatively, you can place the net in a plastic bag (ensuring that the bag contains no holes), then, add the insecticide and water solution, knead well, and remove the treated net from the bag for drying.

7. **Dip the net in the solution until it is thoroughly wet.**

8. **Wring out the net over a bowl and hang up until it has stopped dripping.**

9. **Dry the net.**

10. **Wash your hands and all equipment with soap and water.**
    Triple rinse any containers for reuse, and punch holes in containers or equipment that will be discarded to prevent their reuse as drinking water containers.

11. **Pour any waste insecticide down a pit latrine or into a pit dug into the ground, and NOT into a river or pond, because pyrethroids are highly toxic to fish and aquatic invertebrates.**

**Note:** Prior to traveling, inquire about the availability of insecticide, and plan to purchase and apply these products at your destination.

Pre-impregnated mosquito nets are available from Health Bridge on its Website at [http://www.healthbridge.ca](http://www.healthbridge.ca) and are found in some travel and mountain equipment stores in Canada and in the U.S. These products are not currently registered by the Health Canada-PMRA.