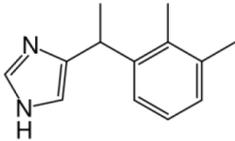


## HOW TO FORMULATE WITH SELEKTOPE TO ACHIEVE OPTIMAL LEACHING RATES

### WHAT IS SELEKTOPE®?

Selektope® is an antifouling active agent developed, patented and registered by I-Tech AB. It can be used in antifouling coatings to reduce hard fouling (primarily barnacle growth) on vessels and other underwater structures.

<b>CAS-No.</b>	86347-14-0
<b>EINECS-no</b>	Not listed
<b>IUPAC Name</b>	4-[1-(2,3-dimethylphenyl)ethyl]-1 <i>H</i> -imidazole
<b>Other common name</b>	Medetomidine
<b>Molecular formula</b>	C <sub>13</sub> H <sub>16</sub> N <sub>2</sub>
<b>Structural formula</b>	
<b>Molecular weight (g/mol)</b>	200,28 g/mol

### HOW MUCH SELEKTOPE® DO I NEED TO USE?

Selektope® is a biocide that has highly favourable antifouling properties at low concentrations (nano Molar). To obtain full protection against barnacle fouling, 0.1 - 0.3% by weight of Selektope® should be used in a wet paint formulation.

### HOW DO I FORMULATE OPTIMALLY WITH SELEKTOPE?

How and when Selektope® is added during the formulation process is key to controlling the release rate of Selektope® from an antifouling paint.

To prevent premature depletion of Selektope® the molecule should be able to interact with a carrier in the paint mixture. A carrier could be an inorganic particle such as zinc- or cuprous oxide. It could also be a metal ion such as Zn<sup>2+</sup> or Cu<sup>2+</sup>, or an acid group on a binder, for example the carboxylic acid on rosin.

I-Tech advises that Selektope® should be added early in the process, rather than adding it post formulation. I-Tech also advises that Selektope® should be added as a solution in a suitable solvent. Preferably the Selektope® solution and the carrier should be mixed first and then the rest of the components can be added.

### 1. Dissolve the Selektepe® in suitable solvent.

It is easier to get a homogeneous mixture in the paint if Selektepe® is used as a solution rather than added in its solid powder form (as supplied). Selektepe® adhesion to inorganic particles is strongly dependent on the solvent used. Either a minimum amount of good, usually somewhat polar solvent can be used (for example 1-methoxy-2-propanol), or excess amounts of a suitable solvent with low eluting power must be administered (for example xylene).

### 2. Add metal oxide pigment particles and mix

Selektepe® will adhere to metal ions and metal oxide such as zinc oxide and cuprous oxide. This has been shown to be an effective way to control the release of Selektepe® and prevent premature depletion.

Inorganic materials such as  $\text{Al}_2\text{O}_3$ ,  $\text{SiO}_2$ ,  $\text{CuO}$ ,  $\text{ZnO}$ ,  $\text{TiO}_2$  and  $\text{MgO}$  can be used. Cuprous oxide, zinc oxide and iron oxide are commonly used.  $\text{ZnO}$  is advised as the best pigment particle for maximum Selektepe® absorption in xylene.  $\text{ZnO}$  and Selektepe® should be mixed at a ratio where the surface area of the  $\text{ZnO}$  correspond to  $500\text{m}^2/\text{g}$  of Selektepe®. The corresponding area for  $\text{CuO}$  and  $\text{TiO}_2$  is about  $2000\text{m}^2/\text{g}$  of Selektepe®.

Using pigment particles with a high surface area, i.e. those that are smaller in size, will favour the absorption of Selektepe® and will prevent early depletion.

### 3. Add the binder solution and other components

If the binder contains a point of interaction with Selektepe® (for example, the acid groups in rosin) it can be added in the beginning as part of the first solution. It is otherwise advised that the binder is added after the Selektepe® solution have been mixed with inorganic materials such as pigments and fillers.

### WHAT HAPPENS IF I ADD SELEKTOPE® POST-FORMULATION?

If Selektepe® is added later in the paint formulation process the surface of the metal oxide pigment may already be occupied and Selektepe® absorption will not take place in an adequate or linear way with uneven distribution and weaker adhesions. This may cause Selektepe® to leach out of the paint too quickly and result in premature depletion of Selektepe® from the treated surface.

