IMERGARD™ WP
AN INDOOR RESIDUAL SPRAY (IRS) PROVIDING A PHYSICAL MODE OF ACTION AND 11 MONTH RESIDUAL EFFICACY
IMERYS AND THE FIGHT AGAINST MALARIA

The world leader in mineral-based specialties, Imerys delivers high value-added, functional mineral solutions to a great number of industry sectors. We draw on our knowledge of applications and scientific expertise to offer innovative sustainable products and technologies.

We respect the world in which we operate and recognize we have a role to play in society, along with obligations to the countries and communities in which we do business.

As we continue to develop innovative solutions that help mankind on a global level - we are heavily vested in the ongoing fight regarding mosquito-control and the global battle against malaria in an effort to help to save lives and protect communities worldwide.

IMERGARD WP

Imergard™ WP (Wettable Powder) has been specifically designed for use in indoor residual spraying (IRS) programs to provide up to 11 months residual control of malaria carrying mosquitoes.

Imergard WP is a mechanical insecticide providing a physical mode of action. It is applied using standard backpack spray equipment. When the mosquito lands on a treated surface, there is a static transfer of Imergard WP particles, which absorb the lipid layer necessary for the mosquito’s survival.

A POWERFUL COMPLIMENT TO ANY INTEGRATED VECTOR MANAGEMENT PROGRAM
Indoor residual sprays (IRS) have been an effective strategy to control malaria transmission, and have helped reduce the number of annual deaths in recent years.

Population growth, urbanization in developing countries, and climate change are megatrends helping mosquitoes evolve to become resistant to these treatments.

Fewer people at risk of malaria are being protected by IRS; declining from a peak of 5% coverage in 2010 to 2% in 2019 primarily as a result of insecticide resistance and rising costs of new technologies.

“If IRS is to remain an important element in an integrated vector control approach for sub-Saharan Africa, alternative insecticides, particularly ones with novel modes of action are urgently needed.” Dr. Sarah J. Moore, Ifakara Health Institute and Swiss Tropical and Public Health Institute, RBM Partnership To End Malaria, 2020

Imergard™ WP has demonstrated long-lasting residual control of susceptible and resistant strains of mosquitoes in both the laboratory and field trials.

Lower portion of a mosquito’s leg after contact with Imergard WP. Statically transferred particles dehydrate mosquitoes, killing them.

Imergard WP particles transferred to the compound eye of an adult female mosquito.

[Photos courtesy of Dr. Jean M Deguenon and Prof. Michael Roe, NC State University]
- In a 2019 community trial in Tanzania, where over 4,000 houses were treated, Imergard WP was able to control the malaria parasite as effectively as the gold standard Positive Control, a micro-encapsulated Pirimiphos-methyl IRS.

- At the conclusion of the eight-month study, Imergard WP maintained 100% efficacy after 72 hours against a threshold target of 80% mortality.

- Imergard WP held its own against the gold standard which is an impressive result for a mechanical insecticide, considering that the mosquitoes in this study were susceptible to micro-encapsulated Pirimiphos-methyl.
APPROACHING ONE YEAR’S LONG-LASTING PERFORMANCE ACROSS A WIDE RANGE OF SURFACES

Imerys extended the cone bioassay study in the community trial in Tanzania to establish if Imergard™ WP can meet or exceed the new industry target of more than 12 months of residual efficacy.

An IRS that has at least a 12 month residual efficacy means it can be applied at any time of the year and not just during mosquito season, resulting in increased IRS coverage.

Imergard WP will provide at least 11 months of residual efficacy on all substrates (brick, mud & cement), meeting the WHO 80% threshold at 72 hours with equivalent performance to the gold standard IRS on both susceptible and resistant species.

![Image](image.png)

Figure 3. Residual Efficacy of Imergard™ WP and Actellic 300CS by month after spraying (on brick, cement and mud) up to 13 months against Anopheles (An.) gambiae s.s. Ifakara Strain. Treatment achieves 80% threshold for 11 months on all substrates.

![Image](image.png)

Figure 4. Residual Efficacy of Imergard™ WP and Actellic 300CS 6 to 13 months after spraying (on brick, cement and mud) against pyrethroid resistant Anopheles (An) arabiensis Kining’ina strain. Treatment achieves 80% threshold for 11 months on all substrates.
HIGH USER ACCEPTANCE

There were no serious adverse events in either treatment arm among sprayers or residents, so there was a high level of user acceptance in the community trial.

Imergard™ WP, like other IRS technologies, does not stop mosquitoes from blood-feeding; this is where bednets have proven an invaluable tool with 50% of the population at risk being protected. However, nearly 40% of pregnant women and children under five years of age, the most vulnerable population, do not sleep under an insecticide-treated bednet.

The primary objective of employing IRS as a strategy for malaria control is to limit the spread of the malaria parasite. After a blood meal, mosquitoes typically rest indoors prior to ovipositioning. If mosquitoes don’t live longer than 10-14 days they will not live long enough to transmit the malaria parasite.

The Imergard WP advantage is that it provides a physical mode of action and is a powerful tool in resistance management.

Imergard WP can help deter cross-chemical resistance development and complement existing IRS chemistry. Since Imergard WP does not heat degrade, it can be applied to tin ceilings, potentially opening up a new large surface area for residual application.

- Application images from 2 villages, Euga & Ebuyu in the Ulanga district, Morogoro region in Tanzania.
- Imergard WP disperses rapidly in water and remains in suspension for the duration of the application window.
- There have been no reported concerns relating to application or the white residue following the completion of the field study.
SAFETY PROFILE: NO PHYSICAL, CHEMICAL, HUMAN HEALTH OR ENVIRONMENTAL HAZARDS

The active ingredient of Imergard™ WP is perlite which has been processed to release its insecticidal properties.

Since the accidental discovery of expanded perlite in 1939, it has been used in a wide range of industrial applications, including cosmetics, agriculture and horticulture, air and liquid filtration, fireproofing and insulation.

Imergard WP has demonstrated efficacy against multiple Anopheles, Aedes and Culex s.s. It has a Toxicity Class IV rating which is the lowest rating and is non-toxic to bees. Imergard WP represent no physical or chemical hazard to human health or to the environment when used as directed.

Imergard WP is WHO Class U: 'Unlikely to represent hazard in normal use'.

6 PACK TOXICOLOGY PROFILE

ACUTE ORAL, RAT
Non toxic
No clinical sign of toxicity at any time throughout the study

ACUTE DERMAL, RAT
>5050mg/Kg
No clinical signs of toxicity or signs of dermal irritation at any time throughout the study

EYE IRRITATION, RABBIT
Minimal
Toxicity category IV: No "positive" effect at 24hrs, minimally irritating effects clearing in <24hrs

SKIN IRRITATION, RABBIT
Non irritating
Toxicity category IV - no irritation observed through 72hrs

SKIN SENSITIZATION, GUINEA PIG
None
No reaction in any test subject

INHALATION TOXICITY, RAT
>0.209mg/L
No abnormalities at any time
NEW RESISTANCE MANAGEMENT

Controls susceptible and resistant strains of mosquitoes.

A physical mode of action offers a resistance management tool. The use of Imergard WP in rotation, mosaic or formulated with other IRS may be beneficial for insecticide resistance management.

LONG-LASTING & FAST ACTING IRS

Imergard™ WP can provide up to 11 months of residual efficacy across a wide range of surfaces.
- One application needed per year
- 5-year shelf life - it can be distributed to application sites months or years in advance

USER ACCEPTANCE

- Applied with standard IRS backpack sprayers
- High levels of user acceptance demonstrated in field trials - no odor, and individuals can enter the structure immediately after application
- Visual application cues allow sprayers to see where it has been sprayed
- Does not heat degrade - can be applied on metal surfaces