Looking closer, seeing further

AkzoNobel is the largest global paints and coatings company and a major producer of specialty chemicals. We supply industries and consumers worldwide with innovative products and are passionate about developing sustainable answers for our customers.

Our portfolio includes well known brands such as Dulux, Sikkens, International and Eka. Headquartered in Amsterdam, the Netherlands, we are a Global Fortune 500 company and are consistently ranked as one of the leaders in the area of sustainability.

With operations in more than 80 countries, our 55,000 people around the world are committed to excellence and delivering Tomorrow’s Answers Today™.

**Employees by business area (%)**
- Specialty Chemicals 20
- Performance Coatings 38
- Decorative Paints 39
- Other 3
- Total employees 55,590

**Specialty Chemicals**
Revenue breakdown by business unit (%)
- Functional Chemicals 36
- Industrial Chemicals 21
- Pulp and Paper Chemicals 20
- Surface Chemistry 17
- Chemicals Pakistan 6

**Performance Coatings**
Revenue breakdown by business unit (%)
- Marine and Protective Coatings 28
- Automotive and Aerospace Coatings 21
- Industrial Coatings 18
- Powder Coatings 17
- Wood Finishes and Adhesives 16

**Decorative Paints**
Revenue breakdown by business unit (%)
- Decorative Paints Europe 52
- Decorative Paints Americas 31
- Decorative Paints Asia 17

**Specialty Chemicals**
As a major producer of specialty chemicals with leadership positions in many markets, we make sure that industries worldwide are supplied with quality ingredients for life's essentials. Our products appear in a remarkable variety of items we all use every day from ice cream to asphalt, soup to soap and plastics to paper. There are more than 2,000 items in our portfolio.

**Performance Coatings**
We’re world leaders when it comes to performance coatings. Over the years we’ve earned a rock-solid reputation based on our innovative technologies, first class service and flexible distribution. Our brands include famous names such as Sikkens, International and Interpon. Performance Coatings have hundreds of uses.

**Decorative Paints**
AkzoNobel is the largest global supplier of decorative paints, with a global portfolio of strong and leading brands. Every day, our products beautify and protect residential and commercial buildings, as well as infrastructure around the globe, and promote safety and good health. They bring color to the world and furnish our homes and offices. And, importantly, they help to create a more sustainable society.

We can help solve your application challenge no matter where you are in the world. This brochure gives an overview of the full spectrum we can offer to your industry. Welcome to AkzoNobel in the mining Industry.
Chemical explosives, specifically those based on ammonium nitrate chemistry, is the primary use. These explosives can be solid, as ammonium nitrate compound, a paste in form of emulsion or mixtures thereof. Typically, the addition of Expancel in explosives range from 0.1 to 0.6 percent by weight depending on the desired density and sensitivity of the finished products and the type of Expancel used.

Expancel Microspheres create consistent uniform voids within the explosives matrix that leads to well balanced control of densities and blasting properties. These properties include: Sensitivity to detonation, strength, brisance and stability of explosives.

Pre-expanded Expancel for Emulsion Explosives
Expancel DET is a very versatile product, with extremely good chemical resistance and compatibility with ammonium nitrate based emulsions. It is available with different average particle size and a very low density of as low as 15 kg/m³. This product is widely used as a sensitizer in bulk emulsions and cartridges mainly for coal mining worldwide but also for metal mining.

Unexpanded Expancel for Ammonium Nitrate (AN) Prills
Expancel WU is used as a sensitizer in the production of AN prills. The main use of this product is found in metal mining.

Expansion Unit
Expancel offers its customers a unique production equipment for their own in-house expansion of microspheres. This results in benefits like a significant gain in economic and quality values as well as reduced emissions from transports.

Expancel is the leading provider of expandable microsphere solutions worldwide.

What is Expancel? Expancel microspheres are inert, hollow, extremely light thermoplastic microspheres, commonly known as “bubbles” or “microballoons” in the explosives industry. These microspheres are extensively used as sensitizers in industrial explosives. Coal, metal and quarry mining operations around the world rely on this AkzoNobel product.
Our Functional Chemicals business is the world’s leading producer of organic peroxides. We supply essential products used in the production and processing of thermoplastic resins, as well as thermoset and elastomeric materials. We have a long history in the mining industry. But our commitment to superior quality and innovation built into every AkzoNobel product, remains today.

The world’s leading thermoset curing systems
Our organic peroxides are used for the curing of thermoset resins, coatings and specialty monomers. We are home to the best known brands in the thermoset market, examples include Butanox®, Perkadox® and Trigonox®. In fact, thermoset resin producers the world over recognize the Butanox logo as synonymous with the highest quality methyl ethyl ketone peroxides (MEKP). We also have a whole range of auxiliary products, such as accelerators and promoters, to meet your specific production requirements.

Butanox

Chemical anchors and mine bolts
In the mining industry our curing systems find their way in chemical anchors and mine bolts. Chemical anchors and mine bolts are used to fix screws and bolts in rocks, mine walls and bridges by using a body filler. Our products are used in sausage mine bolts and glass tubes. We offer various dibenzoyl peroxide (BPO) formulations marketed under the brand names of Perkadox BM, Perkadox CH-50X and Perkadox 20S, including a range of phthalate free curing systems.

Crosslinking peroxides and metal adhesion promoters
AkzoNobel’s crosslinking peroxides are used to improve properties of EPDM and H-NBR rubber and thermoplastic based end-products. The main advantages of peroxide systems over alternative cure systems are excellent resistance against permanent deformation (set properties) and high temperature resistance.

Conveyor belts, hoses and cables
In mining applications our Perkadox and Trigonox peroxides are used in the production of heat resistance conveyor belts, high pressure hoses and rubber cables.

Metal adhesion promoter
One of the latest products we have introduced to the market is Perkabond® 55. Perkabond 55 is used to achieve optimal bonding between (zinc coated) steel cords and rubber based materials, thereby improving the durability of the final article. Perkadox 55 finds its main application in conveyor belts.
High-performance additives in froth flotation and pelletization

Depramin®

Application Area
Various types of Depramin have found general acceptance in the flotation of Potash, Pentlandite (Nickel), Copper, lead and Zinc sulfides and Precious metals (Gold, Platinum Group Metals).

Function
Froth flotation is a physico-chemical separation process based on a difference in hydrophobicity between the desired minerals and the unwanted minerals (“gangue”) like talc, serpentine, chlorite, anhydrite. Depramin products render gangue hydrophilic and improves selectivity.

Products
Depramin is the trade name for a family of watersoluble polymers especially developed for application in froth flotation. Depramin can have a low- or high molecular weight and can have dispersing or coagulating properties.

Peridur®

Application Area
Peridur is a formulation based on cellulose, capable of immobilizing water during the pelleting process giving operators the control need to affect pellet growth rates and sizing.

Function
Peridur is a non-contaminating organic binder for the agglomeration of iron ore pellets. Unlike Bentonite, Peridur contains no elements like silica or aluminum that would affect (the economics of) the steel making process. Peridur can replace Bentonite or can be used together.

Products
Peridur is the tradename for a family of watersoluble polymers especially developed for application in Iron Ore Pelletization. All Peridur grades are customized towards the process, ore characteristics and requirements of our clientele.

Product development and research
Most products are highly customized through close cooperation with customers. Experiments and tests are done at our facilities in Novara (Italy) and Arnhem (the Netherlands), joined trials at customer plants or in collaboration with highly qualified international respected institutes.

Our fundamental understanding about the interaction of Depramin and Peridur with mineral surfaces together with our intensive cooperation with customers and our colleagues from other AkzoNobel business units, is our key to success.

Performance Additives is a sub-Business Unit of Functional Chemicals. Our mining products Depramin and Peridur represent a full range of high-performance Carboxy Methyl Cellulose (CMC) grades already since the 70’s. It meets the demands of various applications in froth flotation and agglomeration of fines. The main raw material for Depramin and Peridur is Cellulose, a natural polysaccharide from renewable sources as Cotton and Wood.
Optimized flotation collectors

We are at the forefront of the advanced colloid and surface chemistry upon which successful flotation depends. This has been achieved by over 40 years of research and development in molecular and surface chemistry, along with feedback from the field.

Our strengths – optimized solutions
The strength of our chemistry and process know-how lies in the fact that we customize solutions to fit each individual ore. And since the ore varies in composition, we must vary the process and adapt it to each individual case. These products cannot be found in a catalogue, they must be tailor-made in close cooperation with the customer.

There are other ores that would not, at present, benefit from a special flotation agent. Instead, the task is to find a standard flotation agent with the performance characteristics best suited to the ore in question.

Tailor-made or standard collectors – we approach each assignment individually assuming more the role of the customer’s partner than that of a traditional supplier.

For a sustainable future
Our focus is not only to provide highly efficient flotation reagents: it is equally important to focus on a sustainable future. We want and are able to support you with knowledge on the behavior and impact of our collector chemistry in your environment. We achieve this by performing a thorough risk assessment. We are also able to support you in other regulatory affairs. We are backed up by an experienced staff of toxicologists, a worldclass analytical department and last but not least, the experience of our team.

A wide range of applications
Successful flotation requires optimum interaction of all the components in the flotation process. The main role in this process is usually played by collectors. Collectors must, therefore, meet very high performance requirements. Ideally, collectors should be:

• Strong enough to enhance recovery but weak enough to enhance selectivity.
• Able to provide a high rate of flotation and good froth.
• Non-sensitive to variations in the composition of the ore and the quality of the water.
• Designed to meet environmental requirements.
• Easy to ship, store and handle.
• Cost effective.

We can help improve your enrichment rates if you work with any of the following minerals:
Apatite/phosphate Barite Calcite Dephosphorization Dolomite Feldspar Graphite Iron ore Kyanite Magnesite Monazite Potash Pyrochlore Quartz Scheelite Silica Wollastonite Zinc oxides

Our products
Our flotation collectors are recognized under the following trade names; Armeen®, Armoflote®, Atrac®, Berol®, Ethomeen® and Lilaflot®

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NaSH, the efficient copper depressor and sulphidizing agent

Sulphur Derivates has three manufacturing sites, located in San Lorenzo (Argentina), LeMoyne (USA), and Cologne (Germany). All three sites, produce Sodium Hydrosulphide (NaSH), a widely used copper depressor and ores sulphidizing agent.

**NaSH as copper depressor**
The product is used to separate copper from an ores concentrate stream, by depressing it, making use of NaSH’s strong potential to generate H₂S in an acid media. A typical example of this application is the case of Molybdenum Plants, where the molybdenum present in a copper collective concentrate is separated in flotation cells where simultaneous mechanisms of molybdenum flotation and copper depression take place. Other example is the separation of copper traces from Nickel concentrates. In the end, wherever it is necessary to separate copper by depression in flotation cells, NaSH is the most effective reagent to do the job.

**NaSH as sulphidizing agent**
The NaSH makes sulphides out of oxide ores. In a flotation process to concentrate sulphide ores where a suitable content of oxides also is present; it is possible to use NaSH to sulphidize the oxides, increasing the ore extraction yield up to 3%, and sometimes even more. In copper mining, the NaSH can be added mainly in two process points: in the entrance to the wenco (pre-rougher) and in the cleaning.
International® Marine and Protective Coatings

Renowned worldwide for our innovative products, high-tech quality and on-the-spot service, we are ideally placed to support your plant and project requirements anywhere in the world.

AkzoNobel’s International Marine and Protective Coatings business unit provides a complete range of products to protect your assets at each stage of the mining process, from extraction and material handling to processing, smelting and transportation. With a proud history stretching back to 1881, operations in 60 countries and over 5,500 employees, we deliver proven, value for money, environmentally responsible solutions to satisfy your needs, allowing you to maximise your return on investment.

International Marine Coatings

Our industry leading marine coatings include products specifically developed to protect drybulk carrier vessels, used to transport the commodities extracted from global mining locations.

As your partner in the shipyard, International Paint, via our highly qualified and experienced technical service team, is on hand to help worldwide, ensuring your vessel is in safe hands at newbuilding and maintenance and repair.

Protecting vessel integrity

Formulated to provide the optimum balance of abrasion resistance and corrosion prevention, our coatings are designed to protect all areas of the vessel, including the cargo holds – the revenue earning spaces and the areas subject to the harshest operating environments. Our specialist cargo hold coatings protect the vessel’s hold structure from the various forms of impact, abrasion and mechanical damage which occur in the loading and carriage of aggressive mined cargoes.

Abrasion resistance solutions

Comprising our Intershield®, Intergard® and Interbond® brands, our range includes options to meet all owner/operator requirements, helping to maintain your vessels’ continued profitability and safe operation.

Maintaining vessel efficiency

Fouling control coatings are applied to a vessel’s underwater hull to keep it smooth and clear of fouling. As a result, fuel consumption and CO₂ emissions are reduced, meaning lower operational costs and enhanced efficiency.

In addition, fouling control coatings minimise the potential for translocation of invasive marine species, an issue which is climbing the agenda of regulatory bodies such as the International Maritime Organisation.

Fouling control solutions

Intersleek® is our ‘non stick’ foul release brand and Intersmooth®SPC, Interswift® and Interspeed® are our antifouling products. The range is designed to meet our customers’ varying performance expectations.
The harsh, aggressive conditions inherent in the mining industry place high demands on the expensive equipment and structures used. That’s why our tough, durable coatings are developed to withstand the damage that results from transporting and processing corrosive, abrasive materials from location to location within the mining facility and shipping them to the global market.

**International Protective Coatings**

You will find International Protective Coatings’ products used in processing plants, smelters and refineries all over the world. Our extensive track record includes asset protection across a extensive range of metals and minerals including copper, coal, gold, aluminium, zinc and iron ore.

**Aggressive microenvironments**

Each plant operation has its own unique microenvironment, incorporating a range of variables such as climate, moisture, abrasion and the chemical environment.

- Structural steel and concrete
- Process tanks and vessels
- Locomotives and wagons
- Shiploading facilities
- Mining equipment
- Solvent extraction
- Thickener tanks
- Wash plants
- Refineries
- Wharfs
- Flotation cells
- Smelters
- Crushing
- Electrowinning

**Planned maintenance and Interplan®**

Planned maintenance can provide real cost benefits in terms of increased productivity, reduced downtime and minimal schedule disruption.

Our Interplan system is aimed at improving structural integrity and reinforces the safety element associated with the use of high performance coatings. This allows the owner to move from ‘reactive’ to ‘predictive’ maintenance.

**Linings solutions – the complete package**

We offer linings solutions for a diverse range of environments, providing chemical, corrosion, high heat, abrasion and impact resistance to steel and concrete.

Our highly durable Interline®, Interzone®, Enviroline® and Ceilcote® product ranges deliver a complete concrete and steel package to protect new and existing assets against a huge range of chemicals from sulphuric and phosphoric acids to sodium hydroxides, sodium cyanides and ammonium chlorides.

The addition of Ceilcote and Enviroline market leading technologies significantly extended our ability to protect concrete, which is often subjected to very aggressive chemical environments.

**Design life**

We protect the high value assets required for processing metals and minerals against the harsh, corrosive mining environment. Our new construction coatings specification will be tailored to your individual project needs. Getting the coating system right early in the design stage can optimise the design life and significantly increase the time to first major maintenance.

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Delivering tomorrow’s answers today

Often people achieve only incremental progress, because their view of tomorrow is determined by what they see today.

We’re committed to reducing our impact on the planet and delivering more sustainable products and solutions to our customers. But we can only do this if sustainability is at the heart of everything we do. That’s why we’ve integrated sustainability into every area of our business – for the benefit of our clients, shareholders, employees and the world around us.

AkzoNobel is committed to sustainability at all levels. This is also incorporated in our sustainability framework, which has three levels: Invent, Manage and Improve. Each includes environmental, economic and social aspects, which together map out the journey towards sustainability.

Invent:
Integrate sustainable value propositions
As we move forward, we are identifying and managing those issues which provide long-term opportunities for our businesses.

Manage:
Include sustainability in all aspects of the value chain
Based on the foundations of compliance and license to operate, we are now integrating sustainability into all areas of the value chain, from market research through to sales and marketing.

Improve:
Continue to comply and ensure our license to operate
Our management processes include directives and standards, management systems, improvement objectives, training and auditing. They are underpinned by AkzoNobel’s risk management process, which integrates environmental, social and governance issues.

Measure
In order to measure our performance as a leader in sustainability we use the SAM (Sustainability Asset Management) benchmark. This offers us an objective view on the areas in which we perform well or where there is room for improvement, as well as a comparison with the performance of our peers.
Our sustainability ambitions

- Top quartile safety performance
- Top three position in sustainability
- Top quartile performance in diversity, employee engagement and talent development
- Top quartile eco-efficiency improvement rate
AkzoNobel is the largest global paints and coatings company and a major producer of specialty chemicals. We supply industries and consumers worldwide with innovative products and are passionate about developing sustainable answers for our customers. Our portfolio includes well known brands such as Dulux, Sikkens, International and Eka. Headquartered in Amsterdam, the Netherlands, we are a Global Fortune 500 company and are consistently ranked as one of the leaders in the area of sustainability. With operations in more than 80 countries, our 55,000 people around the world are committed to excellence and delivering Tomorrow’s Answers Today™.

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