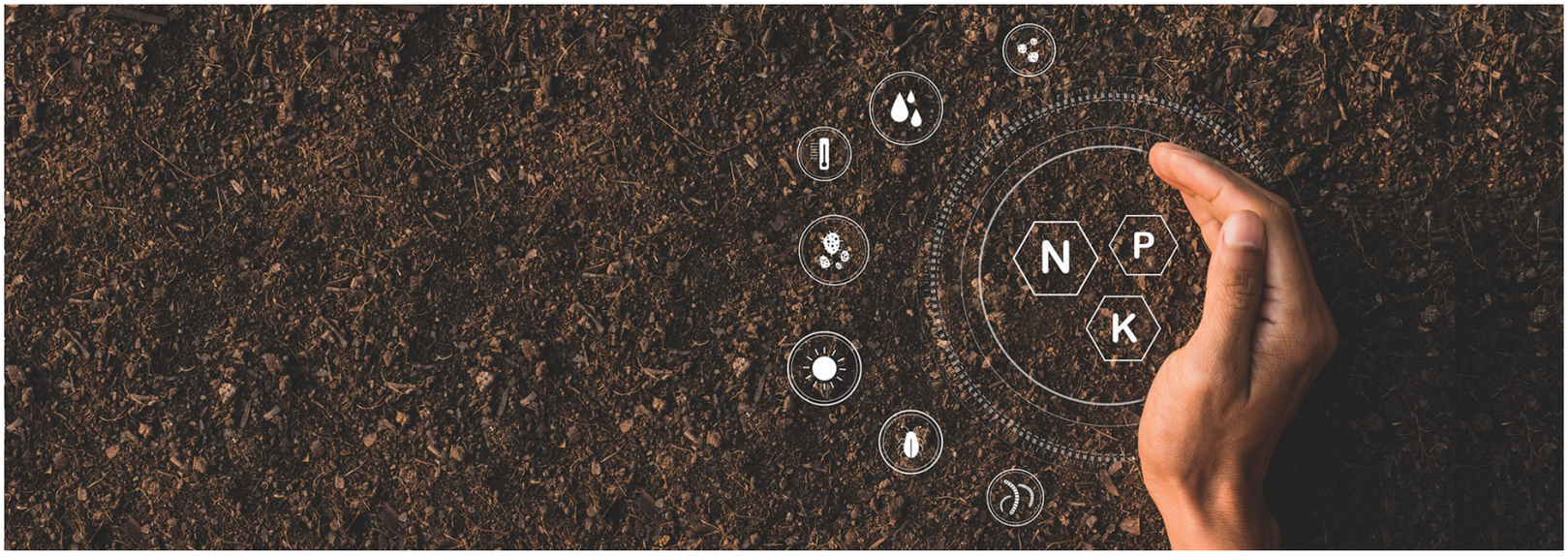
SIBUR for Clients
ISSUE № 17



COMPETITION BETWEEN TECHNOLOGIES

How can we “teach” traditional plastic to decompose quickly under natural conditions, why can’t packaging made of compostable, plant-based polymers conquer the world, and how can we protect nature from waste generated by human activity? Technical Director of International Plastic Guide Eduard Zamyslov, PhD, Chemistry, shared his views on polymers recycling.

Packaging, tableware and other products made of plastic using International Plastic Guide’s solutions regularly face a barrage of criticism. Nevertheless, your company itself raises the issue of environmental pollution. Don’t you see any conflict here?

The pollution problem is real and must be addressed – this issue resonates with all sensible people, regardless of their walk of life. While business is often accused of indifference, this is not the case, as plastics producers invest in making their products as eco-friendly as possible. After all, the future of business hinges on it, and hardly anyone in the industry is happy about the negative environmental impact assessments received by plastic waste. In fact, polymers have no alternative because of their combination of unrivalled properties.

EDUARD ZAMYSLOV

Technical Director of International Plastic Guide

International Plastic Guide produces functional additives and compounds that modify polymer properties, and the biodegradation of plastics is one of our business focus areas. Traditional polyethylene and polypropylene are bulk polymers. They have the properties required, for example, for the manufacture of packaging and containers: they are highly heat-resistant, recyclable, resilient, durable, inert, modifiable, etc. Today, biodegradable (compostable) plant-based polymers cannot compete against them either on price or

properties. Therefore, making traditional polyethylene and polypropylene biodegradable with controlled biodegradation is an exciting and promising undertaking.

And why make plastics biodegradable when we have recycling?

Plastics recycling is economically attractive and viable, but its potential is also limited.

For example, today we see demand for multilayer films. Since multiple polymers are used as feedstocks in their production, they keep food products fresher for longer, protecting them fr om bacteria and sunlight and allowing them to be transported over longer distances. Despite these benefits, the complex composition of these films makes recycling them a challenge. And this is wh ere our solutions can help.

They are highly relevant for flexible packaging, disposable tableware and films.

Your company was one of the first to start supplying the domestic market with imported oxo-biodegradable additives for polymer packaging. Why do you think their use is an effective way to address the plastic waste problem?

Oxo-biodegradation technology was developed in 1992 by Canada's Somers Environmental Products Inc. (EPI). In our opinion, this is the most fitting solution for bulk polymers. Plastics containing these additives decompose within one or two years. First, the material oxidises, breaking down into low molecular weight fractions. This process takes more or less a year. This is followed by microbial biodegradation and the conversion of polymers into CO2, water and biomass.

THE CHEMISTRY OF MODIFIERS USED IN THE BIODEGRADATION OF PLASTICS IS SIMPLE. THESE ARE IN EFFECT METAL SALTS THAT WORK AS CATALYSTS FOR POLYMER OXIDATION

Is this process safe for consumers?

The chemistry of modifiers used in the biodegradation of plastics is simple. These are in effect metal salts that work as catalysts for polymer oxidation. If used in concentrations lower than the maximum permissible levels, they are safe for humans. This polymer modification technology is simple and does not require special equipment. The only challenge is developing the ideal formulation. In order for a plastic bag, for example, to remain functional for 12 or 18 months, it is important to think ahead of its decomposition parameters. Otherwise, there is a risk of the material losing its consumer properties too early. Biodegradability needs to be controllable and predictable.

How costly is this solution, and do you have any competition in the Russian market?

The price of, say, biodegradable films is 10% to 15% higher than that of similar products. Whether it's costly or not – that's up to the consumer.

We are not the only ones in the market, there are similar technologies out there. I won't speak ill of competitors, but our offer is interesting because it is supported by a vast body of research and proven results. We have a wealth of statistical evidence on materials and decomposition conditions behind us, there are laboratories working on our formulations, and there are even cases of the oxo-biodegradation technology being used on the national level in some countries. In Saudi Arabia and the United Arab Emirates, for example, the use of such additives is mandatory. Demand is strong for modifiers in Mexico, Canada, the USA and other countries.

Europe has a range of recycling technology solutions. Photo: a waste incineration plant in Oberhausen, Germany.

The market in Russia is not very big yet. I estimate its size at approximately one thousand tonnes per year of flexible packaging containing oxo-biodegradable additives, but it has been growing from year to year.

How is oxo-biodegradation technology regulated in Russia?

Oxo-biodegradation is relevant and popular in Russia, but there remains untapped potential. The key challenge is building trust. We are constantly being asked whether the technology really works, whether it is true that the plastic can decompose so quickly, etc.

Russia has two relevant GOST standards, which we initiated back in 2016 and 2017. The first standard (GOST 33747-2016) is an introductory one. It provides definitions: what oxo-biodegradation is and how it can be used. The second standard (GOST 34281-2017) discusses the methods used to assess the biodegradation of polymer films. Both documents are interstate standards, applied not only in Russia but also in Kazakhstan and Belarus. The safety credentials of our technology have been confirmed by numerous studies and standards adopted in the UK, the United States and the EU. However, people have their doubts, and this is normal.

You mentioned compostable bioplastics. Is it a rival technology, or does the future lie in using an integrated approach to packaging production and disposal?

So far, no universal solution is available in the market. Each technology has its pros and cons. The same compostable bioplastics will only degrade if certain conditions are in place: temperatures of plus 60 to 70 degrees Celsius, the presence of water, etc. If a package made of such plastic is simply thrown away, it will take just as long to decompose as a container made of regular plastic.

IT IS NOT CLEAR YET WHICH PATH RUSSIA WILL TAKE, AS SEVERAL TECHNOLOGY SOLUTIONS ARE BEING TESTED SIMULTANEOUSLY IN THE COUNTRY

Europe has embraced compostable polymers because it has a mature separate waste collection system, the required technologies,

It is not clear yet which path Russia will take, as several technology solutions are being tested simultaneously in the country. For example, there are three pilot composting plants outside St Petersburg. They are exploring this technology and its suitability for our context. According to our data, the results are still questionable thus far. The compost the companies get cannot yet be used in agriculture.

There are projects to deploy waste incineration plants, and then there are our and similar technologies. At this point in time, I wouldn't dare to predict which solution will eventually dominate the market.

How do you think plastics recycling technologies will develop?

Hard to answer. Today we can see that the development direction is horizontal: recycling, composting, modification. I think the next step would be the development of polymers with new properties that preserve the consumer properties of plastics, but will be "pre-programmed" from the outset to decompose quickly and safely in the environment. Many companies are now investing into research in both recycling and the development of polymers with programmable properties. This means that new solutions will soon be available.