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BROCHURE

INKJET INKS

IONSOL PRODUCT SERIES

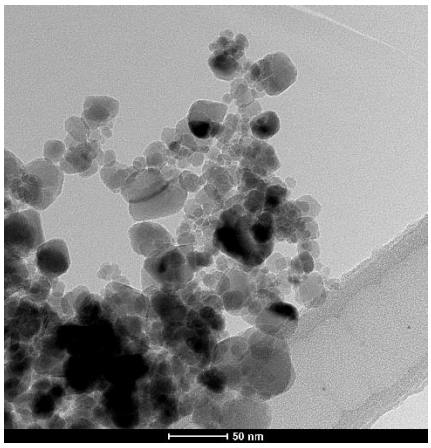
BLACK IRON OXIDE AS A SUBSTITUTE FOR CARBON BLACK

A common black dye for inkjet inks is carbon black, which is an elemental carbon in colloidal form. It is most often sold as a fine powder or as a dispersion in solution with an addition of a surfactant.

By developing the technology of iron (II, III) oxide nanoparticles production, Wion Technology made it possible to replace a classic K pigment, which is carbon black, opening new paths for improving an inkjet printing technique:

1. High opacity power

Wion Technology obtains iron (II, III) oxide through a chemical reaction in an aqueous system. Contrary to a carbon black, which is obtained in the form of a dry micro-powder, iron oxide is obtained in **nano size**, which translates into much better surface coverage.



Our smallest particles reach a size of **8 nm**.

2. Perfect application

Iron (II, III) oxide nanoparticles are susceptible to covering their surface with surfactants, adjusting their properties in accordance with their intended use. The nature of this coating can be anionic, cationic or amphoteric. Such functionalized iron (II, III) oxide particles make them compatible with **water-based resins**. Wion Technology with IONSOL products provides highly concentrated solutions of iron (II, III) oxide nanoparticles ready for direct use in aqueous systems.

Thanks to the use of dispersants, the nanoparticles were coated with a properly selected polymer so that they did not lose their **black colour**, and at the same time did not agglomerate and were easily dispersed when added to a base.

IONSOL products are compatible with **water-borne resins.**

3. Reduction of the carbon footprint and greenhouse gases

A production of carbon black requires a very large amount of energy - it is done by incomplete combustion of gaseous (natural gas) or liquid fuels in specially prepared furnaces. As a result, the total production of carbon black is affected by greenhouse gas emissions such as CO and CO_2, and due to the enormous demand for carbon black, which reached over **10 million tonnes** worldwide in 2012, the problem is reflected in the overall carbon footprint.

A subsequent combustion of carbon containing products (tires, paper) again contributes to release of dangerous gases in accordance with the reactions:

$$C + \frac{1}{2}O_2 \rightarrow CO \qquad C + O_2 \rightarrow CO_2$$

resulting in their re-release into the atmosphere.

Iron (II, III) oxide produced by Wion Technology does not carry the same risks as carbon black. The reaction of obtaining iron oxides is not a harmful and energetically demanding process. Our production technology for this compound is based on a sequence of chemical reactions, obtaining a high-purity product.

The change of carbon black to iron oxide (II, III) is justified not only in technical but also **environmental issues.**

4. Economic factor

Carbon black gained popularity not only because of its colour and opacity power, but also because it was a cheap product to produce. The history of carbon black began in the 1950s, where combustion furnace technology dominated in industrial districts and fuel was common and readily available.

However, a situation is changing with a departure of mankind from environmentally harmful techniques, as well as the consumption of natural gas or hydrocarbon fuels, which are necessary in a production of carbon black.

Environmental regulations and regulations will put more and more pressure on carbon black producers to reduce their carbon footprint, which will ultimately translate into its price.

There is also the political factor in which fuels are an object used to exert a global influence on countries that do not have such resources. All these things do not place carbon black in an established position, and it can be assumed that the price of carbon black will increase with the increase in the operating costs of extracting these fuels.

The use of iron (II, III) oxide will ensure the **safety and stability** of production.

5. Occupational health and safety

Regular contact with a carbon black and similar bulk materials may reduce lung capacity in the long term. The health and safety rules must be strictly adhered to, especially in terms of respiratory protection.

The use of an **aqueous solution** of iron oxide nanoparticles in a workplace does not pose a risk of exposure of a worker to dusty materials. Moreover, it is classified as a non-toxic and non-allergenic material. Therefore, it has also been used in a cosmetics industry.

Dusty materials have characteristics of **explosive** materials, and carbon black additionally creates a **fire hazard**. Iron (II, III) oxide does not support combustion, but can only be oxidized to other forms of this compound.

Iron (II, III) oxide is a guarantee of **safe work.**

ADDITIONALY WE OFFER

- Free samples for tests and reserach
- Matching product parameters
- Material analysis

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