

# OPS

## Basic information

What it is: Iron nanoparticles encapsulated in a carbon matrix, called OPS

## The origin

Spain is currently the world's largest producer of olive oil, generating large quantities of alpechín and alperujo, a polluting organic residue.

OPS are produced from the recovery of waste from the olive sector, specifically vegetable water, using hydrothermal carbonization (HTC) techniques.

## Applications

### BIOGAS

IMPROVEMENT OF ANAEROBIC DIGESTION PROCESSES (BIOGAS)

### WATER TREATMENT

REMOVAL OF METALS IN POLLUTED WATER

DISPOSAL OF PESTICIDES AND PHARMACEUTICAL COMPOUNDS

REMOVAL OF SULFUR COMPOUNDS

### TREATMENT OF GAS STREAMS

CLEANING OF VARIOUS ORGANOCHLORINE AND SULFUR COMPOUNDS

### AGRONOMIC PRODUCTS

IMPROVEMENT OF FERTILIZERS

BIOREMEDIANT

BIOESTIMULAND

### NEW MATERIALS

ADDITIONATION IN THE MANUFACTURE OF CONSTRUCTION MATERIALS AND CERAMICS

TEXTILE FIBERS

MANUFACTURE OF ELECTRODES FOR FUEL CELLS APPLICABLE IN THE GENERATION OF HYDROGEN.

## IRON NANOPARTICLES ENCAPSULATED IN CARBON

### Characteristics

OPS contain on average 2.5% zero valent iron (ZVI), 44.5% total iron and 55.5% carbon. OPS are magnetic and have a mean size of 150 nm, a surface area of 14.7 m<sup>2</sup>/g, an external surface area of 3.864 m<sup>2</sup>/g, an internal surface area of 11 m<sup>2</sup>/g, a micropore volume of 0.004 cc/g and a total pore volume of 0.0696 cc/g.

If an activation process is applied to them, these values can be improved, such as obtaining a surface area of 190 m<sup>2</sup>/g and 10% ZVI.

Ecological and sustainable product, within the framework of the circular economy.

## OPS laboratory metrics

### IMPROVEMENT OF BIOGAS PRODUCTION

- 20% improvement in methane (CH<sub>4</sub>) production.
- Elimination of hydrogen sulfide gas up to 99%.
- 24% increase in the degradation of phytotoxic compounds such as polyphenols.
- Digestate with higher iron and sulfur content (essential nutrients for plants).
- Greater stability of the biogas production process.

### ELIMINATION OF CONTAMINANTS IN WATER

Yield and rate of removal of metals in water

COMPOUND	mg removed/g	mg removed/(g h) after 24h	mg removed/(g h) after 165h
Cd	1,81	0,076	0,011
Cr	4,02	0,152	0,024
Cu	3,99	0,144	0,024
Ni	1,38	0,038	0,008
Zn	1,55	0,057	0,009
LINDANE (HCH) in agitated soils Dose of 50 mg/g soil	51,0	2,13	—

**Non-toxic product that meets circular economy and sustainability requirements.**