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Technique Of Decomposing Organic Substances By Water Plasma

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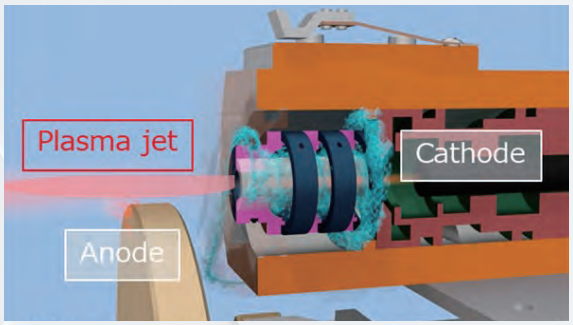
Water Plasma Treatment for organic substances

Water Plasma decompses organic compunds using O and OH radicals

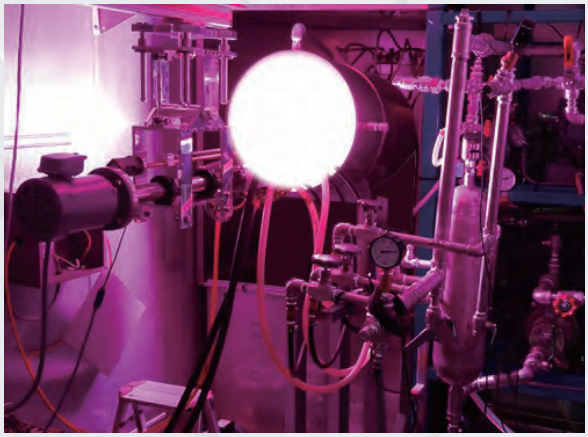
When water passes through electrodes (anode and cathode), the water heats up to 20,000 ℃, the water molecules become ionized and water plasma is generated. The thermal water plasma contains high amounts of O and OH radicals that decomposes organic compounds.



Water plasma generating diagram

This technology is not an incinerator nor a melting furnace

IT'S JUST DECOMPOSITION



Hydrous pyrolysis contains high oxidizing O and OH radicals at 20, 000 degrees Celsius, these radicals decompose organic compounds quickly.

Using only water minimizes unwanted by-products.

The cost of using water is significantly cheaper than existing methods, like Argon gas and diesel.

The machine is simple to operate and maintain.

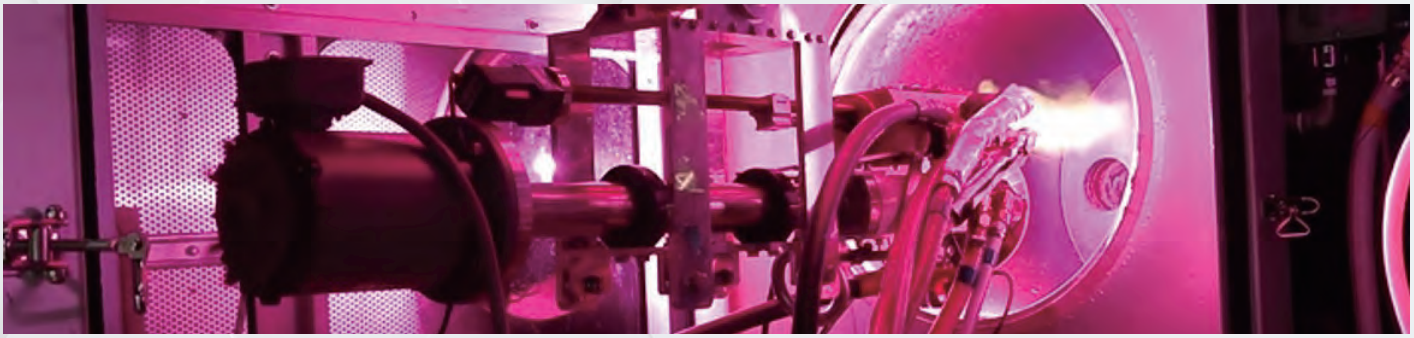
he portability of this technology allows for on-site treatment of organic compounds that are prohibited to move.

This device can be turned on and off instantly by a switch, there is no cool down process.

These radicals suppress the generation of hazardous by-products.

Depending on what substance is being decomposed, common by-products are H_2, CO, and CO_2 gas

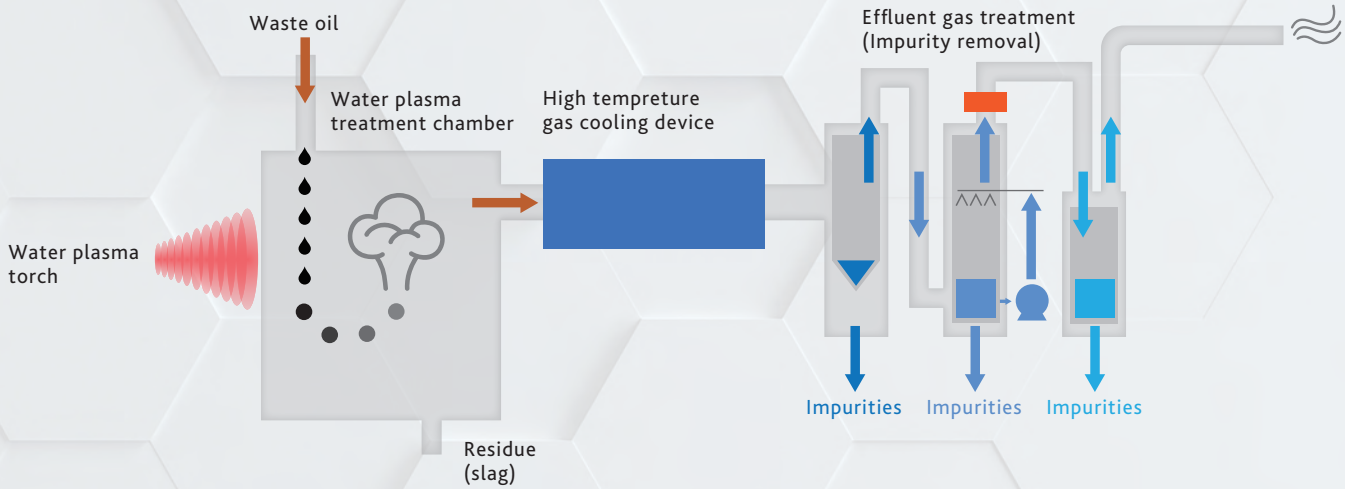
Effluent gas contains H_2, which may be used as a source of energy.



Examples of substances that can be treated with the water plasma device

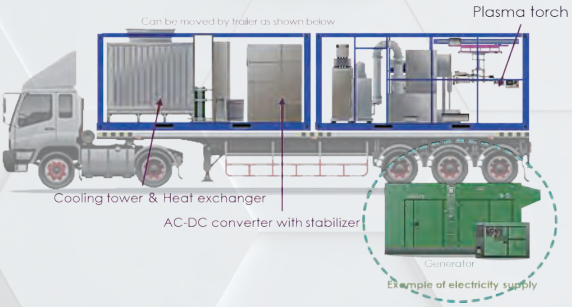
	Material	State	Problems in normal processing	Background	Predicted residue	Characteristic
Organic substances	Chlorofluorocarbon (CFC)	Gas	Stable and cannot be destroyed by combustion	Large quantities of CFC is used in refrigerants and solvents	CO_2 H_2 HCL HF	Compound containing a large amount of carbon, hydrogen and halogen
	Polychlorinated Biphenyls (PCB)	Liquid	Movement and storage are restricted by law. Permission is required for destruction	Commonly outlawed due to carcinogenic properties	CO_2 H_2 HCL	Oily synthetic compound
	Hydraulic oil	Liquid	During combustion, large amounts of smoke cloggs filters quickly	Widely used as hydraulic fluid in turbines in power plants	CO_2 H_2 P_4O_{10}	Oily synthetic compound
Inorganic substances	Asbestos	Solid	Expensive process and in most cases, asbestos is melted in a furnace or chemically treated and both require additional detoxification	Highly carcinogenic, highly regulated by laws	Slag, then reuse for cement, etc	Asbestos before treatment is in a Crystallized form; residue becomes spherical and harmless

Ex: Conceptual diagram of waste oil treatment



Water plasma generation → Substance decomposition (organic waste) → Suppression of hazardous substance recombination → Post-treatment of effluent gas,etc. (Recovery of gas / solid) → Release gases according to emission standards

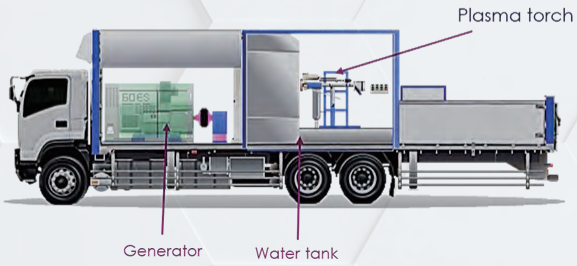
Container-Type Water Plasma Device



Container type can be quickly transported and permanently installed into an existing facility, such as a nuclear power plant.

In-vehicle Water Plasma Device

This mobile truck can be used to treat organic material during an emergency or during a temporary situation.



Model 200 standard vehicle type

Model 177 short-term use vehicle type

	Model 200 standard vehicle type	Model 177 short-term use vehicle type
Product size	(L) 11,970mm x (W) 2,490mm x (H) 3,730mm Weight 21,500kg (Front-front axle 7,380kg Front-rear axle – kg) (Rear-front axle 7,320kg Rear-rear axle 6,800kg)	(L) 11,830mm x (W) 2,490mm x (H) 3,790mm Weight 18,000kg (Front-front axle 7,780kg Front-rear axle – kg) (Rear-front axle 5,310kg Rear-rear axle 4,910kg)
DC generator output	200kW	177kW
AC generator output	60kVA	50kVA
Water Requirements	Requires a 5,000 L external tank	Internal 1,200 L water tank installed
Product capacity	Biphenyl ethanol solution: 400ml / min (24 L / hr)	Biphenyl ethanol solution: about 400ml / min (24 L / hr)
Diesel cost per hour	Approximately 34 Euro / 32 L diesel	Approximately 34 Euro / 32 L diesel