



**Jacobi**  
THE CARBON COMPANY

# Activated Carbon for Flue Gas Treatment



# Flue gas processes

Thermal processes are increasingly used to recover usable products energy from waste materials. These can include disposal of industrial chemicals and effluent; domestic residues, scrap metals or even clinical wastes. Whenever, burning occurs, some of the toxins released will be contained in the combustion gas and these must be removed before emitting them to the atmosphere. Alongside complementary technologies, activated carbons are used to clean the flue gas, ensuring compliance with stringent emissions standards.

## **What is activated carbon?**

Activated carbons are highly refined naturally-occurring substances that exhibit unique properties. Following high temperature treatment the naturally-occurring substances exhibit a diverse range of pore dimensions, suitable for the adsorption of organic and compounds. This means the product is extremely versatile in the adsorption of a wide range of chemical compounds of differing mass and size.

## **What is the challenge?**

In combustion gases, the main organic residues are halogenated compounds known collectively as dioxins and furans. These compounds are present in very small concentrations but are highly toxic.

In addition, the combustion of some products releases mercury (Hg) and activated carbon and other products from Jacobi Carbons are able to effectively remove this from high temperature flue gas streams.





**EcoSorb™ activated carbons are used in powder form to efficiently remove dioxins, furans and mercury in high temperature flue gas treatment systems.**



**The presence of mercury in the environments is increasing in profile daily, with the UN demanding tighter control on its use in a variety of products. Using established activated carbon and innovative liquid reagents, Jacobi is providing the solution to this concern.**

## Product Range

Jacobi Carbons manufacture the EcoSorb™ range of activated carbons from a variety of raw materials according to the application. Utilising traditional sources of carbon like coal and wood, and combining them with newer materials such as lignite and coconut shell, we are able to produce the ideal product for the application.

<b>Product</b>	<b>Description</b>	<b>Application</b>
EcoSorb™ SP23	Coconut shell based powder	Dioxin and furan removal - high capacity
EcoSorb™ SP21	Coconut shell based powder	Dioxin and furan removal
EcoSorb™ BP2	Coal based powder	Dioxin, furan and Hg removal - high capacity
EcoSorb™ BP4	Coal based powder	Dioxin, furan and Hg removal
EcoSorb™ XP17	Blended product	Dioxin and furan removal - premium blend
EcoSorb™ XP15	Blended product	Dioxin and furan removal - standard blend
EcoSorb™ XP13	Blended product	Dioxin and furan removal - economy blend
AddSorb™ VQN	Impregnated product	Combined elemental and ionic Hg removal

THIS INFORMATION IS INTENDED AS A GUIDE ONLY AND FULL SPECIFICATION OF GRADES SHOULD BE TAKEN IN CONJUNCTION WITH YOUR LOCAL JACOBI CARBONS REPRESENTATIVE



Jacobi Carbons operate modern, state-of-the-art manufacturing facilities across the world providing high quality activated carbon products. This diverse manufacturing base provides surety of supply and an integrate quality management system guarantees consistent product from each location.



# Mercury Removal

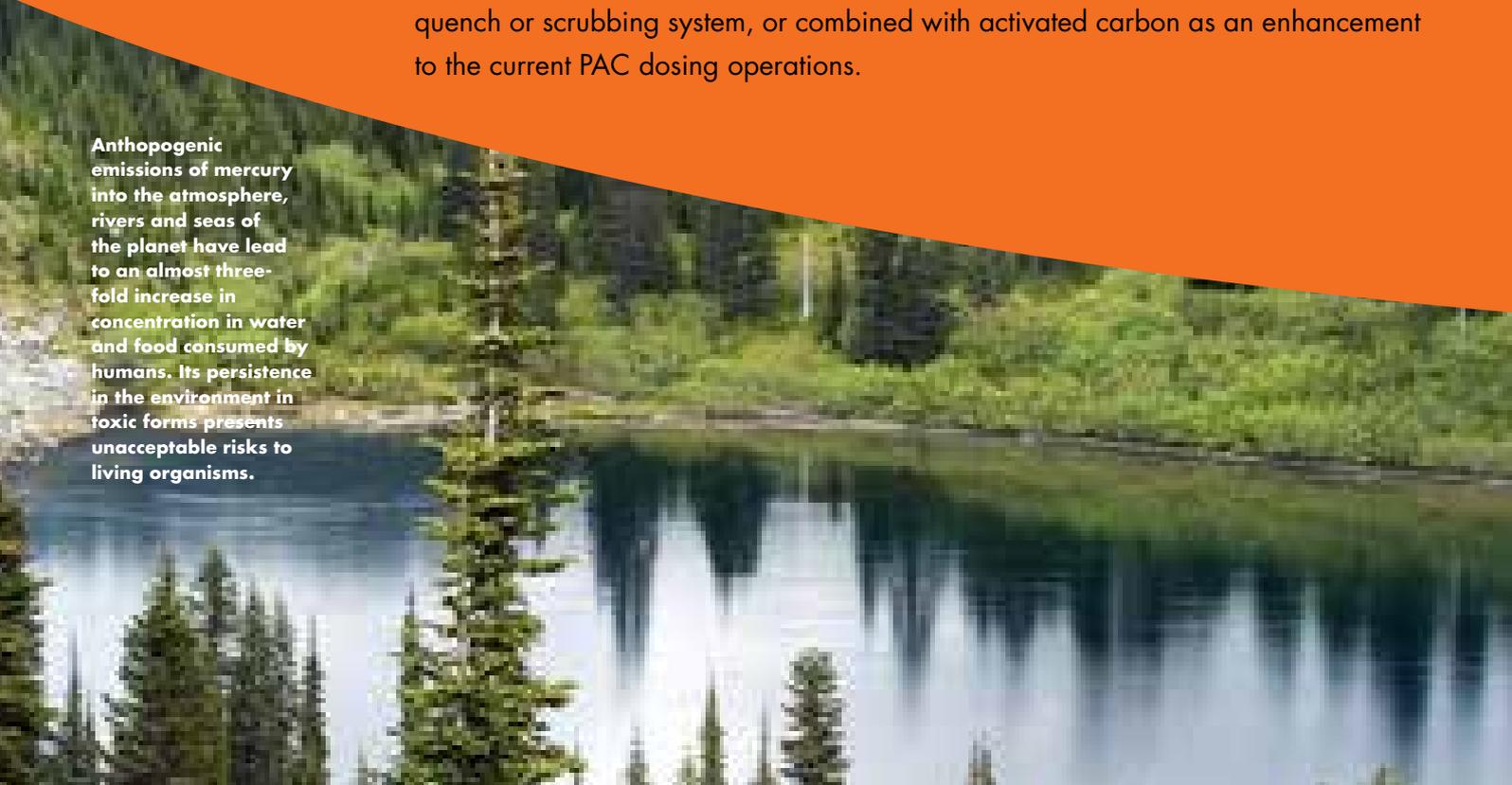
## Risks and solutions

Mercury has two distinct forms present in flue gas emissions:

Ionic form - Readily forms compounds with both halogens and organics which have a direct impact on the level of absorption by humans resulting in a high risk to human health.

Elemental form - Relatively stable but exhibits a high vapour pressure resulting in Hg vapour which can be easily inhaled and results in damage to synapse formation in the brain.

Although activated carbons are effective in the removal of elemental mercury, the control of ionic mercury has proved more problematic. Jacobi Carbons has developed a unique chemical formulation that can be used both directly in the existing flue gas quench or scrubbing system, or combined with activated carbon as an enhancement to the current PAC dosing operations.



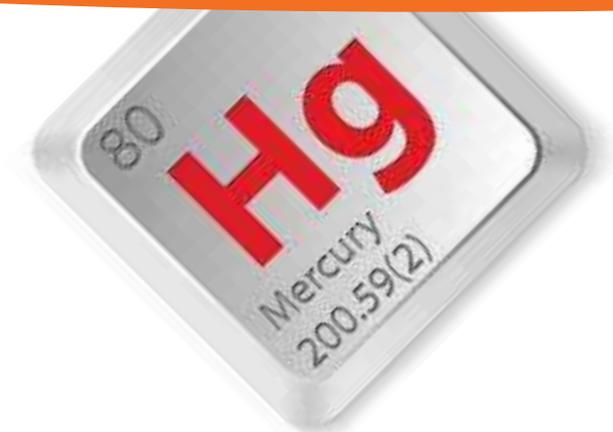
**Anthropogenic emissions of mercury into the atmosphere, rivers and seas of the planet have led to an almost three-fold increase in concentration in water and food consumed by humans. Its persistence in the environment in toxic forms presents unacceptable risks to living organisms.**



## EcoSorb™ QS-Advanta

EcoSorb™ QS-Advanta is supplied as a liquid reagent that can be dosed directly to the wet scrubbing tower, quench system or injected as an aerosol to the flue gas itself. Reacting with both elemental and ionic forms of mercury simultaneously, this unique product effectively binds mercury as an insoluble sulphide, that is easy to separate and of low hazard classification.

Using EcoSorb™ QS Advanta causes precipitation and oxidation of Hg. This is based on the reaction of Sodium-polythionates with ionic mercury [Hg (II)] and elemental [Hg (0)]. The released thiosulfate can react with the available Hg (II) to HgS and liberating  $\text{SO}_3$ . One molecule can stoichiometrically bind 2Hg (II) and at least one Hg (0) into the final HgS product.

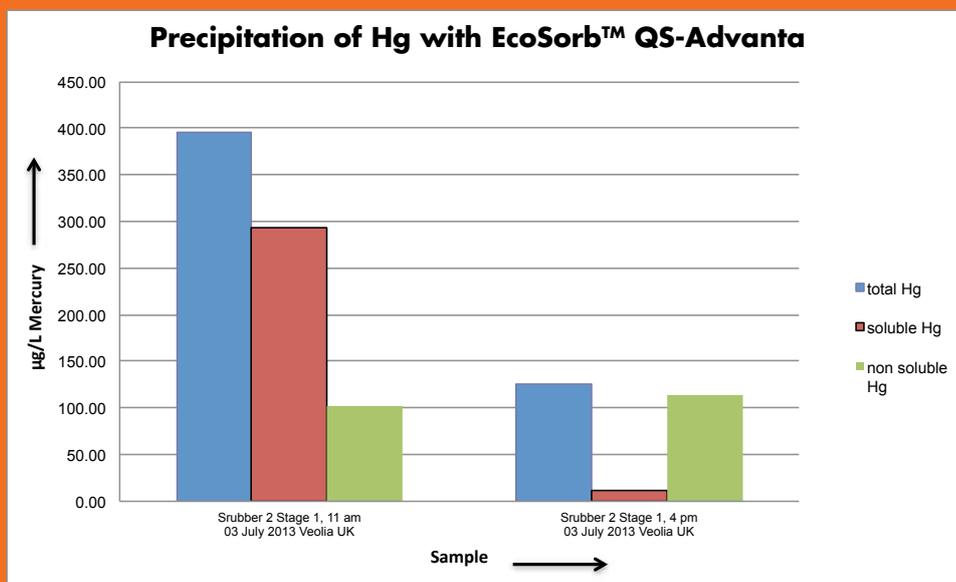


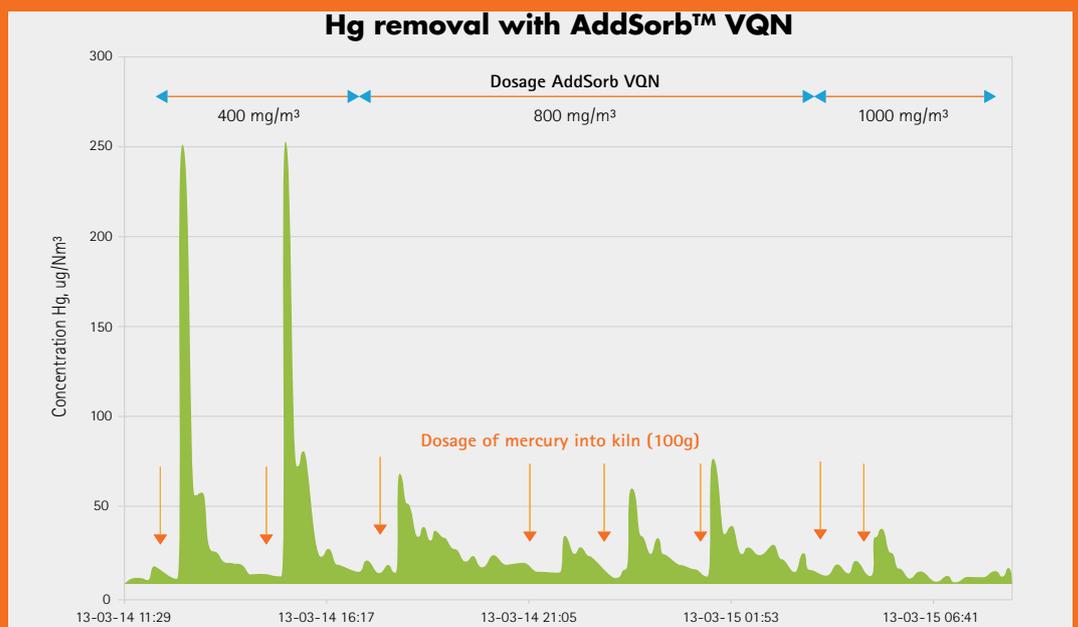
Activated carbon is normally utilised in two very different processes, depending on the nature of the application; the duty required; and the process constraints.

# Operation and Application

## Advanced Liquid Additive (EcoSorb™ QS-Advanta)

Numerous incinerator systems, both municipal and industrial, have successfully implemented the use of EcoSorb™ QS-Advanta in the gas treatment system. Whether used as a continuous additive or implemented during specific incineration campaigns, EcoSorb™ QS-Advanta has demonstrated that it is able to ensure compliance of mercury emissions.





### Advanced Powdered Activated Carbon (AddSorb™ VQN)

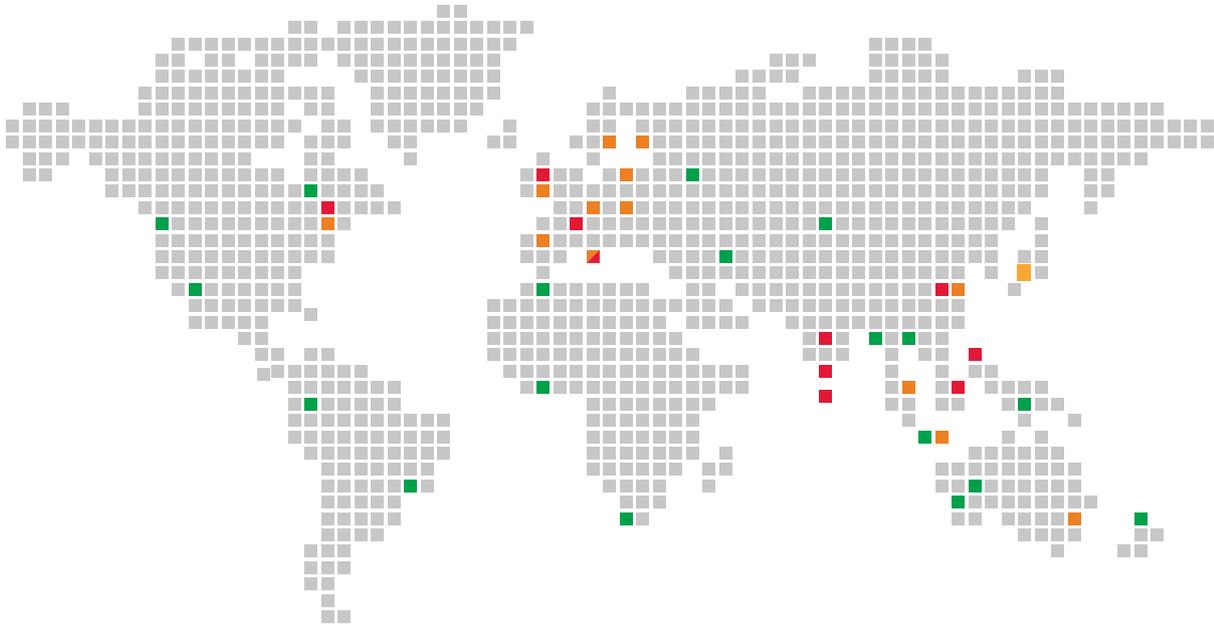
By selective impregnation techniques, EcoSorb™ QS-Advanta can be added to a powdered activated carbon to enhance the mercury removal capabilities. Industrial scale tests have shown removal of elemental and ionic mercury to below the limit of detection are possible, simply substituting AddSorb™ VQN for the existing PAC at current dose levels.

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