Activated Carbon for Oil and Gas Processes
Our ongoing use of fossil fuel, and particularly those derived from oil refining has both a significant financial and environmental impact on everyone on the planet. Jacobi Carbons seeks to strike the right balance between these two factors assisting refineries and consumers at the same time.

The Holistic Company

EFFECTIVELY DEALING WITH the challenges faced by today’s oil and gas industries are of primary concern for all companies active in this highly competitive market. Lowering production costs for refinery operations is one thing, but upholding the high standards mandated for environmental issues cannot be ignored.

It is universally understood that the loss of saleable product can have significant effects on terminal revenue. Recovery of end product, intermediates and processing aids all contribute to economic and cost-effective operations. However, this is to be balanced against the potential impact of the release of highly toxic compounds to the wider environment, where the costs of remediation can far outweigh the potential income the refinery can expect to generate.

This in-depth consideration for key aspects of oil and gas processing has brought Jacobi Carbons to the forefront of the industry; supplying high-performance, quality and cost-effective solutions to refineries, terminals and offshore facilities throughout the world.

As a member of the Osaka Gas Chemicals Group, Jacobi Carbons fully understands the scale and nuances of refinery operations, and the critical role that activated carbon plays in manufacturing processes.

JACOBI CARBONS HAS the technical expertise and extensive knowledge required to understand the challenges our customers face on a daily basis. Regardless of the industry sector, we have the right solution for any situation. Applications for the petroleum industry demand the highest quality activated carbon and Jacobi’s outstanding quality control procedures provide only the finest end product.

In addition to environmental concerns, the right activated carbons can have a direct impact on the economic operations of refineries and terminal facilities. Cleaning contaminated water before release to the environment is important, as is the recovery of a range of expensive processing chemicals. Jacobi’s solutions make sense in so many ways.
THE NEED TO MAINTAIN acceptable quality of processing chemicals for oil refinery operations is crucial. With marginal raw material sources and aging equipment, this need is magnified to reach sustainable standards. Activated carbon used in a fixed bed solution has the ability to constantly treat processing chemicals in full or in a partial treatment stream that can restore chemical properties in line with virgin products. The economic and environmental advantages are obvious.

**The Versatile Company**

**Amine and glycol recovery**
By treating a side stream of recirculating amine liquor, activated carbon can greatly prolong the service life of this important upgrading chemical. Similarly, the purification of glycol used in gas dehydration processes ensures optimum performance and reduces the risk of secondary contamination of the raffinate. Jacobi’s PetroSorb™ 1200, 1500 and 2000 product grades are industry accepted standards for amine and glycol recovery systems. These activated carbons are highly effective in the removal of organics, oils, sulphur compounds, and carbon dioxide accumulated during the treatment process.

**Treatment of process water**
Petroleum refining operations are often located close to the primary extraction point of the feedstock. Many of these locations are found in some of the world’s most arid climates. This makes water management critical. Condensing steam is an easily recovered source and with the help of activated carbon high purity levels required can be achieved.

**Treatment of condensate water**
The increasing demands for the reclamation of water, particularly where refining operations are established in arid regions, places stringent conditions on the function and quality of the activated carbon used. The PetroSorb™ HS series is used in steam condensate treatment for removal of oil and heavy hydrocarbons upstream of ion exchange resins in boiler water recirculation systems. Low silica release versions of this grade are also available to reduce the amount of wash water needed to meet plant silica leach requirements, and ensure that the ion exchange columns function as intended in the removal of trace metals, and not silica, from the recirculating condensate.

**HPNA removal**
During the hydrocracking process, certain compounds called heavy polynuclear aromatics (HPNA) are formed. These compounds can foul processing equipment and have other adverse effects. Jacobi has designed a family of activated carbons that helps remove these undesirable components.

**Mercaptan extraction and fuel sweetening**
Jacobi’s PetroSorb™ G-SWC80 is a durable, high pore volume granular activated carbon that provides a perfect substrate for impregnation with any oxidation catalyst used in the removal of mercaptans from high grade liquid fuels. Providing both exceptional product hardness (minimises fine formation in the treated fuel) and low volume density ensures that PetroSorb™ G-SWC80 meets all the requirements of this critical refinery process.
Inevitably, heavy industry produces liquid waste not suitable for use onsite and certainly not for release into the environment. Activated carbon can efficiently remove a wide range of contaminants from water over an extended period of time. The PetroSorb™ series includes cost-effective activated carbons for a wide range of effluent treatment applications. The final step in the effluent treatment process is usually tertiary treatment, which is often required to meet discharge limits. Jacobi’s PetroSorb™ granular activated carbon (GAC) grades are manufactured from coconut shell, wood, coal and lignite, offering a wide selection of pore size distributions, adapted to meet particular contaminant removal requirements. Performing pilot studies will help to match the most suitable activated carbon to the stream to be treated.

Treatment of wastewater
Groundwater and contaminated runoff can be treated in one step by adding powdered activated carbon (PAC) to existing aerobic or anaerobic biological process complex wastewaters. The PAC helps buffer the biological system against toxic organics in the wastewater. Jacobi offers PetroSorb™ grade PAC that can be tailored to meet individual requirements. Where this is not feasible – for example in offshore applications – Jacobi Carbons can supply packaged mobile filtration units (MFU) containing granular activated carbon (GAC) for treatment by percolation.
GAS PRODUCTION PROCESSES require continuous filtration to remove solid particles, dissolved hydrocarbons and solvent degradation products. Otherwise, these can cause corrosion and other issues that may prove problematic and can be harmful to the environment. A properly designed and adapted activated carbon system can reduce downtime, improve quality, and protect equipment and catalysts. This reduces overall operating costs while minimizing impact on the environment.

Mercury removal
Mercury is often found in natural gas, petrochemical and some refinery feed streams, particularly where marginal resources are exploited. The presence of mercury and its reacted by-products can result in extreme corrosion of metallic components. Jacobi’s solution is a series of high activity, activated carbons manufactured by steam activation of coconut shell (granular) and anthracite coal (extruded). These grades are chemically impregnated specifically for use in the control of mercury in the vapour phase. The chemical impregnations used offer exceptionally high loading capacity (>70% by weight) and high temperature stability for the most arduous operating conditions.

Critical gas generation, PSA
The usage of high purity gases in refinery operations is increasing. Remote extraction locations mean that gas generation is undertaken onsite, as no delivery infrastructure exists. Activated carbon plays a critical role in the separation of oxygen, hydrogen and other critical gases from the air in pressure swing adsorption systems. Jacobi Carbons manufactures gas separation carbons from both coconut shell and anthracite coal by steam activation processes, ensuring excellent cycle yields and high purity end product.

Desulfurization of natural gas
The production of different types of chemicals requires a feed stock virtually free of sulphur to protect catalysts from deactivation. Normally utilised in conjunction with other treatment technologies, activated carbon is able to reduce the residual concentration of sulphur compounds below the olfactory limit of detection. This is a vital requirement whether for controlling levels of sulphur compounds in refinery intermediates, or venting emissions to the atmosphere. Jacobi Carbons manufactures products suitable for use in air, oxygen deficient atmospheres, with exceptionally high capacity (5-60%) by weight and suitable for in-situ regeneration. Our in-house capacity testing facilities can also assist in the determination of the service life of adsorbents in use.
Natural gas use is growing, but the quality available often falls short of stringent specifications. Gas upgrading using products from Jacobi can ensure that high grade product is produced on a consistent basis.

**Activated carbons for Vapour Recovery Units**

Perhaps the highest potential loss of revenue from a refinery is the displacement of vapour from final product during transfer from bulk tanks to transportation and delivery vehicles and ships. All the costs of processing the raffinate are accumulated in this product, and so measures to recover any losses are paramount, even over the environmental impact of spurious emissions to atmosphere.

The use of activated carbon used in the adsorption of hydrocarbons using a regenerative vapour recovery unit (VRU) is well known. Due to the repeated cycles of operation; extreme pressure swings and heating processes, the activated carbon must be able to withstand frequent and repeated regeneration in the adsorption vessels. Furthermore, the concentration range experienced – which is often in the explosive range – requires the activated carbon to generate minimal heat of adsorption. Jacobi Carbons’ PetroSorb™ BX series of products possess these critical properties most suitable for vapour phase adsorption when combined with carbon bed vacuum regeneration techniques. Their high adsorption capacity for volatile organic compounds (VOC) is combined with ease of desorption.
OVER THE YEARS Jacobi has mastered the complex process of manufacturing specialized activated carbons of superior quality derived from coconut shells, wood and coal. We continue to find more opportunities for the oil and gas industries.

Jacobi’s activated carbons are designed to meet an array of individual process requirements. Their highly developed internal surface density gives them superior adsorption capacity and maximum volume activity. Particle size can be adapted to meet the required adsorption performance and hydraulic characteristics.

Our R&D department and technical experts have extensive knowledge of all applicable procedures and can provide assistance and handle process control issues to help clients conform to internationally recognised standards.

Today our production base is the most diverse in the industry. We have manufacturing plants in 11 locations worldwide. Products are stocked at our own warehouses or with our distribution partners, ensuring a first rate chain of supply worldwide.

We take pride in selecting the most appropriate system, operating conditions and activated carbons to meet every need. For our clients we are a high quality product supplier and a support partner that helps them meet any new challenge that lies ahead.

Wood based activated carbons have a more highly developed mesoporosity (steam activation) and macroporosity (chemical activation). These materials are more versatile where a wide range of pollutants is to be removed.

Coal based activated carbons have high density, large pore volume and high surface areas. It is used in the purification process and provides excellent adsorption characteristics in slipstream treatment applications. Particle size is selected for optimum adsorption. By utilizing a variety of coal types (lignite, bituminous and anthracite) Jacobi Carbons is able to offer the widest range of products specifically tailored to give optimum results in refinery duties.

Coconut shell based activated carbons provide high durability and highly microporous structures. These products offer maximum mass per unit volume, providing the optimum level of adsorption capacity.
Jacobi Carbons has developed the most diverse production base in the industry with manufacturing plants, reactivation plants and sales offices located in 19 countries around the world.

Jacobi Carbons is a proud member of the Osaka Gas Chemicals Group.