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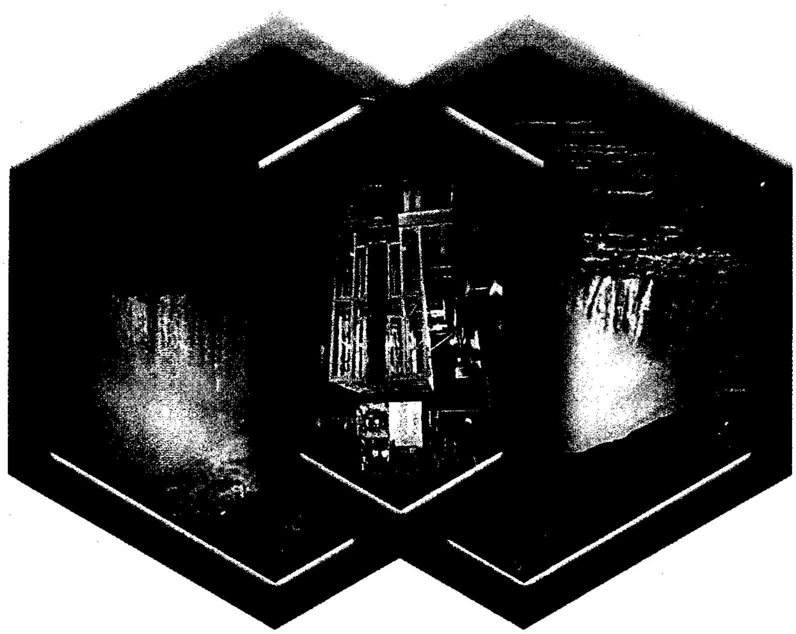

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Pollution Reduction with Heat Integration in Producing Process of the Pitch and Naphthalene from Coal Tar

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The existing scheme of coal-tar pitch fractionating on plants of CIS countries is based on principle of equilibrium flash vaporization of pitch on single-column or two-column units. The historical situation caused the condition under which practically on all by-product coke plants in CIS countries there is no heat integration within the pitch and other fractions manufacturing process from coal-tar pitch. Earlier in paper authors carried out the heat integration of two-column unit of coal-tar pitch distillation. In this paper the case study for more progressive single-column unit of coal-tar pitch distillation was carried out. It was shown, that application of process integration methods will lead to decreasing of return coke oven gas at coal-tar pitch distillation by 88% from the existing level. The released coke oven gas can be used for power generation.This may reduce the harmful emission by 1500 tons per year with taking into account the present usage of natural gas as fuel for power plant. The estimations show, that realization of heat integration on whole by-product coke plant and utilization of available coke oven gas for power generation can lead to decreasing of harmful emission by about 200 thousands tons per year. The proposed technique will be included in the structure of expert system on controlling the pollution emissions of enterprises taking into account their impact on forestlands.This work was performed with European Community support (Program INCO - COPERNICUS-2, Project DEMACSYS, contract N ICA2-CT-2001-10005).

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Reliable Operation of Temperature Swing Adsorption (TSA) Systems

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This paper will provide an overview of the design features and operating practices necessary for reliable operation of Air Pre-Purification Temperature Swing Adsorption Systems in cryogenic air separation plants. Such plants are used to produce oxygen, nitrogen, and argon for a wide variety of industrial and municipal operations including ferrous and non-ferrous metals, chemicals, petrochemicals, paper, and waste water treatment. Discussion will focus on selection of adsorbents, i.e. molecular sieve and activated alumina, adsorbent bed support design, proper loading of adsorbents into adsorber vessels, moisture separators, bake-out procedures, cycle times, monitoring process parameters, process controls and safety. Advances in adsorbent technologies have increased the number of options available for adsorbent selection, so it is vitally important to understand the characteristics of each material and to be able to accurately predict performance in the selection process. Good adsorber vessel design, particularly in the bed support area, is essential for ensuring proper distribution of flow as well as reliable long term operation. The functions of molecular sieve vs. alumina will be discussed along with the impact on performance if these materials become saturated with water from either ambient or process conditions. The importance of regular maintenance of moisture separators will also be discussed in this context. Other design and operating parameters including high temperature "bake-out" of the adsorbent beds, maintenance of adsorption pressures, pressure drops, and temperatures will be reviewed. The design and selection of process controls for the adsorption system have direct impacts on system performance and safety.

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Tasks for Chemical Plant Situation Control

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Presently, the task of integrated assessment of environmental impact from industrial enterprises is growing in importance. It is widely accepted, that such impact from chemical and refining plants is most unaffordable.
The task of situation control system development involves the following stages:
- Identification and analysis of environmental impact caused by air pollutants emitted from chemical plant, identification of pollution dispersion model.
- Identification of pollution sources.
- Extended situation analysis of both production and managerial processes, including identification, classification and estimation of possibilities for reengineering of eventual situations.
- Development of representation models for knowledge acquired on stage 3 (such knowledge may include fuzzy and heuristic knowledge acquired from interviews of experts that shall require additional analysis for concordance).
- Development of knowledge base for decision support system on pollution reduction (DEMACSYS) and its testing for adequacy.

Acknowledgement: The support of European Community (Project DEMACSYS, Contract [1] ICA2-CT-2001-10005 (INCO-COPERNICUS-2)).

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Remote Sensing Texture Segmentation of Polluted Forests

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Forest areas around sources of industrial pollution can be divided into three zones: impact, buffer and background ones. In the buffer zone of moderate forest degradation, the brightness coefficient in the visible part of the spectrum µm increases by 5-10%. Forest structure mosaic is also a feature of the buffer zone. This makes it possible to develop a quantitative method for description of mosaic structure of the brightness field of the buffer zone forest using texture features. The analysis has been carried out for Karabash copper smelter. This territory is well described in terms of dose-effect functions. The original satellite picture was transformed into NDVI followed by discrete wavelet transformation. Texture patterns of the first and second order were obtained as a result. The surface field measurements were represented as integral doze-effect function: integral coefficient of preservation as a normalized integral pollution of the forest. Each sample area was represented by a standard. They were used to calculate texture signatures, energy and deviation being texture indices. Classification was carried out by using a sliding window. For each sliding window position, texture indices were calculated and compared with the signatures. We applied this parameter for surface data identification algorithm. Authors wish to acknowledge the support of European Community (Project DEMACSYS, Contract # ICA2-CT-2001-10005 (INCO-COPERNICUS-2)).

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Optimal Distribution of Recycle Juice in an Integrated Sugar Mill-Ethanol Plant

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Cuban sugar mills are often integrated with ethanol plants to use excess steam and recycle sugar juice to produce ethanol. Several alternative strategies exist for the operation of the integrated sugar mill + ethanol plant. We performed a techno-economic evaluation of various alternatives. The alternatives focused on the % of recycle juice being sent to the ethanol plant. The % of recycle juice being sent to the ethanol plant directly affects the steam demand in the sugar mill and availability of excess steam for the ethanol plant. The total steam demand in the ethanol plant remains constant because the total ethanol production is fixed. Steam is produced in the sugar mill by burning bagasse in a co-generation plant, the remainder of the electricity is purchased from the grid. The steam produced in the ethanol plant was generated by burning fuel oil in a boiler
We developed a detailed heat and material balance and economic analysis around the sugar mill. Sending 100% of the recycle juice to the ethanol plant reduces the unit cost of production of crude sugar by 4.9%, (13.5 USD/T).
We will present a summary of the 4 alternatives complete with economic analysis.

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Process Data Analysis in a Cane Sugar Factory

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A very important task on process system engineering is to attain reliability on the measured values. The aim of this work is to perform data reconciliation in a sugar factory in order to detect relevant variables accordingly to selected goals. A permanent control over key economic and environmental process variables is needed in order to keep the output variables at levels where a desired profit is met.
To represent the architecture of the sugar factory the most important equipment of the plant were raised. Afterwards the historical production data were studied and time periods where the factory worked at steady state and at normal capacity were considered.
Data analysis allows calculating the arithmetic mean and time variability of the different mass flows and component concentrations. In order to perform data reconciliation the errors of the measured variables were assumed to be as twice the standard deviation.
The analysis of the obtained results shows that the acquired plant's values do not have gross errors and they are consistent.
The analysis of the results also allow identifying those variables whose measurement precision have major influence over the accuracy of the non-measured observable parameters.