NO-WASTE

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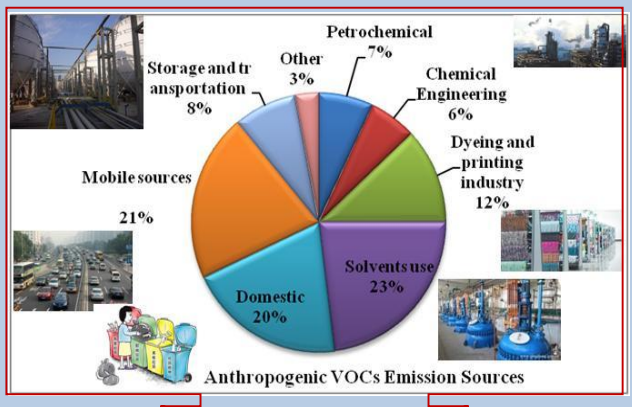
Utilization of Industrial by-products in Environmental Protection

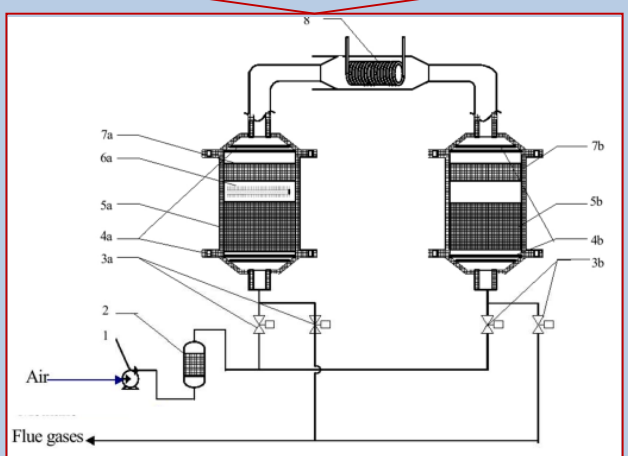
NEWSLETTER 6

Removal of VOCs by Reverse Flow Reactor technologies

There has been great concern over China's air quality in the past decade. As the most serious environmental air issue in China, it is threatening the public health and ecosystems. Haze is closely related to the large emissions of sulfur dioxide (SO_2), nitrogen oxides (NOx), volatile organic compounds (VOCs), and particulate matter (PM) from anthropogenic activities such as industries, traffic transportation, power plants, and biomass burning. It was reported that China's industrial non-methane VOCs emissions had increased by 11.6 times at an average annual rate of 8.5% from 1.15 Tg in 1980 to 13.35 Tg in 2010. The annual VOCs emission amount had almost approach that of NO*x* or SO_2 by now. To cope with such a serious situation and meet the increasingly strict regulations released, more proven removal technologies are required accordingly. In combination with the characteristic of VOCs, regenerative oxidation technologies can be appropriate for low concentration and frequent fluctuation on VOCs concentration. Among them, RCO (regenerative catalytic oxidation) and RTO (regenerative thermal oxidation) are widely applied in the removal of VOCs. In fact, heat is regenerated by reverse flow reactor for regenerative oxidation technologies.



Anthropogenic VOCs Emission Sources



Schematic of CFRR and experimental flowsheet (a, b represents the two symmetric sections, respectively): (1) air compressor, (2) mixer, (3) pneumatic valves, (4) distribution grid, (5) regenerator, (6) electric heater, (7) combustion catalyst, and (8) heat exchanger.

RTO/RCO

No-waste has initiated many theoretical and experimental studies on reverse flow reactor (RFR). And they provided the guidelines for the design of RCO and RTO. The Process Design Package (PDP) was designed. Currently the Chinese Government is piloting a plan to impose charges on companies' emission of VOCs. In the near future, the tax will be levied on emissions of VOCS in an all-round way. In 2016, the Ministry of Science and Technology of China will launch a number of major science and technology programs and key projects, focusing on the technology demonstration and application of VOCs removal.

Contacts:
e-mail: wangsheng@dicp.ac.cn

e-mail: wangsd@dicp.ac.cn

WP 1 Hydrogen and synthesis gas production from waste
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WP 4 R&D on the HTC technology to valorize industrial by-products and wastes,Federal University of Applied Sciences, Goiania

WP 5 Utilisation of methane originating from coal mining
Dalian Institute of Chemical Physics

WP 6 Research on the HTC process: Product design
Trier University of Applied Science

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Newsletter by Dalian Institute of Chemical Physics, CAS

Environmental pollution is a global problem. Unsustainable production of goods, improper treatment of waste, emissions to air and water, and inadequate legislation cause growing problems to human beings and the nature. The urgent need for reducing environmental load coming from industry, agriculture and communities demands for novel ways of thinking. NO-WASTE collaboration will attack to this current problem by developing environmentally sound and sustainable utilization and valorization methods for wastes and emissions. **The aim is to create valuable new products and renewable energy vectors to minimize the amount of waste as well as emissions to air and water.**The frame of operation of NO-WASTE allows a great number of green chemistry related possibilities to create networks of knowledge between the scientists of different fields (science, engineering, economy, health) in different countries.