CHEMICAL OXIDATION OF TRSs USING RESIDUAL CHLORINE DIOXIDE IN A KRAFT PULPING PLANT.

André Normandin, Lionel Martel
MESAR/ENVIRONAIR INC.
2270, Léon-Harmel, bur. 240
Québec, QC Canada G1N 4L2

Renée Riffon
NEXFOR PAPIERS FRASER
Pâtes Thurso
451, rue Victoria
Thurso, QC Canada JOX 3BO

Brian O'Connor, Serge Genest
PAPRICAN
570, boul. St-Jean
Pointe-Claire, QC Canada H9R 3J9

RÉSUMÉ

Une technique innovatrice de destruction des soufres réduits totaux (SRT) a été pilotée par PAPRICAN et adaptée à pleine échelle par MESAR/ENVIRONAIR au traitement des gaz non condensables (GNC) dilués de l'usine de pâte Kraft de Nexfor, à Thurso. Le projet consistait à la collecte, au transport et au traitement des évents de GNC dilués de la pulperie. La réduction des SRT contenus dans les gaz se fait par mélange de ces gaz avec ceux en provenance des évents de l'atelier de blanchiment. Les essais pilotes ont montré que le dioxyde de chlore résiduel contenu dans les gaz du blanchiment était suffisant pour réduire la charge de SRT contenue dans les gaz malodorants de manière à ce que les concentrations de ces contaminants soient conformes à la réglementation. Les conversions de SRT obtenues à pleine échelle ont confirmé ces résultats. Pour couvrir les périodes d'arrêt de l'atelier de blanchiment, un système de relève a de plus été installé.

ABSTRACT

An innovative technique to oxidise total reduce sulphide (TRS) was conducted by PAPRICAN, and then implemented on full scale basis by Mesar / Environair to treat diluted non-condensible gas (DNCG) at Kraft mill of Nexfor, Thurso. The project was the collection, transport and treatment of vents containing DNCG at pulp mill. The main reduction reaction of TRS contained in gas is performed by gas mixing with those coming from bleach plant vent. Pilot scale trial have shown that residual chlorine dioxide contains in bleach vent was sufficient to reduce SRT load under the regulation requirements. Full scale SRT conversion have confirmed these results. To cover periods where bleach plant is shutdown, a backup system is installed, but results are to be confirmed.

INTRODUCTION

The total reduced sulfides (TRSs) present in non-condensable gases are partly responsible for the characteristic odour of Kraft pulping plants. These odours mostly originate from the vents associated to pulp production equipment such as digesters, blow tanks and washers, or to the equipment used for the black liquor recovery. Since the early 90's, the Canadian provinces, and more recently the USA[1], have implemented regulations that force Kraft pulp manufacturers to collect and treat all plant vents containing TRSs.

The traditional approach for treating these gases consists in incinerating them, either in a lime kiln, in the plant boilers, or in a dedicated incinerator. However, thermal incineration of NCGs has several drawbacks, such as the risk of toxic gases inhalation (leakage points on existing boilers due to their age), explosion risks (several cases of boiler explosion following the introduction of TRSs have been reported), reluctance of the operating personnel, complexity of the security devices necessary to ensure safe injection of those gases into kilns or process boilers, high operating costs, and high boiler modification costs. The reader can find additional information about traditional incinerating methods and technologies in more fundamental papers[2, 3, 4].

In addition, alternate approaches have been developed by certain equipment manufacturers specialized in the treatment of industrial emissions. These approaches consist in chemically oxidizing the contaminants contained in the NCGs using powerful oxidizers such as sodium hypochlorite or chlorine dioxide, used for pulp bleaching, thus available on site at plants equipped with a bleaching process.

One of these techniques consists in mixing the TRS-laden gases with the gases coming from the bleaching process vents, in order to make use of the residual oxidants contained in the bleaching gases to oxidize the contaminants. The entire process takes place in gas phase. The technical feasibility of this approach was shown be PAPRICAN during pilot tests performed at the Domtar plant in Cornwall, ON in 1999. The technique was then implemented as a full-scale process by MESAR/ENVIRONAIR at the Nexfor Papier Fraser plant in Thurso, QC.

The goal of this article is to describe the oxidation techniques implemented at the Nexfor plant in Thurso, in order to emphasize the simplicity and the low cost of this chemical alternative in comparison to more traditional approaches for treating TRSs, for plants operating a bleaching process.