

WASTE MANAGEMENT OF ENERGY SECTOR WASTE - FLY ASH FROM BURNING CRUDE OIL AS CATALYSTS

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INTRODUCTION

Due to the increased world population and demand for electricity, the level of greenhouse gases and pollutions is still growing. During last years' scientists were trying to provide new technologies to reduce the amount of emitted NO_x and utilize the waste from energy sector. One of the most promising methods may be fly ash waste (due to its chemical composition [1]) implicated as catalyst used in Selective Catalyst Reduction, which is based on conversion of nitrogen oxides to elementary nitrogen. The main aim of this study was to check the possibilities of application fly ash from burning crude oil as low-cost and eco-friendly catalyst to be used in that process.

EXPERIMENTS

As catalyst properties are connected with surface area and the amount of active centres the main point was to test the surface of starting sample, N_2 low-temperature adsorption was the method used [2]. The obtained values seemed not to be high enough that is why developing the surface was needed. As a first step, CO_2 activation has been applied because of ability of this gas to enlarge the amount of porous structure and what is connected with that increase active surface. Nitrogen adsorption has been applied once again afterwards.

The samples were also purified with mixture of acids to reduce the amount of substances known of their poisonous properties for work of catalyst. One sample was activated for 15 minutes and the other one for 30 minutes to check also if time may have influence on samples.

RESULTS AND DISCUSSION

After using CO_2 on samples the specific surface area has increased 5 to 6 times depending on time of gas application on starting samples (Table 1). This may have significant outcome for catalysts, which mechanisms are based on surface interactions, and because of that more molecules may react with each other [3].

Table 1. Specific surface area of samples.

Sample	Specific surface area, m^2/g
Non-activated starting sample	2,5
15 minutes activated sample	13,0
30 minutes activated sample	16,0

Using mixture of acids - HCl , HNO_3 and HF - had impact on the chemical composition of the fly ash and caused decrease in amount of undesirable elements. On the other hand, the content of elements, which are active in Selective Catalytic Reduction, has increased (Table 2). That may provide longer time of lasting catalyst and its better work parameters [4].

Table 2. Amount of undesirable components in samples.

Component	Sample		
	Non-activated	15 minutes activated	30 minutes activated
P	733,2 ppm	723,6 ppm	716,9 ppm
S	10,066 %	8,373 %	8,201 %

CONCLUSION

This study has shown that it may be possible to manage waste from energy sector and instead of storage - use them to prepare active and selective eco-friendly catalysts from the fly ash for Selective Catalytic Reduction. Numerous studies among them will be conducted to obtain catalysts with the highest possible conversion rate and selectivity.

REFERENCES

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