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Problems of Environment Protection During the Utilization of Spent Vanadium Catalysts

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ABSTRACT: In the paper technology is presented which allows environment protecting and utilizing completely the main components of spent vanadium catalysts with high-quality products receiving.

I INTRODUCTION

Modern conditions of mineral-raw materials basis, generally change owing to processing of more poor ores. This allows regarding some industrial wastes as promising repeated raw materials, which are high-concentrated and include valuable components. Spent vanadium catalysts from sulphuric acid production, nitrogen industry, Claus-process, selective catalytic reduction of NO_x gases by ammonia are such repeated materials. They include toxic components, and their burial without disactivating is prohibited. The technologies for spent vanadium catalysts processing offers ensuring environment protection which were tested in industrial conditions.

2 DETAILS OF THE STUDY

Today in the Republic of Kazakhstan, like in other countries of the world, a tendency is observed as mining of poor ores at deep levels in hard mining and geological conditions. These factors decrease the profitability of exploitations of a number of ore deposits. That is why it is possible to regard some industrial wastes as promising repeated raw materials. Such high-concentrated mineral raw materials are spent vanadium catalysts (SVC) which are used for sulphuric acid production by contact method. For its production, gases from roasting of copper, lead and zinc ores are used, characterized by non-stable composition and presence of harmful admixtures, which cause the quick decreasing of vanadium catalysts' activity. Average service life of vanadium catalysts is 1-2 years. And the most harmful admixtures are arsenic, fluorine and selenium, in fact they are very toxic elements. SVC may be: stored in special waste fields, buried and utilized. *SVC* storing and burying are very dangerous for environment because in these cases pollution of surface and underground water and soils takes place. SVC utilization may be carried out in two directions:

1. Immediate usage of spent vanadium catalysts without their regeneration by a way of charging at different stages *of* process new made vanadium catalysts. This method may be used only for catalysts, which do not include contact poisons.
2. Extracting the main components from spent vanadium catalysts and their usage in new made vanadium catalysts production. By this way we may receive pure compounds of vanadium.

Scheme of SVC processing is presented in Figure I.

Technology was worked out for spent vanadium catalysts processing, which allows the utilization of the main components of SVC (vanadium, potassium, silicon) and receiving high-quality products (catalyst and pure solution of fertilizer K_2S0_4). This technology was tested in industrial conditions. Received new made catalysts have catalytic intensity of 84-86% and 40-45% when temperature is 485°C and 429"C, respectively. Pure solution K_2S0_4 was tested both in industrial conditions as a raw material for liquid potassium fertilizer production and in agricultural conditions as an independent fertilizer. This method of spent vanadium catalysts excludes gas emission and water discharge at all stage of SVC processing.

3 CONCLUSIONS

Using of offered technology of spent vanadium catalysts processing allows avoiding of industrial areas pollution by toxic elements, decreasing negative technical-in-gcnesis action of mining and metallurgical complexes on environment and, at the same-time, receiving necessary goods for industry and agriculture of the Republic of Kazakhstan.

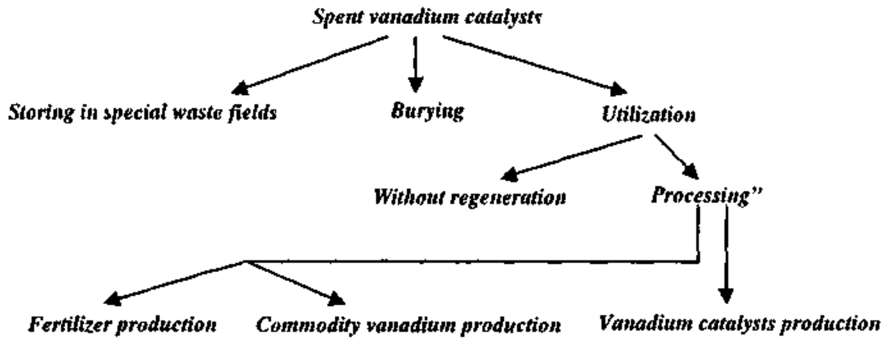

Figure 1 Scheme of spent vanadium catalysts processing