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CATALYSTS USED IN THE FERTILIZER INDUSTRY IN TURKEY^{1/}

by

Hefik S. Oezner

Turkish Nitrogen Industries
Kuetahya Turkey

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The catalysts used in the fertilizer industry was first introduced in Turkey when the first nitrogen based fertilizer plant was completed in Kütahya at 1961. After this one phosphoric acid-triple super phosphate, two nitric acid-calcium ammonium nitrate plants were completed and ammonia plant in Kütahya was expanded.

Some difficulties have been confronted with the catalysts and catalyst beds of the ammonia plants at Kütahya.

The CO conversion catalyst of the old plant had been oxidized two times for the opening of the reactor for the maintenance purposes. Even though, both of the oxidizing processes had been carried out with extreme care it had been not possible to prevent the local excessive temperature rises consequently in both cases considerable amount of the catalyst had been found severely sintered. Since then a nitrogen atmosphere had been used in the maintenance loading and unloading operations.

The catalyst of new plant however was oxidized successfully. As far as we know the only difference between these two catalysts is new one is tableted^{and}/old one is not.

The heater cover tube of new ammonia converter (which was taken in to operation at the middle of 1968) was damaged at the end of 1968 and also in May 1969 it was damaged again. In both cases catalyst was unloaded and loaded under nitrogen atmosphere. After these two operations the converter could not reach 80 % of its nominal capacity. So the catalyst was changed with the new one.

Unfortunately in 1971 the cooling tubes of the same converter were deformed and broken. Catalyst was unloaded, tubes were repaired and then new catalyst was loaded.

So that in three years at three different times for repairing purposes and one for changing the catalyst the ammonia production was stopped at a total of 4 1/2 months.

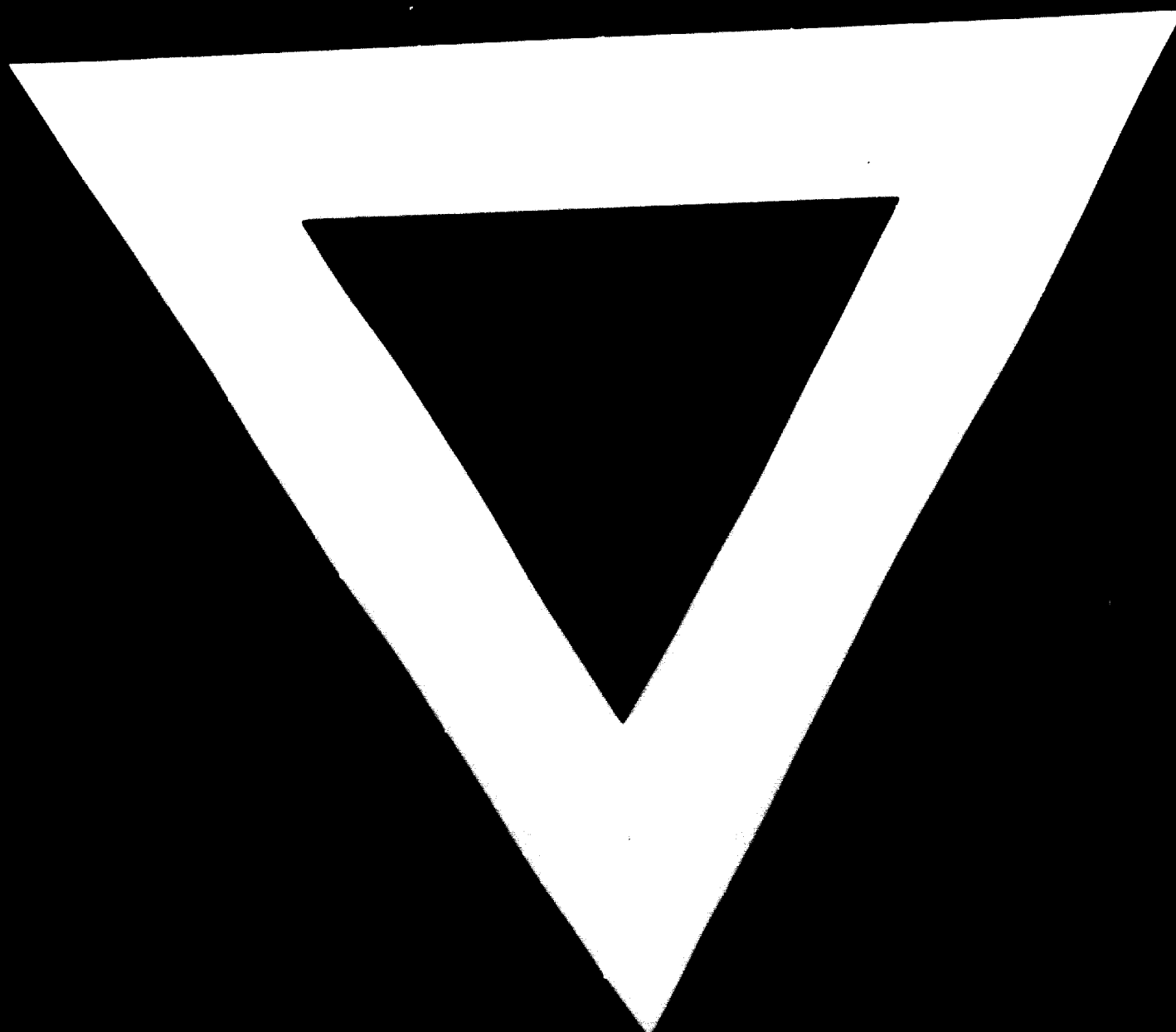
The reasons of all these troubles can be explained in many different ways. But as our opinion we can mainly group them in two parts :

1) Heating of catalyst to the reaction temperature ^{at} start up can be possible with a small amount of gas with a little heater in a reasonable time. This causes great temperature differences between bottom and upper part of catalyst bed and between heater-tube and catalyst bed. So thermal stresses can damage parts of converter seriously. To obtain uniform temperature distribution throughout the converter at start up, the heater capacity must be taken as big as possible.

2) In developing countries like ours because of electricity power very often start up and shut down can occur in ammonia plants. In every shut down and start up as we mentioned the thermal stresses can cause great damage.

For this reason the designer of this equipment must consider all this points.





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