

CHAPTER IV.

MANUFACTURE OF CATALYST FOR ORGANIC SULPHUR REMOVAL.

This catalyst is prepared by mixing lux mass with sodium carbonate.

The lux mass is stored in the open and contains 50-60% water, and also some alkaline (7%), calculated as sodium carbonate, partly consisting of NaOH , partly of Na_2CO_3 .

It is mixed with the soda in a so-called counter-current mixer (Esch Hochleistungsgegenstrommischer, Esch Werke, Duisburg). This is a cylindrical mixer of about 2 m dia. with a vertical spindle, with a planetary system of scrapers revolving around it.

In this mixer 600 kg of lux mass containing 50% of water, 100 kg of dry calcinated sodium carbonate and about 220 kg dust (see below) are mixed at a rate of 5-7 charges per 8 hours. So much water is necessary that the mass is just sufficiently plastic. If the lux mass contains less than 7% alkali, a corresponding quantity of Na_2CO_3 is added above the quantity of 100 kg mentioned before.

The lux mass and the soda are mixed for about 1/4 hour, after which about 1/2 the quantity of dust is added, followed by 20 minutes' mixing. Then the remaining dust is added and the mixing continued for 5 minutes, after which the mass is dropped through the bottom.

After mixing, the mass is dropped by an "Entleerungsklappe" and fed by hand to a so-called "Passier" sieve, consisting of a horizontal plate with holes varying in diameter from 3/8-5/8 inch, drilled in 3 of the 4 quadrants. Arms revolving on a vertical spindle push the mass through these holes, from which it drops onto the revolving blades of a hot air drier.

It is important that the mixing should be well timed, to attain the desired plasticity of the mass, which hardens rather quickly by cooling below 32° .

Delay in passing through the "Passier" sieve might result in breakage of the arms; it has been found, however, that the mixing time does not influence the quality of the product. An extruder such as is used for the manufacture of synthesis catalyst would be unsuitable in this case.

The drier (Büttner Werke, Uerdingen), of the same construction as used in the synthesis catalyst plant, has a diameter of 6 m, the inside diameter of the vanes being 3 m. The drier has 22 sets of vanes, spaced at a vertical distance of 200 mm.

The air for the drier is pre-heated in a tubular heater with steam of 18 atm., the heating coils in the drier getting steam at 8 atm. The temperature of the air in the drier is about 100° , with a maximum of 120° ; a higher temperature would result in too much splitting up of the mass. The latter enters the drier with about 35% water and leaves it with 3-5%. After leaving the hot air drier, the product is taken up by a bucket conveyor and fed to a vibrating sieve, which separates:

- a) parts over 15 mm
- b) product from 10-15 mm
- c) parts under 10 mm (dust).

The oversize product is passed through a breaker and sieved in a second vibrator. The oversize from this apparatus is transported back to the first vibrator.

All parts under 10 mm are taken up by a conveyor and used as stated before, together with the dust, which is collected by a special vacuum system; the dust-catching bags are emptied periodically by releasing the vacuum.

The capacity of the hot air drier was stated to be 15 tons/24 hours. (For synthesis catalyst driers the capacity was given at 5 tons). It is considered that this type of drier could be replaced successfully by a belt-type drier, where the material stays on a belt and is not dropped periodically onto the lower set of vanes.

The above-mentioned size for the product of 10-15 mm is used at present by way of trial; normally sulphur catalyst of 5-15 mm has been used. Also experiments with 5-10 and 10-20 mm are being carried out.

The chemical analyses of lux mass and sodium carbonate are available at Holten.