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PROCESS FOR THE MANUFACTURE OF FERTILIZERS RICH IN P_2O_5

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5 Claims. (Cl. 71—7)

The present invention relates to a process for the production of fertilizers rich in phosphoric acid from crude phosphates and to the products obtained thereby, it consists in subjecting the crude phosphates at an elevated temperature to the action of phosphorus pentoxide preferably in the form of vapour. Under these conditions the combination of the P_2O_5 with the crude phosphate takes place quickly and completely with the formation of fertilizing substances, which can be easily distributed, having for example a P_2O_5 content up to 60% and over.

This P_2O_5 content can be regulated within fairly wide limits according to the quantities of P_2O_5 employed. Thus for example fertilizers can be manufactured which correspond to calcium pyrophosphate, calcium metaphosphates or mixtures of these, that is to say in which the molecular proportion $CaO:P_2O_5$ amounts to about 1:½ to 1:1. Fertilizers still richer in phosphoric acid, for example in which the molecular proportion of CaO to P_2O_5=1:2 can also easily be obtained from the crude phosphates.

The fertilizers obtained in this manner are not hygroscopic have good covering power and the solubility of the phosphoric acid is satisfactory for fertilizing purposes. The solubility can be still further increased by effecting a sudden cooling or quenching of the hot, preferably molten, products, care being preferably taken that a large superficial area is produced. The cooling or quenching can be effected for example by pouring the molten product on to cold iron plates or by allowing it to flow into cold water.

One method of carrying the process into effect is to produce the P_2O_5 necessary for the reaction by the combustion of elemental phosphorus, preferably in the form of vapour, and to use the heat of combustion for maintaining the reaction temperature. This method of carrying out the process is particularly advantageous as it enables the phosphorus-containing gases which are formed in the manufacture of phosphorus by reduction of phosphates to be directly utilized. In this case the phosphorus contained in the phosphorus furnace gases is burnt to P_2O_5 in known manner and the heat resulting from this combustion is utilized for maintaining the reaction. The available amount of heat can be still further improved by utilizing the CO content of the phosphorus furnace gases for the development of heat.

Example

Phosphorus-containing gas is burnt with air in the lower part of a stationary, heat-insulated shaft which is charged with filling material. The gases of combustion containing P_2O_5 spread upwards in the shaft and bring it to the necessary temperature of about 1200° C. Crude phosphate in fine-grained form or in the form of small pieces is continuously fed from above into the shaft. It lies at first on the filling materials. After it has been partly converted by the P_2O_5, it first becomes tacky and finally liquid and flows over the filling material in the opposite direction to the stream of gas. It thereby takes up further quantities of P_2O_5 and finally collects in the lower part of the furnace where it is run off from time to time and preferably allowed to flow directly into cold water for quenching.

The product obtained can easily be ground to have a size of grain suitable for fertilizing purposes. The phosphoric acid content of the final product, which also depends to some extent on the dimensions of the furnace, can be regulated as desired within wide limits by varying the rate of charging and the speed and composition of the phosphorus-containing gases.

Instead of taking place in the above-described apparatus, the conversion of the crude phosphate may take place for example in an apparatus of the following kind. The molten reaction mass is placed in a heat-insulated, fire-proof container. Into this mass there dips a system of pipes in which the combustion of the gases containing phosphorus vapour is effected. The heat developed is directly transferred to the melt and maintains the necessary temperature. The P_2O_5-containing combustion gases are driven through the melt in as fine a distribution as possible, whereby the P_2O_5 content is taken up by the mass. The crude phosphate to be converted is continually introduced into the melt and the product of the reaction is run off from time to time in portions and quenched.

I claim:—

1. Process for the production of fertilizers rich in phosphoric acid from crude phosphates which comprises treating the crude phosphates with phosphorus pentoxide at glowing heat.

2. Process for the production of fertilizers rich in phosphoric acid from crude phosphates which comprises treating the crude phosphates with phosphorus pentoxide at glowing heat and suddenly cooling the products of the reaction.

3. Process for the production of fertilizers rich in phosphoric acid from crude phosphates which comprises treating a crude phosphate with phos-

phorus pentoxide vapour at a temperature of about 1200° C.

4. Process for the production of fertilizers rich in phosphoric acid from crude phosphates which comprises treating the crude phosphate with phosphorus pentoxide at glowing heat until the proportion of combined P_2O_5 is greater than that which would correspond to the production of the metaphosphate.

5. Process for the production of fertilizers rich in phosphoric acid from crude phosphates which comprises burning phosphorus to form phosphorus pentoxide treating the crude phosphate with the pentoxide formed at glowing heat, and using the heat of combustion of the phosphorus to maintain the reaction temperature.

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