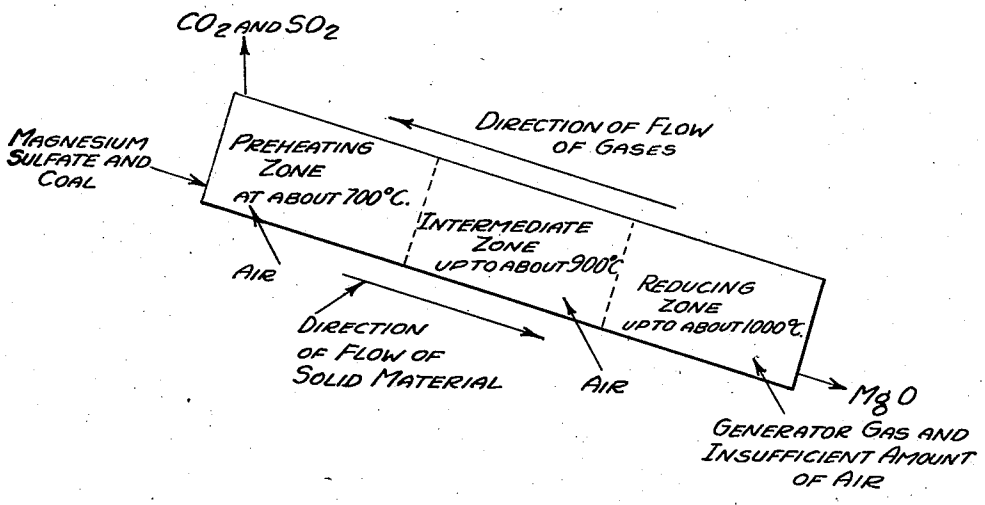
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PROCESS OF PREPARING MAGNESIA AND SULPHUR DIOXIDE

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PROCESS OF PREPARING MAGNESIA AND SULPHUR DIOXIDE

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The present invention relates to a process of preparing magnesia and sulphur dioxide.

The known processes of reducing magnesium sulphate by means of coal do not yet show an industrially useful way for obtaining magnesium oxide and only one uniform sulphur compound in a practically complete yield. The main difficulties reside in the fact that, on using a deficiency of coal, the reduction does not occur quantitatively; on using an excess of coal, however, S, H_2S, COS and CS_2 are formed besides SO_2. It has, therefore, been suggested to effect the reduction with an excess of coal, but to let follow as second operative step a chlorinating or oxidizing roasting. These processes, obviously, have the drawback that other sulphur compounds are formed besides sulphur dioxide, the working up of which compounds is very difficult.

Now we have found a process by which it is possible in one single operation to reduce magnesium sulphate practically completely so as to form magnesium oxide, a gas being simultaneously obtained which contains the sulphur only in the form of sulphur dioxide in such a concentration that sulphur trioxide may be prepared therefrom in a contact apparatus attached to the reaction device. This decomposition of the magnesium sulphate is attained by subdividing the reduction furnace into three zones. In the upper, feebly oxidizing zone the mixture of magnesium sulphate and coal introduced which contains a deficiency of coal is pre-heated. During its migration it passes the middle zone where the temperature rises from about 700° C. to 900° C. In this zone the coal has a reducing action. The gaseous phase is kept neutral in that zone of the furnace. When the content of the furnace reaches the lower zone the coal is already consumed. The unchanged magnesium sulphate still present is then completely reduced in a reducing gaseous medium. By the partial combustion of the gas introduced at the lower end of the furnace for the purpose of heating the interior of the furnace, carbon dioxide and/or steam are formed, the formation of magnesium sulphide being prevented thereby. The temperatures in this zone are at about 1000° C.

By this mode of working the above mentioned drawbacks of the known processes of decomposing magnesium sulphate are avoided. On the one hand the formation of sulphur and hydrogen sulphide is practically prevented by the use of a deficiency of coal in the middle zone and on the other hand the unchanged magnesium sulphate is likewise reduced so as to form magnesium oxide by the reducing action of the gases in the lower zone. Any reduced sulphur gases which may be formed in this zone are completely oxidized in the upper zone by the air blown in so as to form sulphur dioxide.

By the slowly rising temperatures in the middle zone it becomes also possible that in the range of higher temperatures a sufficient quantity of magnesium oxide is present to prevent the hitherto technically inevitable agglutination of the charge of the furnace. Generally a content of 50 per cent. to 70 per cent. of magnesium oxide is sufficient for the mixture when it enters the third zone of about 900° C. to 1000° C.

For carrying out the reduction there may, for instance, be used a revolving furnace with a gas-tight closure at one side and an inlet for gas and air at different parts of the furnace. Of course, an inlet for gas and air according to the conditions of the invention may likewise be mounted at other furnaces, for instance, a shaft kiln, a tunnel kiln or the like. As heating and reducing gas there may be used a gas containing hydrogen, carbon monoxide or a gasified liquid reducing agent. The reducing coal should be poor in ash.

The following example serves to illustrate the invention, but it is not intended to limit it thereto; the parts are by weight:

The upper end of a revolving furnace is charged with a mixture of 100 parts of kieserite and 8.5 parts of a granular coke from lignite. The heating gas (generator gas) and the corresponding quantities of air are introduced through burners one of which is mounted at the lowest end of the lower third of the furnace and is fed in a strongly reducing way (3 to 5 per cent. of H_2+CO remain unburnt) in order to decompose the residues of $MgSO_4$ whereas the other burner is situated at the limit between the lower third and the middle zone, the addition of air to the heating gas being regulated there so that neither a reducing nor an oxidizing but solely a neutral burning atmosphere is formed by which the temperature is brought to about 900° C. At the limit between the middle and the upper zone where the gases in the furnace have cooled to about 700° C. by the action of the material introduced a new oxidizing zone is created by the addition of air to such an extent that at the inlet end the waste gases are composed of about 1 per cent. of O_2, 18 to 20 per cent. of CO_2 and 8 to 10 per cent. of SO_2. Under these working conditions the gases contain neither other sulphur compounds nor elementary sulphur. The

product obtained is practically completely reduced and contains about 95 per cent. of MgO (residue: impurities from the kieserite and ash portions of the coal.)

If the magnesia thus obtained is to be further treated so as to obtain sintered magnesite, its high temperature is with advantage directly utilized by heating the reaction product, which by the necessary flux of iron oxide (for instance, roasted pyrites) to the mixture of kieserite and coal has been given the usual composition, to about 1400° C. in a correspondingly lined prolonged part of the furnace in an oxidizing atmosphere.

It is also possible, instead of using coal and gas, to perform the reduction with the aid of gas alone, whereby a magnesia is obtained which is free from coal ash. In this case the material is heated, in the first oxidizing zone, to about 700° C., the temperature is then slowly raised to about 1000° C., 900° C. being not exceeded until the material contains about 50 to 70 per cent. of magnesia.

The invention is of course not limited to the exact details described, for obvious modifications may occur to a person skilled in the art.

What we claim is:

1. A process of preparing magnesia and sulphur dioxide by reduction of magnesium sulphate which comprises leading the material through an oxidizing preheating zone having a temperature of about 700° C. and reducing the material in a furnace heated in the interior at temperatures rising up to about 900° C. without sintering in the presence of a reducing agent of the group consisting of coal and gas, said reducing agent being present in a quantity sufficient to effect full reduction of no more than about 50 to 70 per cent. of the magnesium sulphate to magnesia and completing the reduction at temperatures rising up to about 1000° C. while in contact with a gaseous reducing agent.

2. A process of preparing magnesia and sulphur dioxide by reduction of magnesium sulphate which comprises leading the material through an oxidizing preheating zone having a temperature of about 700° C. and reducing the material in a furnace heated in the interior at temperatures rising up to about 900° C. without sintering with coal in the presence of a neutral atmosphere, said coal being present in a quantity sufficient to effect full reduction of no more than about 50 to 70 per cent. of the magnesium sulphate to magnesia and completing the reduction at temperatures rising up to about 1000° C. while in contact with a gaseous reducing agent.

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