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Decomposition Points of Some Sulphates in an Air Current

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furnaces themselves, more exact data is wanted on such decomposition points.

The purpose of this work was to determine a few of these decomposition points of the sulphates. The work has already been done without doubt, but the results have never appeared where they are readily accessible, and have certainly not been copied in our more recent books. This determination was not made with the great accuracy that the physical chemist might desire, but rather more to simulate the actual conditions existing in a roasting furnace, that is, in a current of air such as would pass over the materials in a roasting furnace.

The method employed was to insert a porcelain boat, carrying the sulphate in a porcelain combustion tube, into a combustion furnace. Lying on the surface of the sulphate in the boat was the hot junction of a Le Chatelier thermo-couple, previously carefully standardized, the cold junction being in melting ice. Connected to the one end of the combustion tube was a three-mouthed bottle containing a solution of caustic soda carefully neutralized with sulphuric acid, using methyl orange as an indicator. The connecting tube ended in a glass tube dipping well below the surface of the liquid in the three-mouthed bottle. Through the central mouth passed the stem of a separatory funnel, in the bulb of which was placed a dilute solution of caustic soda. Finally the third mouth of the bottle was connected with an aspirator for producing the necessary air current through the apparatus. As decomposition took place the SO_2 and SO_3 passed along with the air current into the liquid in the bottle and affected the indicator. The introduction of caustic soda from the separatory funnel allowed of this acid being neutralized and served to keep the apparatus in continuous working order. Some idea, only qualitative, could be gained as to the rate of decomposition by the amount of caustic soda added to keep the indicating solution neutral.

The results obtained on the sulphates studied were as follows:

FeSO_4 : The first traces of decomposition showed themselves at 550°C . The increase was but slight up to 580°C . and then became more rapid until 600°C . was reached when there was a sudden increase. On heating for two hours at this temperature all decomposition seemed to have stopped as only very slight traces appeared on further heating to 650°C . No further traces were noted between this last temperature and 960°C ., the highest temperature attainable in the test.

CuSO_4 : The first traces of acid appeared at 400°C . Only slight amounts were noted as the temperature was slowly increased to 690°C ., when a very rapid evolution took place. A further trace was obtained at 700°C ., and then no more up to 900°C ., the highest temperature attained in this investigation.

ZnSO_4 : The first traces of decomposition appeared at 730°C ., more appearing at each increase of temperature up to 760°C ., when the decomposition was very rapid. All the acid seemed to have been removed at this temperature for no more was found on raising the temperature to 980°C .

In all cases the experiments were repeated several times and gave almost identical temperatures for each stage at each repetition, the points seemingly very markedly characteristic of each salt.

Data of this nature needs no further comment as to its value to the roaster, showing the minimum temperature at which the furnace may be run for complete decomposition and the limits which need not be exceeded for producing the same result.

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Decomposition Points of Some Sulphates in an Air Current.

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It has been rather disappointing to look in the many new treatises on chemistry and metallurgy and find such statements as "ferrous sulphate decomposes at a low red heat" or other equally vague statement. This decomposition point of the sulphates is of very great importance in all roasting operations, and now that fuel economy is being forced down our throats (because we would not take it in any other way), and the pyrometer is now as integral a part of our plant as the