

different positions—ortho-, meta-, para-, etc. It can be shown that even a small difference in the activation energy of 5 per cent. will lead to difference in rate of substitution of more than a power of 10. This in turn will be reflected in the yield of the product. Combined with the normal errors in the estimates of yield in an average preparation of an organic compound, secondary products of a side reaction can be readily missed if the proportion is small, as will be the case here. One can legitimately conclude, then, that the experimental observations and theoretical requirements of the systems of the type of hydrindene do not require a static picture of the type postulated by Mills and Nixon. The fusion of a saturated ring to an aromatic system need not necessarily involve any appreciable change in the bond angles or in the bond distance of the common bond. The relative ease of substitution can be readily accounted for by a consideration of the polarising force of the substituents as well as the reactant molecules. There is no doubt that further investigation and accurate data are needed for a full appreciation of the problem.

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## GEOMAGNETIC STORMS

GEOMAGNETIC activity during the quarter January-March 1947 was on the increase as compared with the previous quarter. Some details of the geomagnetic disturbances recorded at the Alibagh Magnetic Observatory during the quarter January-March 1947 are given in the following table in which  $t_0$  and  $t$  represent the time (I.S.T.) of commencement of the disturb-

ance and its intense phase respectively, and T the duration of the intense phase expressed in hours. The ranges in the three different elements (D, H and V) of the earth's magnetic field have also been given, D, in minutes of arc, H and V in  $\gamma$  where  $1\gamma = 10^{-5}$  gauss. The maximum *k-index* recorded during the disturbances have also been given.

Date	$t_0$	$t$	T	Range			$k_m$	Nature of commencement
				D	H	V		
1947								
January, 16-17	h. m. 8 57	h. m. 8 57 on 16th	hrs. 5½	min. 5·8	$\gamma$ 153	$\gamma$ 58	6	Sudden
January, 24-27	About 10 00	10 21 on 25th	7	5·8	258	64	6	Gradual
February, 16-17	8 29	15 38 on 16th	9	5·1	366	88	8	Sudden
March, 2-3	9 29	13 45 on 2nd	7	7·8	434	77	8	Sudden
March, 8-9	About 11 30	11 30 on 8th	12	4·1	330	45	6	Gradual
March 15	14 12	14 12	8	4·6	199	35	6	Sudden