

SUBJECT - CHEMISTRY
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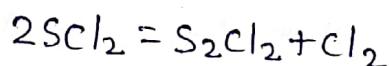
TOPIC - SULFUR CHLORIDES

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The chlorination of molten sulfur gives S_2Cl_2 , which is an orange liquid of revolting smell. By using an excess of Cl_2 , with traces of $FeCl_3$ or I_2 as catalyst, at room temperature, an equilibrium mixture of S_2Cl_2 (-85%) and S_2Cl_2 is obtained.

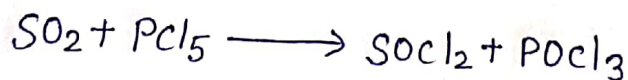
The dichloride (S_2Cl_2) readily loses chlorine within a few hours, as in the equilibrium of Reaction



but it can be obtained pure as a dark red liquid by fractional distillation in the presence of PCl_5 , which stabilizes S_2Cl_2 .

Sulfur chlorides are solvents for sulfur, giving dichloro-sulfanes up to about $S_{10}Cl_2$. These compounds are used in the vulcanization of rubber and are also useful as mild chlorinating agents.

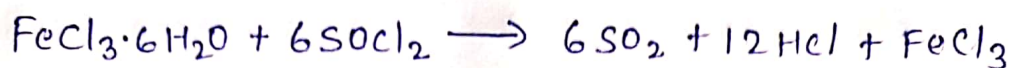
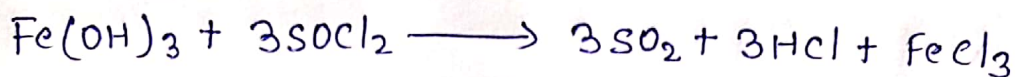
Thionyl chloride ($SOCl_2$) is obtained by Reaction



It is a colorless fuming liquid (bp $80^\circ C$) that is readily hydrolyzed as in Reaction

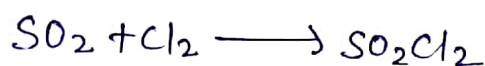


Because the products of reactions such as are volatile (and therefore easily removed) thionyl chloride is often used to prepare anhydrous chlorides, such as iron(III) chloride as in Reactions.



Thionyl chloride has a pyramidal structure with sulfur at the apex. Sulfur can be considered to be sp^3 hybridized, and it should be classified as an AB_3E system.

The presence of one lone pair on sulfur allows thionyl chloride to act as a weak Lewis base. Some $d\pi-p\pi$ bonding between S and O is present. Sulfuryl chloride (SO_2Cl_2) is obtained by reaction



The reaction requires a catalyst such as FeCl_3 . Sulfuryl chloride is a colorless liquid that fumes in air, due to hydrolysis. It finds use as a chlorinating agent for organic compounds. The structure of sulfuryl chloride may be considered to be derived from a tetrahedron.