TDC Part I
Inorganic Chemistry

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TOPIC:- Halogen Oxides

Halogen Oxides

A large number of halogen oxides are known (Table 26), some of which are unstable.

Table 26: Compounds of Halogens with Oxygen

Fluorides		Oxides					
Compound	Oxidation Sate	Chlorine Compound	Oxidn State	Bromine Compound	Oxidn State	Iodine Compound	Oxidation State
OF_2	-1	Cl_2O	+1	Br_2O	+1	I_2O_5	+5
O_2F_2	-1	ClO_2	+4	BrO_2	+4		
		Cl_2O_6	+6	BrO_3	+6		
		Cl_2O_7	+7				

The binary compounds of fluorine and oxygen are referred to as fluorides. The most stable oxide is I_2O_5. The oxides of chlorine and bromine decompose readily. The bonds are largely covalent due to small electronegativity difference, however some ionic character is noted in iodine oxides. ClO_2 and Cl_2O find some practical importance as bleaching agents and germicides, while I_2O_5 is used in estimation of carbon monoxide

$$I_2O_5 + 5CO \longrightarrow I_2 + 5CO_2$$

The reaction is quantitative and the liberated iodine may be estimated by titration with sodium thiosulphate

$$I_2 + 2Na_2S_2O_3 \longrightarrow 2NaI + Na_2S_4O_6$$

The structures of some halogen oxides are shown in Fig 29.

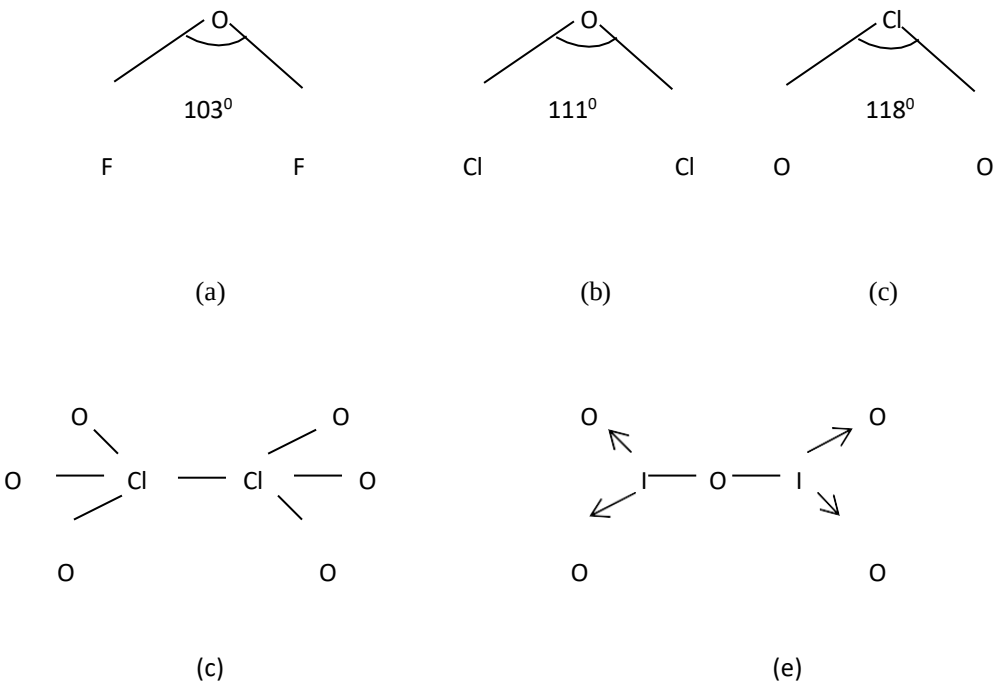

Fig. 29: The structures of (a) OF_2 (b) Cl_2 O (c) ClO_2 (d) Cl_2O_6 (e) I_2 O_5

The structure of OF_2, Cl_2O and Br_2O are all related to a tetrahedron with two positions occupied by lone pair of electrons (like H_2O). Repulsion between the lone pairs reduces the bond angle in F_2O from the tetrahedral angle of $109^0\ 28^l$ to 105^0. In Cl_2O and Br_2O, the bond angles increase due to steric crowding of the large halogen atoms.