

## REACTIONS OF OXO ANIONS WITH HALOGEN AND NOBLE GAS FLUORIDES

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An excess of  $\text{BrF}_5$  when reacted with  $\text{MNO}_3$  ( $\text{M}=\text{Cs}, \text{Rb}, \text{K}, \text{Na}$ ) produces the corresponding  $\text{MBrF}_4\text{O}$  salts and  $\text{FNO}_2$  in quantitative yields under mild conditions. With  $\text{LiNO}_3$  the products are  $\text{LiF}$ ,  $\text{FNO}_2$  and  $\text{BrF}_3\text{O}$ . These reactions represent new, simple, one step syntheses for  $\text{BrF}_4\text{O}^-$  salts,  $\text{BrF}_3\text{O}$  and  $\text{FNO}_2$  from commercially available starting materials.  $\text{NaBrF}_4\text{O}$  and  $\text{RbBrF}_4\text{O}$  are new compounds and were characterized by vibrational spectroscopy, DSC and their x-ray powder diffraction patterns. With  $\text{Cs}_2\text{SO}_4$ , an excess of  $\text{BrF}_5$  forms  $\text{CsSO}_3\text{F}$  and  $\text{CsBrF}_4\text{O}$ , whereas with  $\text{CsIO}_4$  it produces cis- and trans- $\text{CsIF}_4\text{O}_2$  and  $\text{BrF}_3\text{O}$ . When in the  $\text{LiNO}_3$ - $\text{BrF}_5$  system a large excess of  $\text{LiNO}_3$  is employed, the primary reaction products are  $\text{LiF}$ ,  $\text{BrONO}_2$  and  $\text{N}_2\text{O}_5$ . With an excess of  $\text{IF}_5$ ,  $\text{CsNO}_3$  produces  $\text{CsIF}_4\text{O}$  and  $\text{FNO}_2$  which forms with an excess of  $\text{IF}_5$  the unstable  $\text{NO}_2^+\text{IF}_6^-$  adduct. With  $\text{IF}_7^-$   $\text{CsNO}_3$  forms first  $\text{CsIF}_6 + \text{O}_2$ , followed by the displacement reaction  $\text{IF}_6^- + \text{IF}_7^- \longrightarrow \text{IF}_8^- + \text{IF}_5$  and adduct formation  $2\text{IF}_5 + \text{IF}_6^- \longrightarrow (\text{IF}_6 \cdot 2\text{IF}_5)^-$ . With  $\text{XeF}_6$ ,  $\text{CsNO}_3$  underwent a complex reaction producing  $\text{CsXeO}_2\text{F}_3 \cdot \text{XeF}_2$ ,  $\text{O}_2$ , and  $\text{FNO}_2$ .