*Hummers' Method for*

# Synthesis of Graphitic Oxide

1. Stir 100g of powdered flake graphite and 50g of sodium nitrate ($NaNO_3$) into 2.3L of 66° Baumé technical sulfuric acid ($H_2SO_4$) in a large jar held at 0°C in an ice bath.
2. Add 300g of potassium permanganate ($KMnO_4$) while maintaining "vigorous agitation". Control the rate of addition as to prevent the temperature from exceeding 20°C.
3. Remove from the ice bath and bring the temperature to 35±3°C for 30 minutes. At 20 minutes, the mixture should become pastey and brownish gray.
4. At the end of 30 minutes slowly stir 4.6L $H_2O$ into the paste. Violent effervescence and an increase in temperature to 98°C should result. The solution should remain at this temperature for 15 minutes.
5. Dilute further from 14L warm $H_2O$ and treat with 3% hydrogen peroxide ($H_2O_2$). The solution should turn a bright yellow upon $H_2O_2$ treatment.
6. While still warm, filter the solution.
7. Wash the yellowish-brown filter cake 3 times with a total of 14L warm $H_2O$.
8. Disperse the graphitic oxide residue in 32L $H_2O$ to approximately 0.5% solids. Remaining salt impurities can be removed by treating with resinous anion and cation exchangers.
9. The dry form of graphitic oxide is obtained by centrifugation followed by dehydration at 40°C over phosphorus pentoxide ($P_4O_{10}$) *in vacuo*.