## Answer on Question #64224, Chemistry / General Chemistry

During a laboratory activity one of your classmates decides to perform an unauthorized experiment and mixes 250ml of household bleach solution with excess 1mol/L hydrochloric acid solution. The short term exposure limt for Cl gas is 1ppm. Detriment if this unauthorized experiment has surpassed the expouser limit for Cl gas assuming the room can holds 1.2x10^4L of air.

Solution:

$NaClO + 2 HCl \rightarrow Cl_2 + H_2O + NaCl$
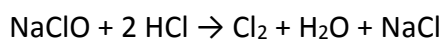
Household bleach is 3 - 8% NaClO, so assume a 5% solution by mass.

250ml x 5%NaClO = 12.5 g

M (NaClO) = 74.44 g/mol

NaClO is the limiting reactant so from the mass you can calculate the mol Cl_2

n = m/M = 12.5 / 74.44 = 0.168 mol NaClO which will give 0.084mol Cl2

The relationship, 1mol ideal gas = 22414ml at STP

1mol / 22414ml = 0.084mol / x ml

x = 22414 ml * 0.084 mol / 1 mol = 1882. 8 ml

1ppm = 1ml Chlorine in 1 000 000 ml of Air

In the lab, there are 12 000 000 ml of Air, so we only need to find if more than 12 ml Cl

Therefore, at STP, we have 1882.8 ml and you have exceeded the 1 ppm limit.

Answer: 1882.8 ml