Answer on Question #54378 – Chemistry – Organic Chemistry

Question:

How would you prepare chloroform from ethanole and acetone ? Write all the steps involved in these methods.

Answer:

1) It can be prepared from ethanol in reaction with bleaching powder and water:
   a) $CaOCl_2 + H_2O \rightarrow Ca(OH)_2 + 2HClO$ (hydrolysis of bleaching agent)
   b) $HClO + C_2H_5OH \rightarrow C_2H_4O$(acetaldehyde) $+ HCl + H_2O$
   c) $HClO + HCl \rightarrow Cl_2 + H_2O$
   d) $3Cl_2 + C_2H_4O \rightarrow CCl_3\text{-}CHO$ (chloral) $+ 3HCl$
   e) $2CCl_3\text{-}CHO + Ca(OH)_2 \rightarrow 2CHCl_3 + Ca(HCOO)_2$
2) Haloform reaction for acetone:
   a) $CaOCl_2 + H_2O \rightarrow Ca(OH)_2 + 2HClO$ (hydrolysis of bleaching agent)
   b) $HClO + C_2H_5OH \rightarrow C_2H_4O$(acetaldehyde) $+ HCl + H_2O$
   c) $HClO + HCl \rightarrow Cl_2 + H_2O$
   d) $3Cl_2 + CH_3\text{-}CO\text{-}CH_3 \rightarrow CCl_3\text{-}CO\text{-}CH_3 + 3HCl$
   e) $2CCl_3\text{-}CO\text{-}CH_3 + Ca(OH)_2 \rightarrow 2CHCl_3 + Ca(CH_3COO)_2$

   f) Haloform reaction (Preparation from acetone):

$3\ NaClO + CH_3\text{-}CO\text{-}CH_3 \rightarrow CHCl_3 + 2NaOH + Na(CH_3COO)$