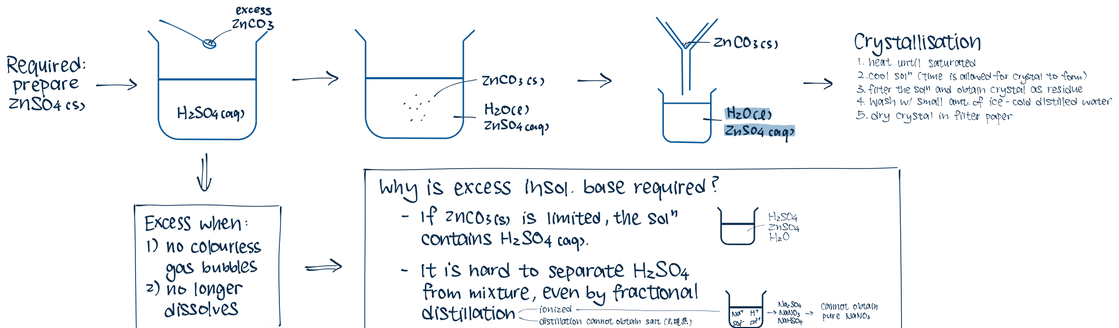
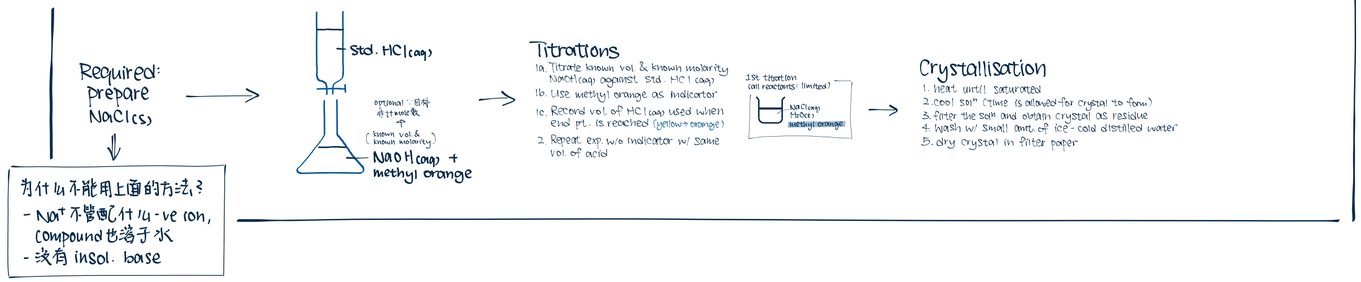
Preparation of salt

1 Soluble salt

ACID – BASE ⟶ EXCESS INSOL. BASE + ACID

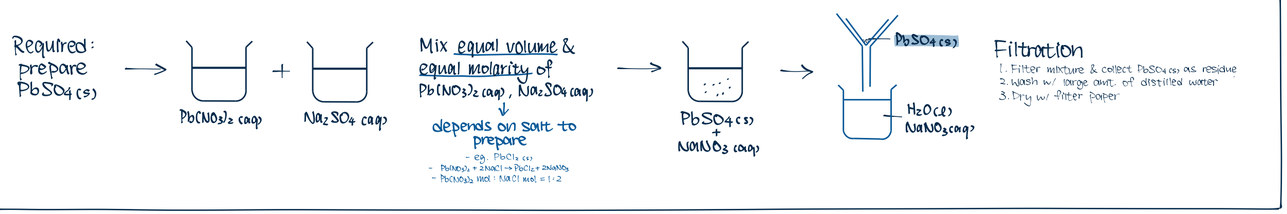


ACID-BASE ⟶ TITRATION OF SOL. BASE + ACID



2 Insoluble salt

PRECIPITATION



SPECIAL CASE: prepare $NaHSO_4$ (s)

- H_2SO_4 的 ionization 其实有两个步骤:
  a. $H_2SO_4 \rightarrow H^+ + HSO_4^-$
  b. $HSO_4^- \rightarrow H^+ + SO_4^{2-}$
- 如何通使 H_2SO_4 只 ionize 一次?
  > 只提供 complete rx 所需 mole 一半的 H_2SO_4 (aq).
  > 本来: $2NaOH + H_2SO_4 \rightarrow Na_2SO_4 + 2H_2O$, $NaOH : H_2SO_4 = 2 : 1$
  > 如果要成: $NaOH : H_2SO_4 = 1 : 1 \Rightarrow NaOH + H_2SO_4 \rightarrow NaHSO_4 + H_2O$
- 如何确保 $NaOH : H_2SO_4 = 1 : 1$? → Procedure
  > Mix equal volume & equal molarity of NaOH (aq) and H_2SO_4 (aq).
  > Heat soln until saturated then cool soln.
  > Time is allowed for crystal to form.
  > Filter the soln, obtain crystal as residue.
  > Wash crystal w/ little amt. of ice-cold distilled water.
  > Dry crystal in filter paper.

  } Crystallisation
- Tip: 其他同类型的 salt 也能通过控制 mole ratio 而获得.
  > $H_3PO_4 \rightleftharpoons H^+ + H_2PO_4^-$ —— $1NaOH + 1H_3PO_4 \rightarrow NaH_2PO_4 + H_2O$
  $H_2PO_4^- \rightleftharpoons H^+ + HPO_4^{2-}$ —— $2NaOH + 1H_3PO_4 \rightarrow Na_2HPO_4 + 2H_2O$
  $HPO_4^{2-} \rightleftharpoons H^+ + PO_4^{3-}$ —— $3NaOH + 1H_3PO_4 \rightarrow Na_3PO_4 + 3H_2O$
  (mole ratio 通过控制 volume / molarity 改变)