Introduction to acids

1 Definition - Arrhenius Rule

- Hydrogen-containing **covalent compound** that **dissolves in water** to ionize H^+ as the **only positive ion**. → ionization (离子化)
- $[H^+] > [OH^-]$
- eg.
  - > $HCl_{(aq)} \rightarrow H^+ + Cl^-$
  - > $H_2SO_{4\,(aq)} \rightarrow 2H^+ + SO_4^{2-}$

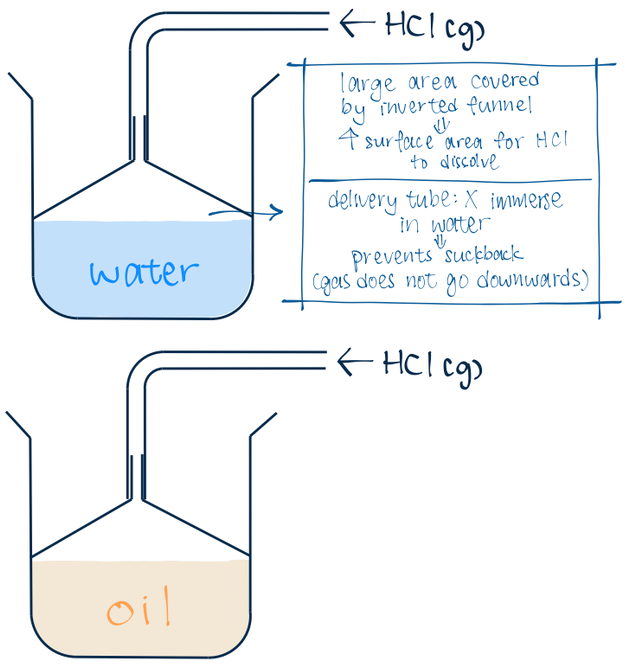
2 Acidic properties

- tastes sour
- conducts electricity (∵ ✓ mobile ions)
- reacts w/ bases / other substances

3 Importance of water to acids

- acids must be dissolved in water to possess acidic properties
  (Arrhenius rule: "... dissolves in water to ionize H^+ ..." → X water = X H^+)

EXPERIMENT TO DEMONSTRATE WATER'S IMPORTANCE



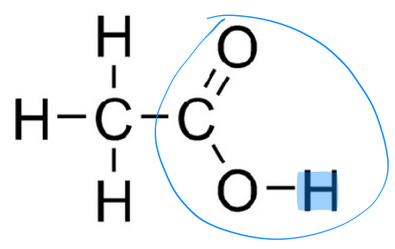
1. Pump $HCl_{(g)}$ into water and oil respectively.
2. Use **blue litmus paper** to test if the liquids are acids.
   - > water: blue → red
   - > oil: remains blue

↳ Only HCl dissolved in water exhibits acidic properties

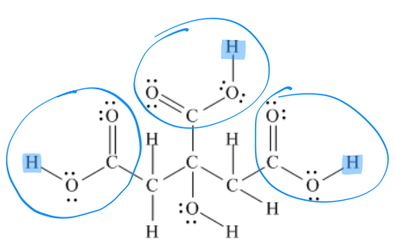
- 可不可以用加 iron → 看有没有 0C (应是 colourless gas bubbles) 的方法判断是不是 acid?
  - ↳ 不可以 ∴
  - ↳ oil 一开始也会有气泡 (泵气进液体自然会产生气泡), 但之后因 HCl 溶进油里了 (HCl 为 SMS, 并且 non-polar, like dissolves like) 气泡会消失

4 注意点

1. Dilute acids 不一定是 corrosive, 保险起见写 irritant 较好
2. Acidic gas (除了 CO_2) 都是 corrosive (吸入体内, 在肺泡少量的水 ionize 成 acid ⇒ concentrated)
3. 如果 acid 有 COOH, 则**只有 COOH 里面的 H** 才会 ionize 成 H^+
   - ∴ acid molecule 里面 H atoms 的数量不代表 acid (completely ionize 后) 掉落 H^+ 的数量
   - eg 1. $CH_3COOH \rightleftharpoons CH_3COO^- + H^+$



   - eg2. citric acid (tribasic)



5 Acids 的分类

1. strong vs weak acids
2. conc. vs dilute acids
3. basicity

} 影响 pH

4. mineral acid vs organic acid
   - obtained from minerals / living things
   - mineral acids: HCl, H_2SO_4, HNO_3, H_3PO_4 ...
   - organic acids: CH_3COOH (ethanoic acid), citric acid ...