# Reactions: acid-R.A.s

# Redox reactions > For more info on redox reactions, see 7) Redox reactions, chemical cells & electrolysis

- \* transfer of electrons
- -> forming of ionic compounds
- -> acid-metal reactions
- $\times$  acid-base reactions (it it transfer of  $\underline{H}^{\dagger}$  Naci+Hz0  $\Rightarrow$   $\underline{H}^{\dagger}$ +OH  $\Rightarrow$  Hz0
- 左吸有用
- $R.A. \xrightarrow{et} O.A.$ reducing agent,还原别人 Oxidorting agent,氧化别人

## 2 Acid-metal reactions

- G Pb+2HCl→PbClz+Hz

#### →★这是liquid H2SO4

- Dilute HzSO4 (K>Pb)
  - => 2H++Zn > Hz+Zn2+
- conc. HzSO4 (all metals) > 2e + 2H+ + Hz SO4 -> SO2 + HzO +zn( > ZN -> Zn2+ + Ze -> 沒抓成萬子(:: liquid)

→ H<sup>+</sup>被转換至OH¯→形成水→并沒有电子转换

- $\Rightarrow$  2H++HzSO4+ Zn  $\Rightarrow$  SO2 + HzO + Zn<sup>2+</sup>
- ☆ 这还是写full equ. 比较好(不知道salt 落下溶水,不落水不脱写成 ton)
- $C > 2H^{+} + 804^{2} + Pb + HzSO_{4} \rightarrow PbSO_{4} + 80z + 2HzO$ (> Plo + 2Hz804 -> PloS04 + 80z + 2Hz0

#### HNO3

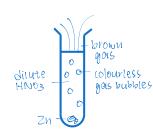
# - Very dilute HNO3 (K→Pb) > $2e^- + 2H^+ \rightarrow H_2$ +2n( > $Z_N \rightarrow Z_N^{2+} + 2e^-$

=> 2H++Zn>+Z+Zn2+

### - dilute HNO3 (ag) (all metals)

$$> 63e^{-}+4H^{+}+N03^{-}\rightarrow N0+2H_{2}0$$
  
+zn( $> 32n \rightarrow 32n^{2+}+2e^{-}\rightarrow 可以抓一定要抓!$ 

- $\Rightarrow 8H^{+} + 2NO_{3}^{-} + 3Zn \Rightarrow 2NO + 4H_{2}O + 3Zn^{2+}$
- & 附加一条公式: 2NO+O2→2NO2



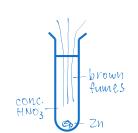
NO不溶于水 >产生
colourless gas bubbles

colourless gas bubbles

NO在离开水后会与空气里
的Oz react 成NOz (棕色)

#### >尽管是 (onc.还是 ng

=> 4H++2NO3+2NO2+2H2O+Zn2+



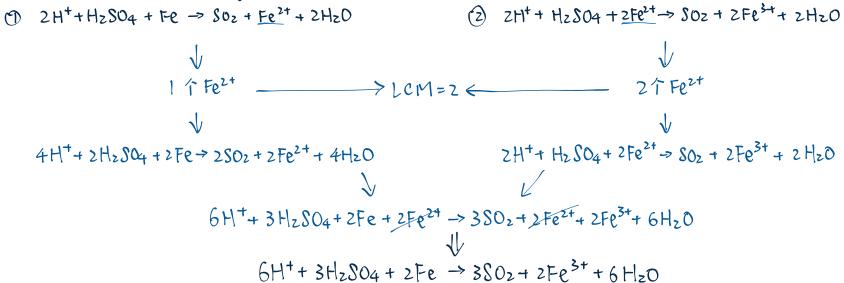
NO2虽然溶于水可是沒有足够的水

### 4 Acid - non-metal reactions

- R.A. < Carbon  $\rightarrow$  2H<sub>2</sub>O+C  $\rightarrow$  CO<sub>2</sub>+4H<sup>+</sup>+4e<sup>-</sup> Sulphur  $\rightarrow$  2H<sub>2</sub>O+S  $\rightarrow$  SO<sub>2</sub>+4H<sup>+</sup>+4e<sup>-</sup>
- O.A. (only conc. Hz804) -> 2e+2H++Hz804 -> 802 + 2Hz0
- 2H2O+C+4H++2H2SO4 -> CO2+41+++2SO2+4H2O  $\Rightarrow$  C+2HzSO<sub>4</sub>  $\Rightarrow$  CO<sub>2</sub>+2SO<sub>2</sub>+2H<sub>2</sub>O
  - 2 H2O+S+4H++2H2SO4 -> SO2+4H++2SO2+4H2O
  - $\Rightarrow S + 2H_2SO_4 \rightarrow 3SO_2 + 2H_2O$

### 5 Acid-metal ion reaction

- R.A. metal ions especially > Fezt Fezt -> Fezt + e
- O.A. only conc. HzSO4 -> 2e+2H++HzSO4 -> SOz + 2HzO
- C> 2Fe2+ + 2H+ + HzSO4 → 2Fe3+ SO2+ 2H2O
- : Hz804 ce) + Fe will undergo 2 reactions



# 6 Differentiating conc. / dilute acids

	dilute HCI (ag)	conc. Hz SO4 ce)	conc. HNO3 (ag)
Pb	Pb+2HCl→ PbClz+Hz  (> white precipitate	Pb+2HzSO4 → PbSO4 + SOz + 2HzO  Gwhite precipitate Genoking smell	$4H^{\dagger} + Pb + 2HNO_3 \rightarrow Pb^{2+} + 2NO_2 + 4H_2O$ G brown fumes
Си	X Reaction	2H++ Cu+ HzSO4 -> Cu2+ + SOz+2HzO  (> colourless solution -> blue (> choking smell	4H++Cu+2NOz-> Cu2++2NOz+2HzO  Golourless Solution > blue Gorown fumes