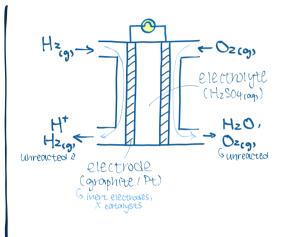
1 Principle

- Combustion of fuel (fuel + 0z -> ...)
- hazard warning labels: flammable + oxidizing fuel(燃料) Oz(助燃料)
- advantages
- 5 eg. for hydrogen fuel cells
- > environmentally friendly as water is produced
- > high energy efficiency.
- 女問意 electrolyte 方 acidic/alkaline medium
 - > acidic: OH- TOH+
 - > alkaline: H+ to OH-
 - > Carbonate $(CO3^2)$: 转版 acidic medium $(OH^- 1) > H^+)$, 再加 $CO3^{2-} (2H^+ + CO3^2) \rightarrow CO2 + H_2O)$

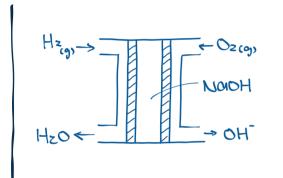
2 Examples

HYDROGEN FUEL CELLS, ACIDIC MEDIUM



- A: Hz > 2H++2e= Colordic medium 二不用变
- C: 4H++ Oz + 2H2O+4e->40H-+4H+ C> 4e + 4H + O≥ → ≥H≥O
- => 2H2 + O2 → 2H2O
- > +ve: environmentally friendly as water is produced -ve: explosive (: Hz)

HYDROGEN FUEL CELLS, ALKALINE MEDIUM.

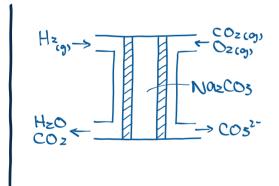


- A: $20H^{+}H_{z} \rightarrow 2H^{+} + 2e^{-} + 20H^{-}$ $\Rightarrow 20H^{-} + H_{z} \rightarrow 2H_{z}0 + 2e^{-}$ C: $O_{z} + 2H_{z}0 + 4e^{-} \rightarrow 40H^{-}$

 \Rightarrow $2H_2 + O_2 \rightarrow 2H_2O$

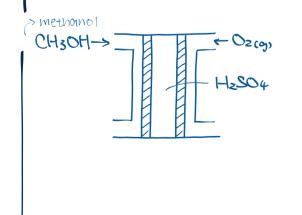
5 tue/-ve same as acidic medium cell

HYDROGEN FUEL CELLS, CARBONATE MEDIUM -

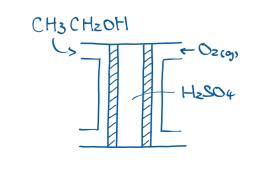


- A: CO32+ Hz > 2H++2e+ CO32 G CO32-+H2→CO2+H2O+20-
- 一先变做 a cidit medium C: 4H++ Oz + 2H2O+4e->40H-+4H+ C> 2 CO32+ Oz + 4H+ + 4e- -> 2H2O + 2CO32-GO2+2CO2+2H2O+4e → 2H2O+2CO22 $6 + 200_2 + 4e^- \rightarrow 200_3^{2-}$
- => 2Hz + O≥ > 2H≥0
- > tue/-ve same as acidic medium cell

OTHER FUEL CELLS



- C: 4H++ 02 + 2H2O+4e->40H-+4H+ C> 4e + 4H + O≥ → ≥H≥O
- > full eqn: CH5OH + O2 → H2O+CO2 A: H20+ CH30H -> CO2+6H+60-
- 4e + 4H+ 02 -> 2H20
 - +) H2O+CH3OH -> CO2+6H+60 2CH3OH+302→4H2O+2CO2



- C: 4H++ Oz + 2H2O+4e->40H-+4H+ C> 4e-+4H++02 -> 2H20
- A: 3H2O+ CH3CH2OH -> 2CO2 + 12H+12e
- 4e + 4H+ 02 -> 2H20
- +) 3H2O+ CH3CH2OH -> 2CO2+12H++12e CH3CH2OH+302→3H2O+2CO2

For hydrogen fuel cells

- overall egn.
 - > 无论如何也是 2Hz + Oz -> 2HzO
- Acidic medium
 - > Anode: H+, Cathode: H20
- Alkolline medium
 - > Anode: 1-120, conthode: OH