

Why Formic Acid?



BChE.ITB

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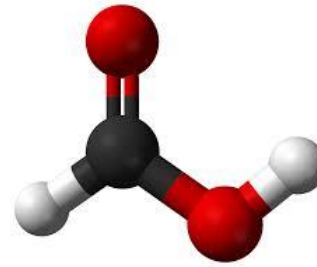
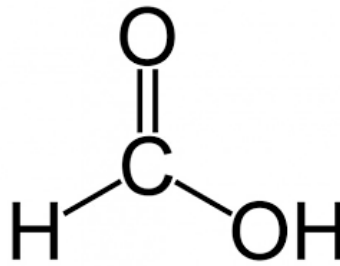
Bandung Institute of Technology (Indonesia)

Bioenergy Engineering and Chemurgy

FY 2022 1st meeting of ERIA working group on Future Mobility Fuel Scenario

January 23th 2023

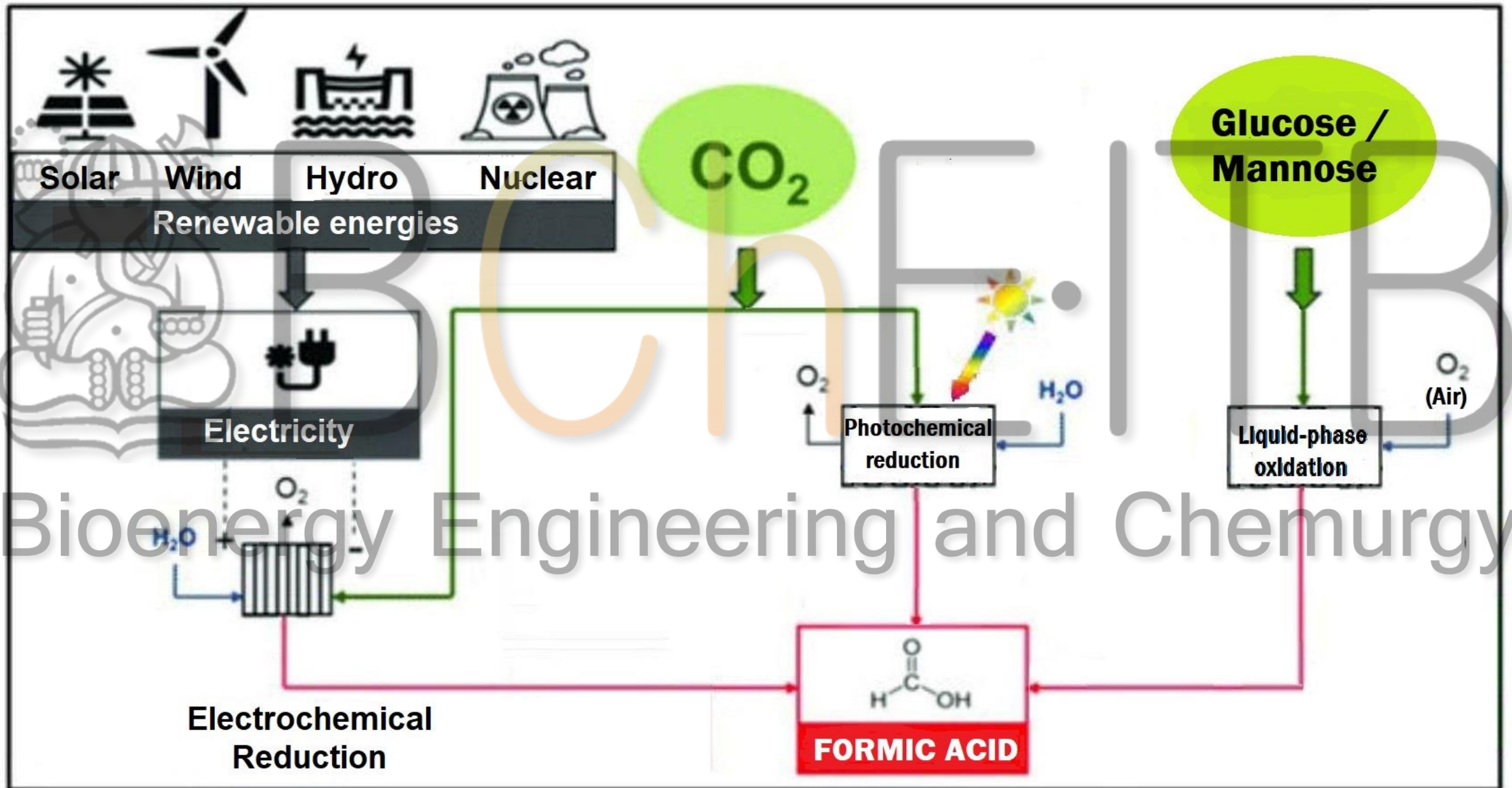
What is formic acid?



- Clear liquid, pungent odor, sharp taste;
- corrosive (rather strong acid);
- $T_{\text{freezing}} = 8,4 \text{ }^{\circ}\text{C}$;
- $T_{\text{boiling}} = 101 \text{ }^{\circ}\text{C}$;
- $\rho = 1,22 \text{ kg/L}$;
- Molecular weight $M_r = 46,03 \text{ g/mol}$.
- 2 gram of H_2 in 38 ml liquid!.



Routes of formic acid production





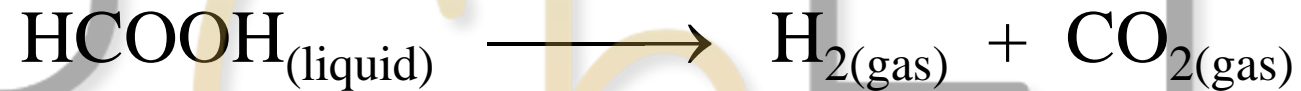
**25 kW formic acid fuel cell electricity
generating unit**



Formic acid fuel cell powered bus

Hydrogen generation from formic acid (in the vehicles fuel tank)

- In contact with noble metal catalysts (Pd > Pt > Au > Ag) nearby room temperature, formic acid will decomposes into hydrogen and carbon dioxide (CO₂) :



- If necessary, the hydrogen produced can be separated from its mixture with CO₂ using membrane technology.
- The (purified) hydrogen can then be burned in the IC engine.



energies (2022)



Review

Hydrogen Internal Combustion Engine Vehicles: A Review

Kamil Wróbel ^{1,*} , Justyna Wróbel ^{2,*}, Wojciech Tokarz ¹, Jakub Lach ¹, Katarzyna Podsadni ³ 
and Andrzej Czerwiński ⁴



THANK YOU VERY MUCH

for your attention

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