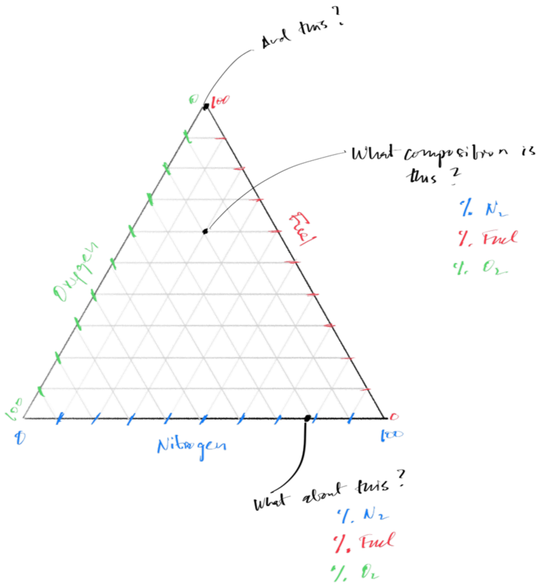
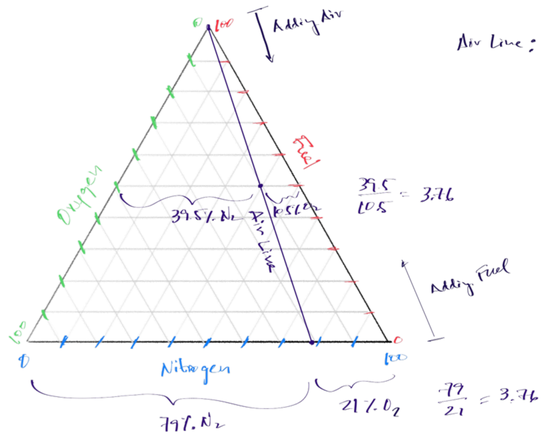




Air Line: $-\frac{100}{79} \cdot N_2 + 100 = Fuel$

Example Question:

If I add fuel to air until I have 50% fuel, how much oxygen is present?

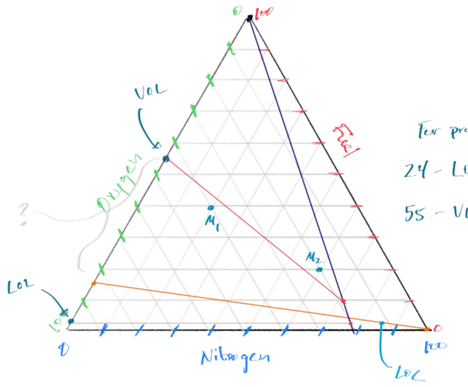
- Option 1 - Solve with chart
- Option 2 - Ratio $\frac{N_2}{O_2} = 3.76$

$0.5 = X + 3.76X$ (O_2)

$X = 0.105$

$C_3H_8 + 2O_2 \longrightarrow CO_2 + 2H_2O$

For every 1 molecule of C_3H_8, 2 molecules O_2



For propane,

24 - LOL - Lower flammability limit in pure oxygen

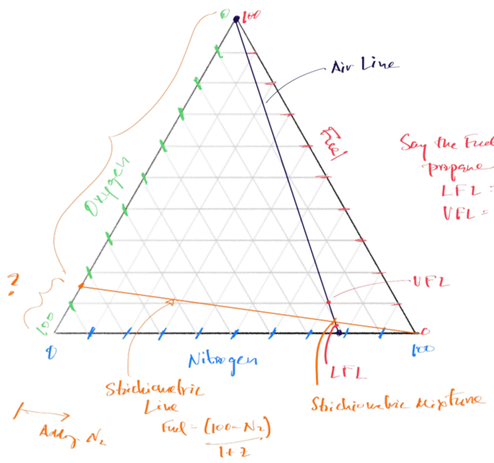
55 - VOL - Upper

LOC - Limiting oxygen Concentration

propane: N_2/air 11.5, CO_2/air 14.5

Example Question

- What does the flammability zone/region encompass
- Is composition x, y, z flammable?
- Composition, C_1, has a fuel concentration $> UFL_1$, is it flammable after I've tried to inert the atmosphere with N_2?
- If I mix 50% M_1 w 50% M_2 what is my resulting composition?
- Where could I expect soot to form?
- How to estimate key points on the plot?



Say the Fuel is propane

LFL = 2%

UFL = 9.8%

$C_3H_8 + O_2 \longrightarrow CO_2 + H_2O + CO + H_2 \ldots$

stoichiometric:

$C_3H_8 + 5O_2 \longrightarrow 3CO_2 + 4H_2O$

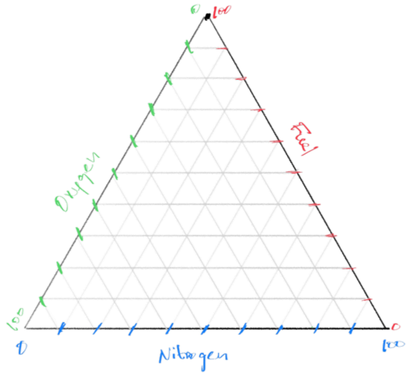
$\frac{1}{1+5+3.76\cdot5} = 0.04$

Example Questions

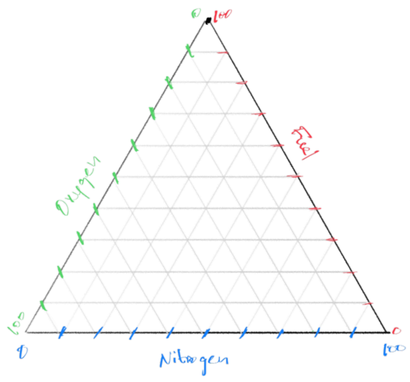
- Draw the Stoichiometric line
- Is a fuel concentration of x, y, z (fuel, N_2, O_2) stoichiometric?

$\frac{x}{2} = ?$ $\frac{2}{1+2} = ?$

What does the flammability diagram for H_2 look like?



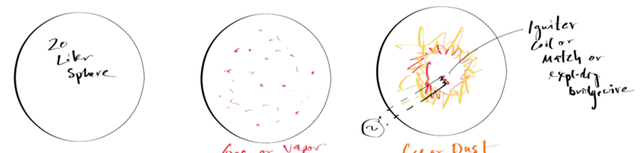
What does the flammability diagram at T = 50°C for H_2 look like?

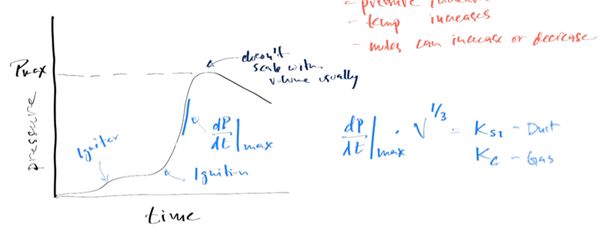


How is dust flammability similar or different?

- LEL, UFL, VOL, LOL, LOC?
- Could you draw a flammability diagram?
- What about particle size? < 400 μm dia
- What about Minimum Ignition Energy?
- What about dispersion uniformity? Uniform?

Dust / Gas Explosibility





Example Question:

- Given a K_{St} value, what is the $\frac{dP}{dt}\Big|_{max}$ for a given Volume?
- Given K_G, please size a relief panel or valve