Quiz 8c — Tips & Practice Problems

disclaimer: Of course, this worksheet doesn't cover everything that might be on Quiz 8. (or later, on Exam 4)

- Carbon Cycle for atmosphere, to remove & **add** CO_2: page 124 pairs - (into ocean & **from ocean**), (photosynthesis & **respiration**), (reforestation & **deforestation**), **burn fossil fuels**. CO_2-storage in carbonate minerals + fossil fuels, ocean, sand/silt, soil, atm, forest.

- Use page 378 and lectures (#30-Nov26, #31-Nov28) to know **properties-and-uses** (related!) for plastics in Big Six. (later, nylon,...)

- Energies of Combustion: it's "more fair" to compare kJ/gram, not kJ/mole. (e.g. in lab, $C_{135}H_{96}O_9NS$ vs $C_{40}H_{82}$ in kJ/g, 10 g each)
- **octane rating** and **fuel energy** are not correlated: e.g., n-octane (low octane, -20) has more kJ/g than ethanol (high octane, 108).

1. What has more fuel-energy in kJ/g: propane vs 1-octene (only HC, only HC, ≈ same); 2-propanol vs 4-octanol (1O, 3C, hi O-%; 1O, 8C, lo O-%); ethanol vs MTBE (1C 4C, 1O, 2C, 1O, 5C); benzene vs hexane (HC ≈ HC). also, pentane & butanol (no O vs O)

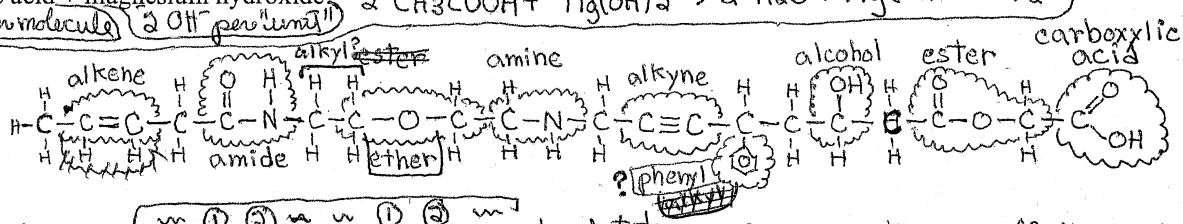
2a. Write rxn-equation for combustion of ethanol: $1\,C_2H_5OH + 3\,O_2 \rightarrow 2\,CO_2 + 3\,H_2O$

Do you see why it isn't 3.5 O_2?

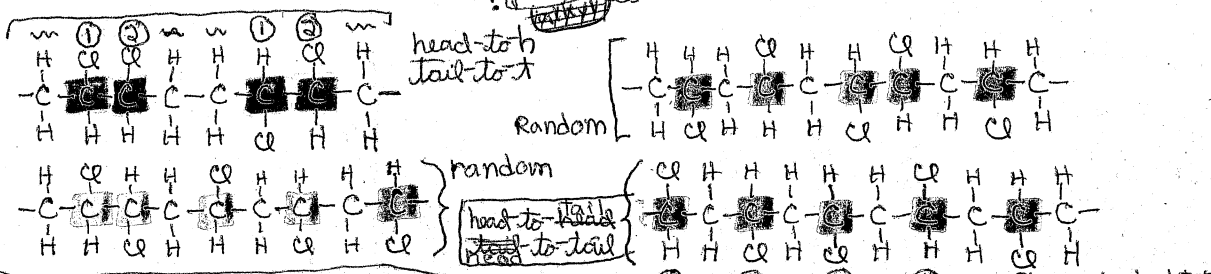
2b. and for ethanoic acid + magnesium hydroxide: $2\,CH_3COOH + Mg(OH)_2 \rightarrow 2\,H_2O + Mg(CH_3COO)_2$

(1 H^+ per molecule) (2 OH^- per "unit")

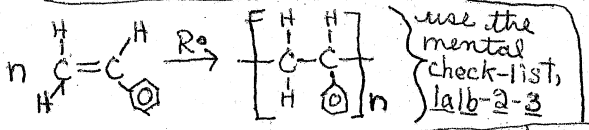
3. find, **name**, and **circle*** (what is required?) all functional groups
* or bracket



4. Mark each as Random, "head-to-tail, head-to-tail", "head-to-head, tail-to-tail".



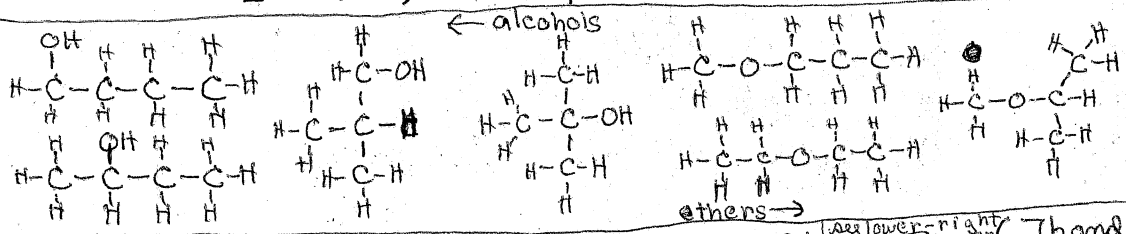
5. Write rxn-equation for polymerization of styrene:



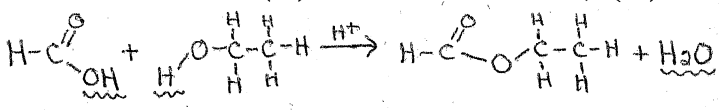
use the mental check-list, 1a/1b-2-3

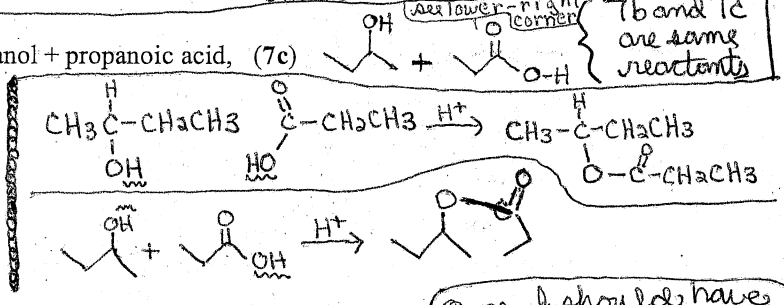
6. Draw all 7 isomers (4 alcohols, 3 ethers) for $C_4H_{10}O$; always "answer" with formula like $CH_3CH_2CH_2CH_2OH$, to show what it actually is, when functional group is important in answer

usually it is important



7. Write reactions for: (**7a**) methanoic acid + ethanol, (**7b**) 2-butanol + propanoic acid, (**7c**)





7b and 7c are same reactants

Oops, I should have drawn this elsewhere to leave more room for #8.

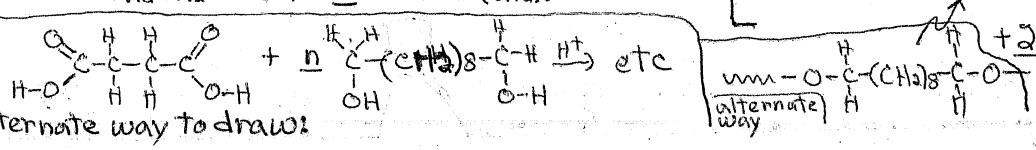
Here is an alternate way to show molecules:

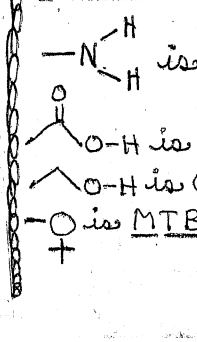
(HOOCCH_2CH_2COOH $HOCH_2(CH_2)_8CH_2OH$) ← also OK for rxn-equation

8. Write a reaction-equation for polymerization of $HOOCCH_2CH_2COOH + HOCH_2(CH_2)_8CH_2OH$.

WHOLE EQUATION is in the LINE BELOW:

$n\ HOOC\text{-}CH_2CH_2\text{-}COOH + n\ HOCH_2\text{-}(CH_2)_8\text{-}CH_2OH \xrightarrow{H^+} [\ldots]_n + 2n\ H_2O$



alternate way to draw:

draw ⬡, not ⬡