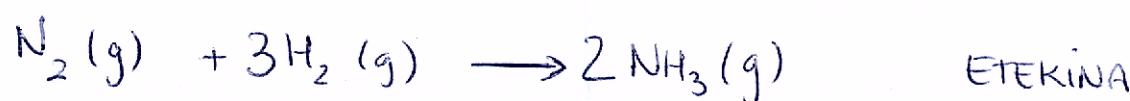


1. EBALUAZIOA

"ERREPASO ARIKETAK"

2. BATX.
KIMIKOA

1.-



50 L

b.n.

?

7.60.

$$50 \text{ L } N_2 \cdot \frac{1 \text{ mol } N_2}{22,4 \text{ L } N_2} \cdot \frac{2 \text{ mol } NH_3}{1 \text{ mol } N_2} \cdot \frac{17 \text{ g } NH_3}{1 \text{ mol } NH_3} \cdot \frac{60 \text{ g } NH_3 \text{ (borttakoa)}}{100 \text{ g } NH_3 \text{ (teoriko)}} = \\ = \underline{\underline{45,54 \text{ g } NH_3}}$$

?

10 L (borttakoa)

b.n.

$$10 \text{ L } NH_3 \cdot \frac{1 \text{ mol } NH_3}{22,4 \text{ L } NH_3} \cdot \frac{1 \text{ mol } N_2}{2 \text{ mol } NH_3} \cdot \frac{28 \text{ g } N_2}{1 \text{ mol } N_2} \cdot \frac{100 \text{ g } N_2 \text{ (teoriko)}}{60 \text{ g } N_2 \text{ (borttakoa)}} = \\ = \underline{\underline{10,42 \text{ g } N_2}}$$

2.-



32 g CaC_2 laguna



$V = 24 \text{ L}$

a)

$T = 20^\circ\text{C} = 293 \text{ K}$

$P = 700 \text{ mmHg} = 0,92 \text{ atm}$

$$0,92 \text{ mol } CO_2 \cdot \frac{1 \text{ mol } C_2H_2}{2 \text{ mol } CO_2} \cdot \frac{1 \text{ mol } CaC_2}{1 \text{ mol } C_2H_2} \cdot \frac{64 \text{ g } CaC_2}{1 \text{ mol } CaC_2} = 29,44 \text{ g } CaC_2$$

$$\left. \begin{array}{l} PV = nRT \\ 0,92 \cdot 24 = n_{CO_2} \cdot 0,082 \cdot 293 \end{array} \right\} n_{CO_2} = 0,92 \text{ mol}$$

$$CaC_2 \text{ aberastasuna} \Rightarrow \frac{29,44 \text{ g } CaC_2}{32 \text{ g } CaC_2 \text{ laguna}} \times 100 = \underline{\underline{\% 92}}$$

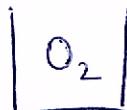
$$b) 0,92 \text{ mol } \text{CO}_2 \cdot \frac{1 \text{ mol } \text{C}_2\text{H}_2}{2 \text{ mol } \text{CO}_2} \cdot \frac{2 \text{ mol } \text{O}_2}{1 \text{ mol } \text{C}_2\text{H}_2} = 0,92 \text{ mol } \text{O}_2$$

$$PV = nRT$$

$$0,92 \cdot V_{\text{O}_2} = 0,92 \cdot 0,082 \cdot 293 \Rightarrow \underline{\underline{V_{\text{O}_2} = 24 \text{ L}}}$$

$\left[\text{CO}_2$ -ren modukoa doiketagatik, eta baldintzak berdinak direnako]

3.-



$$a) V = 500 \text{ cm}^3 = 0,5 \text{ dm}^3 = 0,5 \text{ L}$$

$$P = 0,5 \text{ atm}$$

$$T = 298 \text{ K}$$



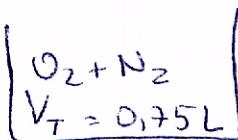
$$P_{\text{O}_2} V = n_{\text{O}_2} RT$$

$$n_{\text{O}_2} = 0,01023 \text{ mol}$$

$$P_{\text{O}_2}' V' = n_{\text{O}_2} RT$$

$$\underline{\underline{P_{\text{O}_2}' = 0,3 \text{ atm}}}$$

$$P_T = P_{\text{O}_2}' + P_{\text{N}_2}' = \underline{\underline{1,3 \text{ atm}}}$$



$$V = 250 \text{ cm}^3 = 0,25 \text{ dm}^3 = 0,25 \text{ L}$$

$$P = 3 \text{ atm}$$

$$T = 298 \text{ K}$$



$$P_{\text{N}_2} V = n_{\text{N}_2} RT$$

$$n_{\text{N}_2} = 0,0307 \text{ mol}$$

$$P_{\text{N}_2}' V' = n_{\text{N}_2} RT$$

$$\underline{\underline{P_{\text{N}_2}' = 1 \text{ atm}}}$$

$$b) n_{\text{O}_2} = 0,01023 \text{ mol} \rightarrow m_{\text{O}_2} = 0,32736 \text{ g} \quad \left. \begin{array}{l} m_T = 1,187 \text{ g} \\ \downarrow \end{array} \right\} \begin{array}{l} \text{O}_2 = 72,1 \\ \text{N}_2 = 72,1 \end{array}$$

$$n_{\text{O}_2} = 0,01023 \text{ mol} \rightarrow V_{\text{O}_2} = 0,01023 \text{ L}$$

$$\left. \begin{array}{l} V_T = 0,04093 \text{ L} \\ \downarrow \end{array} \right\} \begin{array}{l} \text{O}_2 = 25 \\ \text{N}_2 = 75 \end{array}$$

$$n_{\text{N}_2} = 0,0307 \text{ mol} \rightarrow V_{\text{N}_2} = 0,0307 \text{ L}$$

$$\begin{array}{l} \text{O}_2 = 25 \\ \text{N}_2 = 75 \end{array}$$



4,98 g Na laguna

$$\begin{aligned} PV &= nRT \quad \left\{ \begin{array}{l} V = 1,4 \text{ L} \\ T = 25^\circ\text{C} = 298 \text{ K} \end{array} \right. \\ 0,95 \cdot 1,4 &= n_{\text{H}_2} \cdot 0,082 \cdot 298 \quad P = 720 \text{ mmHg} = 0,95 \text{ atm} \end{aligned}$$

$$n_{\text{H}_2} = 0,0544 \text{ mol}$$

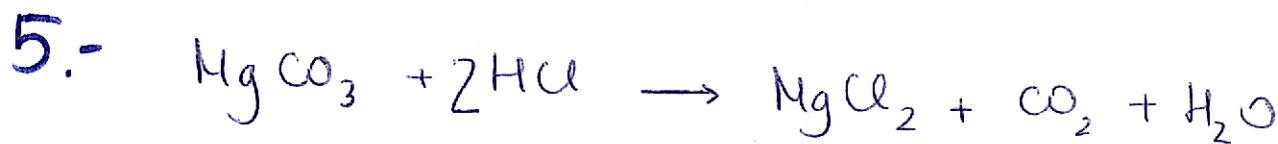
$$0,0544 \text{ mol H}_2 \cdot \frac{1 \text{ mol Na}}{\frac{1 \text{ mol H}_2}{2}} \cdot \frac{23 \text{ g Na}}{1 \text{ mol Na}} = 2,5 \text{ g Na.}$$

$$\text{Lagunaren purutasuna: } \frac{2,5 \text{ g Na}}{4,98 \text{ g Na laguna}} = \underline{\underline{\% 50,2}}$$

$$\text{b) } M_{\text{NaOH}} = \frac{n_{\text{NaOH}}}{V}$$

$$n_{\text{NaOH}} \Rightarrow 0,0544 \text{ mol H}_2 \cdot \frac{1 \text{ mol NaOH}}{\frac{1}{2} \text{ mol H}_2} = 0,1088 \text{ mol NaOH}$$

$$M_{\text{NaOH}} = \frac{0,1088 \text{ mol}}{0,1 \text{ L}} = \underline{\underline{1,088 \text{ mol/L}}}$$

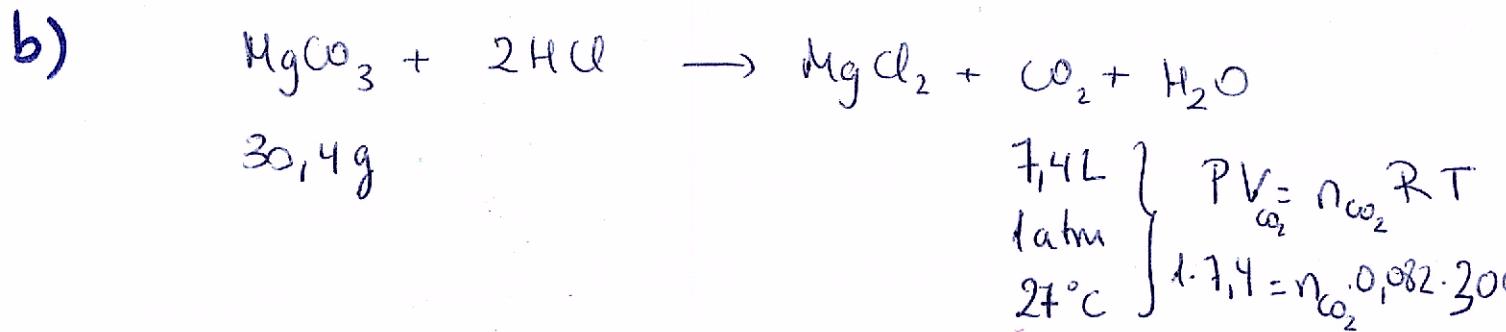


30,4 g 1,095 g/mL

% 20

a) V_{HCl} ?

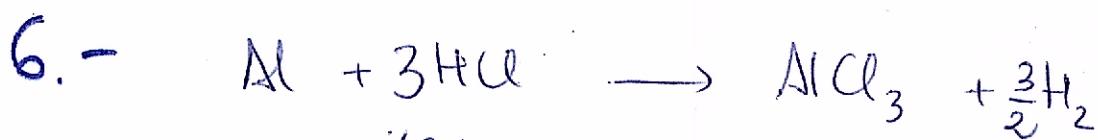
$$\begin{aligned} 30,4 \text{ g MgCO}_3 \cdot \frac{1 \text{ mol MgCO}_3}{84,3 \text{ g MgCO}_3} \cdot \frac{2 \text{ mol HCl}}{1 \text{ mol MgCO}_3} \cdot \frac{36,5 \text{ g HCl}}{1 \text{ mol HCl}} \cdot \frac{100 \text{ g HCl d20}}{20 \text{ g HCl}} \\ \cdot \frac{1 \text{ mL HCl d20}}{1,095 \text{ g HCl d20}} = \underline{\underline{120,2 \text{ mL HCl d20}}} \end{aligned}$$



$$30,4\text{ g } MgCO_3 \cdot \frac{1\text{ mol } MgCO_3}{84,3\text{ g } MgCO_3} \cdot \frac{1\text{ mol } CO_2}{1\text{ mol } MgCO_3} = 0,361 \text{ mol } CO_2 \quad n_{CO_2} = 0,3 \text{ mol}$$

teorikoki. Lortzen dika.

$$\frac{0,3 \text{ mol } CO_2 \text{ (lortu)}}{0,361 \text{ mol } CO_2 \text{ (teorikoa)}} \times 100 = \underline{\underline{83,1}}$$



$7,6\text{ g}$ $\underline{\underline{7,36}}$

$$d = 1,18 \text{ g/cm}^3 \quad \left. \begin{array}{l} d = \frac{m}{V} \\ V = 100\text{ mL} = 0,1\text{ L} \end{array} \right\} m_{HCl} = 118 \text{ g HCl diox}$$

$$118 \text{ g HCl diox} \cdot \frac{36 \text{ g HCl}}{100 \text{ g HCl diox}} = 42,48 \text{ g HCl}$$

$$d = 1,18 \frac{\text{g}}{\text{cm}^3} \cdot \frac{100\text{ cm}^3}{1\text{ dm}^3} \cdot \frac{1\text{ dm}^3}{1\text{ L}} = 1180 \text{ g/L}$$

a)

$7,6\text{ g Al}$ $\left. \begin{array}{l} \text{mugatzarria?} \\ 42,48 \text{ g HCl} \end{array} \right\}$

$$7,6\text{ g Al} \cdot \frac{1\text{ mol Al}}{27\text{ g Al}} \cdot \frac{3\text{ mol HCl}}{1\text{ mol Al}} \cdot \frac{36,5 \text{ g HCl}}{1\text{ mol HCl}} = 30,82 \text{ g HCl}$$

Datuen begiztuz, HCl soberan izango dugu eta mugatuko gaitezena aluminioak izango da, alinago amaituko baita. Beraz, mugatzarko Aluminioa da.

$$b) 7,6 \text{ g Al} \cdot \frac{1 \text{ mol Al}}{27 \text{ g Al}} \cdot \frac{\frac{3}{2} \text{ mol H}_2}{1 \text{ mol Al}} = 0,42 \text{ mol H}_2$$

$$PV = nRT$$

$$\frac{750}{760} \cdot V_{H_2} = 0,42 \cdot 0,082 \cdot 298 \Rightarrow \underline{V_{H_2} = 10,5 \text{ L}}$$

7.-



% 63,1 C

% 8,7 H

$$T = 25^\circ\text{C}$$

$$P = 750 \text{ mmHg} = 0,987 \text{ atm}$$

$$m = 1,65 \text{ g}$$

$$V = 629 \text{ mL}$$

$$63,1 \text{ g C} \cdot \frac{1 \text{ mol C}}{12 \text{ g C}} = 5,258 \text{ mol C}$$

$$8,7 \text{ g H} \cdot \frac{1 \text{ mol H}}{1 \text{ g H}} = 8,7 \text{ mol H}$$

$$28,2 \text{ g O} \cdot \frac{1 \text{ mol O}}{16 \text{ g O}} = 1,7625 \text{ mol O}$$

Konposatuk hurrengoa pisu molekularrak
izan behar du:

$$PV = nRT$$

$$0,987 \cdot 0,629 = n \cdot 0,082 \cdot 293$$

$$n = 0,0144 \text{ mol}$$

$$PM = \frac{m}{n}$$

$$\underline{PM = 114,4 \text{ g/mol}}$$

$$\frac{n(C)}{n(O)} = 3$$

$$\frac{n(H)}{n(O)} = 5$$

Formula Empirikoa: C_3H_5O $\rightarrow PM = 3 \cdot 12 + 5 \cdot 1 + 16 = \underline{57 \text{ g/mol}}$

Formula molekularra: $C_6H_{10}O_2$ [Kalkulu berarreko konposatuaren
pisu molekularrak bikoitzeko delako]



$$d = 3,12 \text{ g/L} \quad b.n. \quad \left. \begin{array}{l} 1 \text{ mol} = 22,4 \text{ L} \\ \text{edo} \\ T = 25^\circ \text{C} = 298 \text{ K}, P = 1 \text{ atm.} \end{array} \right.$$

a)



$$0,275 \text{ g} \quad 0,7165 \text{ g} \quad 0,654 \text{ g} \quad 0,3375 \text{ g}$$

$$0,654 \text{ g } CO_2 \cdot \frac{1 \text{ mol } CO_2}{44 \text{ g } CO_2} \cdot \frac{12 \text{ g C}}{1 \text{ mol } CO_2} \cdot \frac{12 \text{ g C}}{1 \text{ mol } CO_2} = 0,178 \text{ g C}$$

ordnung: 0,476 g O.

$$0,3375 \text{ g } H_2O \cdot \frac{1 \text{ mol } H_2O}{18 \text{ g } H_2O} \cdot \frac{2 \text{ at-g H}}{1 \text{ mol } H_2O} \cdot \frac{1 \text{ g H}}{1 \text{ at-g H}} = 0,0375 \text{ g H}$$

ordnung: 0,3 g O.

$$CO_2 \left\{ \begin{array}{l} 0,178 \text{ g C} \\ 0,476 \text{ g O} \end{array} \right. \quad H_2O \left\{ \begin{array}{l} 0,0375 \text{ g H} \\ 0,3 \text{ g O.} \end{array} \right.$$

$$C_{\square} H_{\square} O_{\square} \left\{ \begin{array}{l} 0,178 \text{ g C} \\ 0,0375 \text{ g H} \\ 0,275 - (0,178 + 0,0375) = 0,0595 \text{ g O} \end{array} \right.$$

$$0,178 \text{ g C} \cdot \frac{1 \text{ mol C}}{12 \text{ g C}} = 0,015 \text{ mol C}$$

$$\frac{n(C)}{n(O)} = 4$$

$$0,0375 \text{ g H} \cdot \frac{1 \text{ mol H}}{1 \text{ g H}} = 0,0375 \text{ mol H}$$

$$\frac{n(H)}{n(O)} = 10$$

$$0,0595 \text{ g O} \cdot \frac{1 \text{ mol O}}{16 \text{ g O}} = 3,72 \cdot 10^{-3} \text{ mol O}$$

$$\text{Formula empirikoa : } C_4H_{10}O \Rightarrow PM = \underline{\underline{70 \text{ g/mol}}}$$

Gure koposatuk izan behar duen piso molekularrak hurrengoa da :

$$PM = \frac{m}{n}$$

$$V = 22,4 \text{ L}$$

$$d = 3,1 \text{ g/L}$$

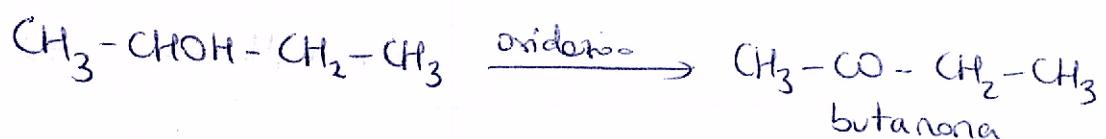
$$\left. \begin{array}{l} n=1 \text{ mol} \\ d = \frac{m}{V} \end{array} \right\} \Rightarrow m = 69,9 \text{ g.}$$

$$\underline{\underline{PM \approx 70 \text{ g/mol}}}$$

Bera z, formula molekularra C₄H₁₀O da.

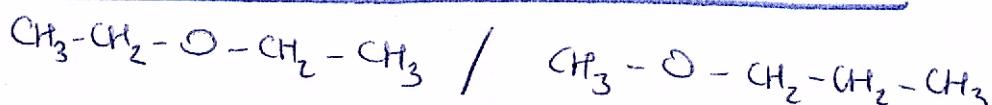
- b) a. Zetoria bat emateko oxidatz gero alkohol izan behar da, law karbonoz osatutakoa, bera z,

$$\underline{\underline{A = 2-\text{butanol}}}$$



- b. Ester bat litzango da, bi aukera dawde.

$$\underline{\underline{B = \text{diethyl ester} / \text{methylpropyl ester}}}$$



9.- a) % 62 C $62 \text{ g C} \cdot \frac{1 \text{ mol C}}{12 \text{ g C}} = 5,167 \text{ mol C}$

% 10,4 H $10,4 \text{ g H} \cdot \frac{1 \text{ mol H}}{1 \text{ g H}} = 10,4 \text{ mol H}$

% 27,6 O $27,6 \text{ g O} \cdot \frac{1 \text{ mol O}}{16 \text{ g O}} = 1,725 \text{ mol O}$

$$\frac{n(C)}{n(O)} = 3 \quad ; \quad \frac{n(H)}{n(O)} = \frac{6}{4} \Rightarrow \text{Formula empirikoa: } C_3H_6O$$

$$d = 1,28 \text{ g/L}$$

$$T = 56^\circ\text{C} = 329 \text{ K}$$

$$P = 454 \text{ mmHg} = 0,6 \text{ atm}$$

$$PV = nRT$$

$$PV_m = m \cdot nRT$$

$$P \cdot \left(\frac{m}{n}\right)^{PM} = \left(\frac{m}{V}\right)RT$$

$$PM = \frac{dRT}{P} = \frac{1,28 \cdot 0,082 \cdot 329}{0,6} = 57,6 \text{ g/mol}$$

Formula empirikoaren PM = $3 \cdot 12 + 6 \cdot 1 + 16 = 58 \text{ g/mol}$.

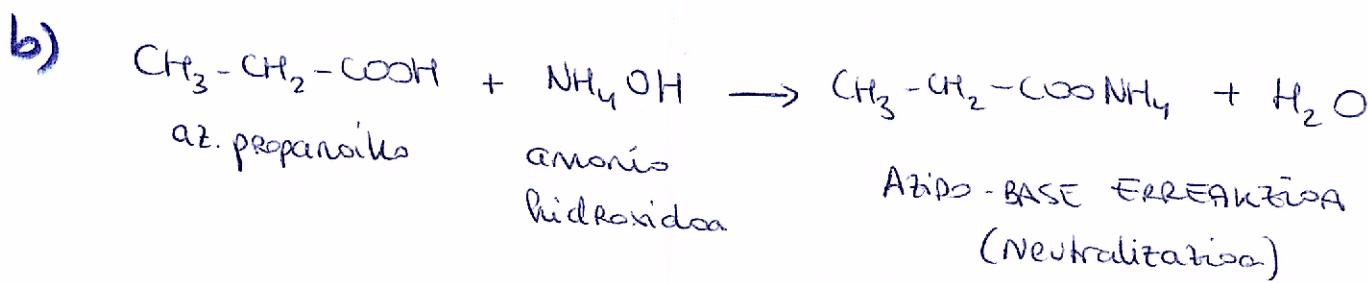
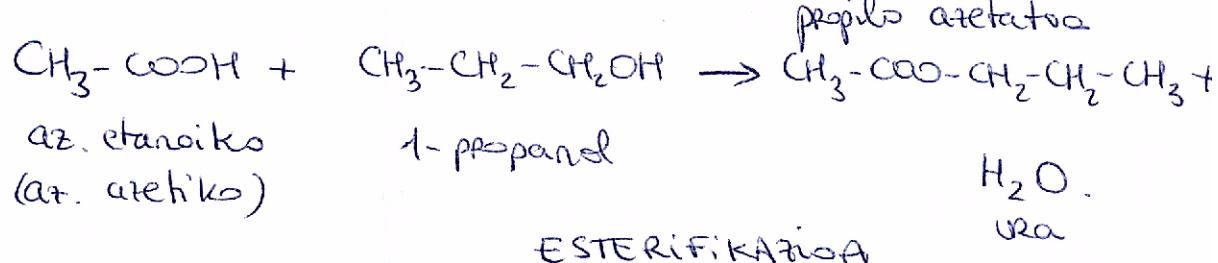
Formula molekularrak : C₃H₆O. [Guare komposizioak PM- bera dantzeleko]

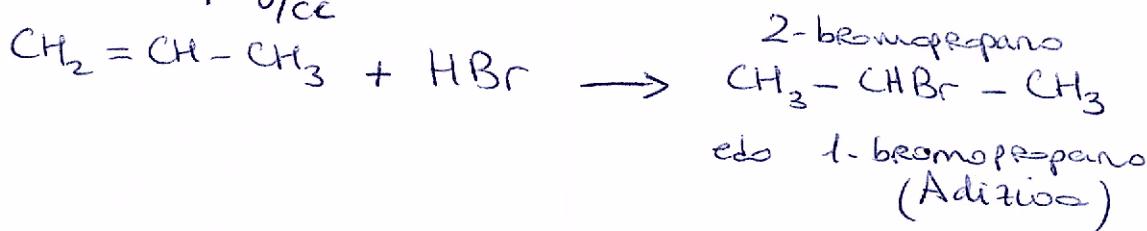
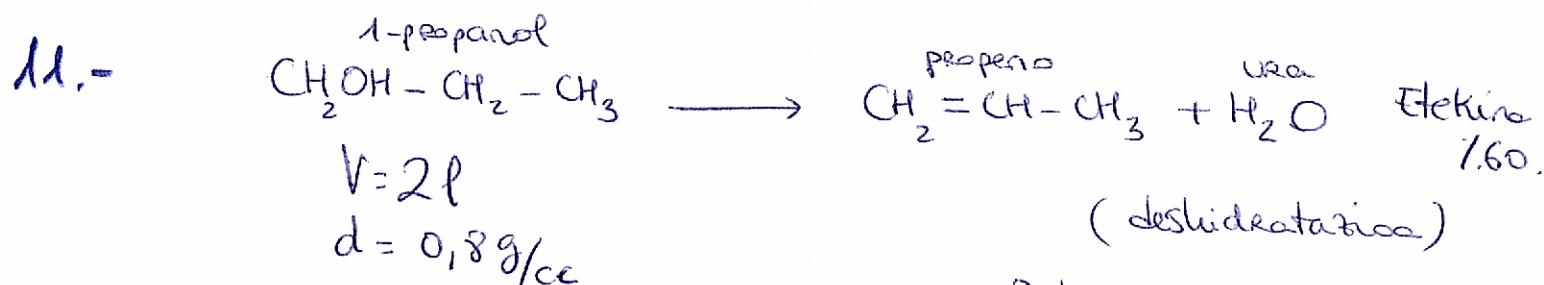
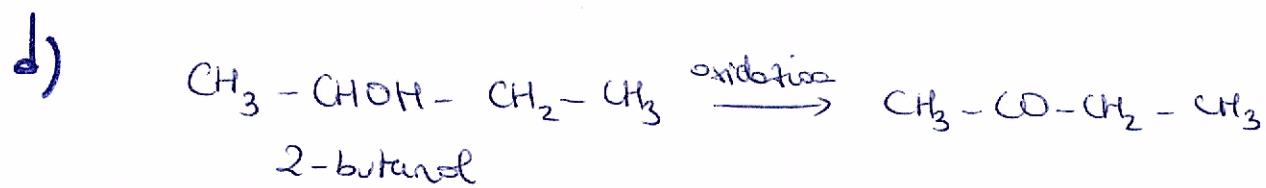
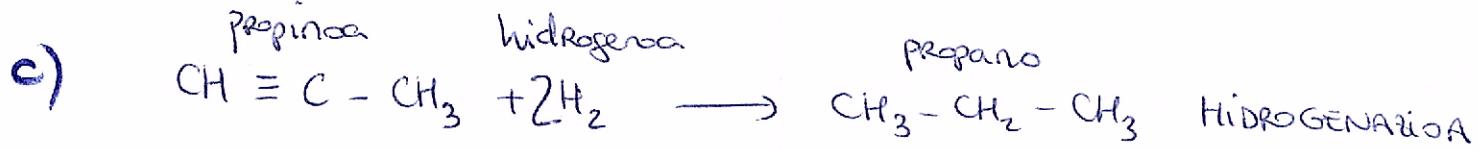
b) A = CH₃-CH₂-CHO (erraz oxidatzen da az. propanoile
propanal loztzen)

B = CH₃-CO-CH₃ (et de erraz oxidatzen, aldihid
propanone batetikin konpontzen badugu.)

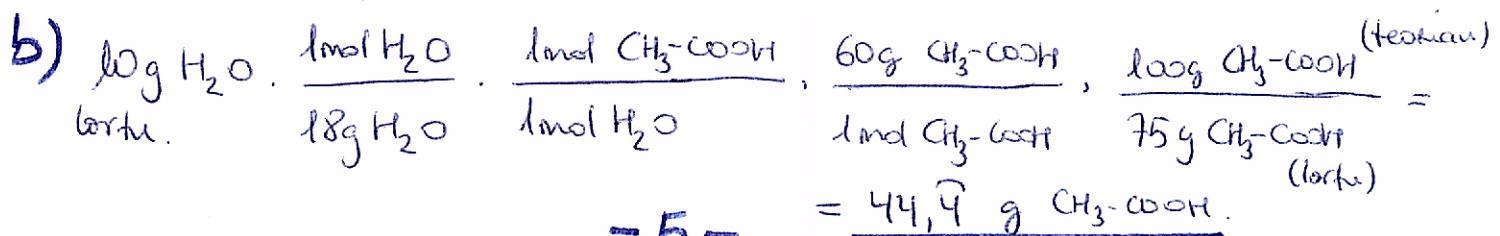
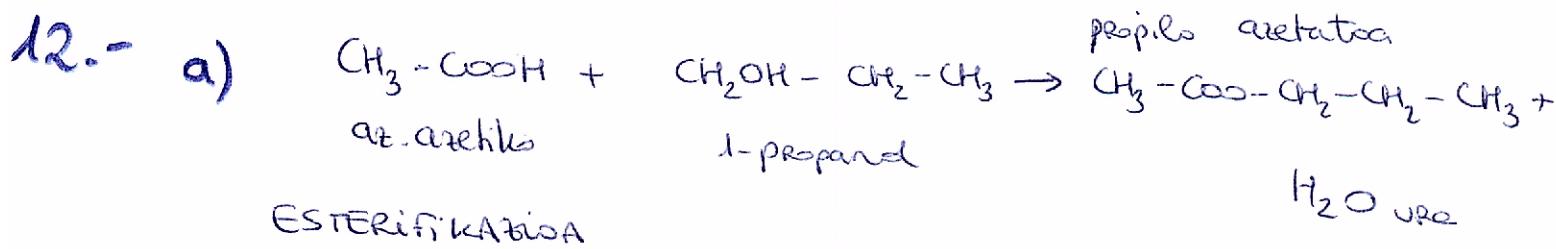
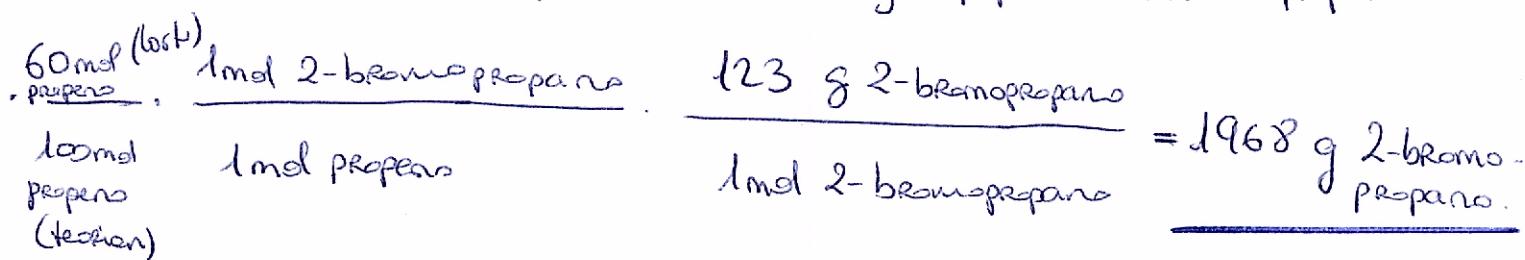
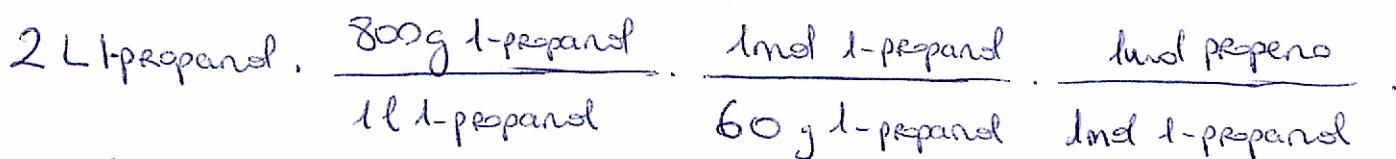
⊗ Hormeb desberdinak direz laborategi eta orokorean
aldehidak eta zetonak.

10.- a)

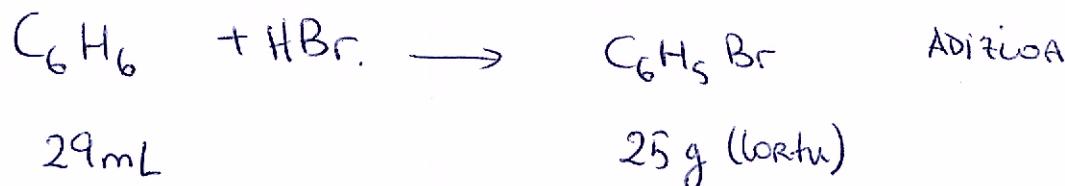




$$d = 0,8 \frac{\text{g}}{\text{cc}} \cdot \frac{100\text{cc}}{1\text{l}} = 800 \text{ g/L}$$



13.-



$$d = 0,88 \text{ g/mL}$$

$$29 \text{ mL C}_6\text{H}_6 \cdot \frac{0,88 \text{ g C}_6\text{H}_6}{1 \text{ mL C}_6\text{H}_6} \cdot \frac{1 \text{ mol C}_6\text{H}_6}{78 \text{ g C}_6\text{H}_6} \cdot \frac{1 \text{ mol C}_6\text{H}_5\text{Br}}{1 \text{ mol C}_6\text{H}_6} \cdot \frac{157 \text{ g C}_6\text{H}_5\text{Br}}{1 \text{ mol C}_6\text{H}_5\text{Br}}$$

$$= 51,37 \text{ g C}_6\text{H}_5\text{Br} \text{ teorion lortu behar dira.}$$

Hala ere, errealtitatea desberdin da eta bakanrik 25 g lortzen dia, beraz erreakzioaren etekina

$$\frac{25 \text{ g C}_6\text{H}_5\text{Br} \text{ (lortu)}}{51,37 \text{ g C}_6\text{H}_5\text{Br} \text{ (teoricoa)}} \times 100 = \underline{\underline{48,17}}$$