

Lezione 3

Ex 1

Na, H, P, O

Na = 12.84%
H = 7.03%

P = 8.66%
O = 71.74%

$H_2O_{crst} = 60.35\%$

$$\text{mol Na} = \frac{12.84 \text{ g}}{23.00 \text{ g/mol}} = 0.5585 \text{ mol}$$

$$\frac{7.03 \text{ g}}{1.02 \text{ g/mol}} = 6.96 \text{ mol H}$$

$$\text{mol P} = \frac{8.66 \text{ g}}{31.0 \text{ g/mol}} = 0.280 \text{ mol}$$

$$\frac{71.74 \text{ g}}{16.00 \text{ g/mol}} = 4.484 \text{ mol O} \leftarrow$$

$$\text{mol } H_2O_{crst} = \frac{60.35 \text{ g}}{18.00 \text{ g/mol}} = 3.349 \text{ mol} \sim 3.35 \text{ mol}$$

$$\begin{aligned} &\rightarrow 3.35 \text{ mol O} \\ &\rightarrow 3.35 \text{ mol} \cdot 2 = 6.70 \text{ mol H} \end{aligned}$$

$$\begin{aligned} \text{mol O} &= (4.484 - 3.349) \text{ mol} = 1.13 \text{ mol O} \\ \text{mol H} &= (6.96 - 6.70) \text{ mol} = 0.26 \text{ mol H} \end{aligned}$$



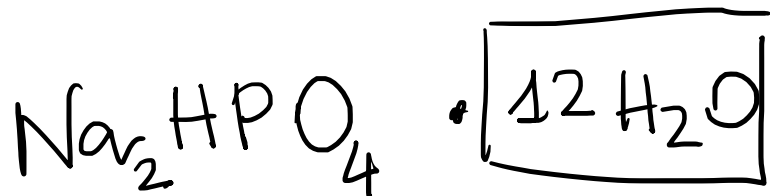
(2)

$$\text{mol Na} = 0.558 \text{ mol} \quad \textcircled{2}$$

$$\text{mol P} = 0.280 \text{ mol} \quad \textcircled{1}$$

$$\text{mol O} = 1.13 \text{ mol} \quad \textcircled{4}$$

$$\text{mol H} = \underline{\underline{0.26 \text{ mol}}} \quad \textcircled{1}$$



EX 2

1 g AgCl e AgBr contengono $5.986 \cdot 10^{-3} \text{ mol Ag}$ % della miscela

$$\text{mol tot} = 5.986 \cdot 10^{-3} \text{ mol} = X_{\text{AgCl}} + Y_{\text{AgBr}}$$

$$\begin{cases} 5.986 \cdot 10^{-3} \text{ mol} = \frac{m_{\text{AgCl}}}{143.3 \text{ g/mol}} + \frac{m_{\text{AgBr}}}{187.8 \text{ g/mol}} \\ m_{\text{AgCl}} + m_{\text{AgBr}} = 1 \end{cases} \Rightarrow$$

②

$$m_{\text{AgCl}} = 0.400 \text{ g}$$

$\times 1 \text{ g}$

40 % AgCl

60 % AgBr

$$m_{\text{AgBr}} = 0.600 \text{ g}$$

AgCl
AgBr



Ag⁺

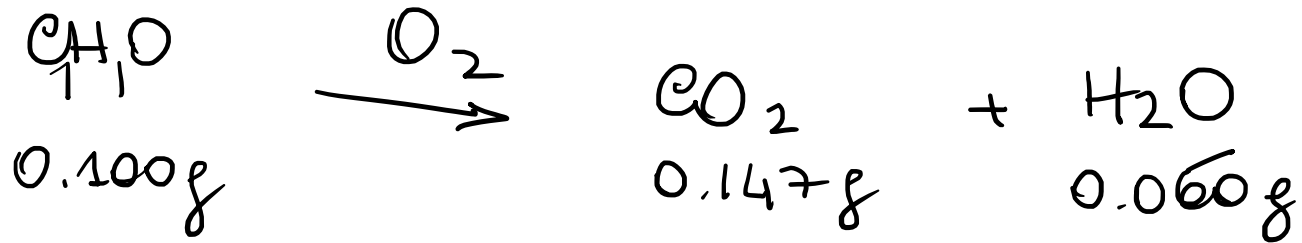
mol Ag⁺
or units

??

% composition

2

EX3



Calculare la formula mure = ?

$$\text{mol CO}_2 = \text{mol C} = \frac{0.147 \text{ g}}{44.0 \text{ g/mol}} = 0.0033 \text{ mol} \cdot 12.0 \text{ g/mol} = 0.0396 \text{ g C}$$

$$\text{mol H} = 2 \cdot \text{mol H}_2\text{O} = \frac{0.060 \text{ g}}{18.0 \text{ g/mol}} \cdot 2 = 0.0066 \text{ mol} \cdot 1.01 \text{ g/mol} = 0.0067 \text{ g H}$$

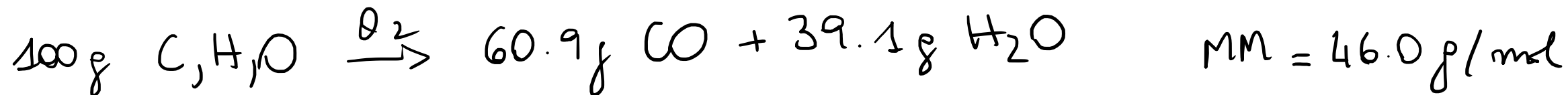
$$m\text{O} = 0.100 \text{ g} - 0.0396 \text{ g C} - 0.0067 \text{ g H} = 0.0538 \text{ g di O}$$

$$\text{mol O} = \frac{0.0538 \text{ g}}{16.00 \text{ g/mol}} = 0.0033 \text{ mol O}$$

CH₂O

(4)

EX 4

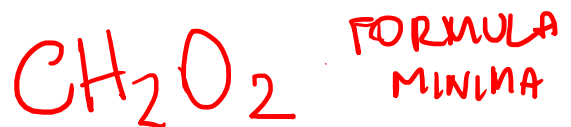


$$\text{mol C} = \text{mol CO} = \frac{60.9 \text{ g}}{28.0 \text{ g/mol}} = 2.175 \text{ mol C} \cdot 12.0 \text{ g/mol} = 26.1 \text{ g C}$$

$$\text{mol H} = 2 \cdot \text{mol } H_2O = \frac{39.1 \text{ g}}{18.0 \text{ g/mol}} = 4.344 \text{ mol H} \cdot 1.01 \text{ g/mol} = 4.39 \text{ g H}$$

$$100 \text{ g} - 26.1 \text{ g C} - 4.39 \text{ g H} = 69.51 \text{ g O}$$

$$\frac{69.51 \text{ g}}{16.0 \text{ g/mol}} = 4.344 \text{ mol O}$$



MM_{min} = 46.0 g/mol

anche la

FORMULA MOLECOLARE

5

Legge dei gas perfetti

$$pV = nRT$$

↑
pressione
atm

↑
L

↓
mol gas

→
T = K

$$R = \frac{pV}{nT}$$

IDEALITÀ

$$R = 0.0821 \frac{\text{atm L}}{\text{mol K}}$$

⑥

EX 5

$$T = 25^{\circ}\text{C} + 273 = 298 \text{ K}$$

82.7% C
17.3% H

$d = 2.35 \text{ g/L}$ a 25° e 752 ton

$$760 : 1 \text{ atm} = 752 : x$$

Formula massa
e
molecolare del
composto

$$pV = nRT \Rightarrow p \cdot V = \frac{m}{MM} \cdot R \cdot T$$

$$p = 1 \text{ atm}$$

$$1 \text{ atm} = 760 \text{ ton}$$

$$d = \frac{m}{V}$$

$$MM = \left(\frac{m}{V} \right) \cdot \frac{RT}{p}$$

$$MM = \frac{2.35 \text{ g/L} \cdot 0.0821 \frac{\text{atm L}}{\text{mol K}} \cdot 298 \text{ K}}{\frac{752 \text{ ton}}{760 \frac{\text{ton}}{\text{atm}}}}$$

$$MM = 58.1 \text{ g/mol}$$

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$$\% C = 82.7\%$$
$$\% H = 17.3\%$$

$$MM = 58.1 \text{ g/mol}$$

$$\text{mol C} = \frac{82.7 \text{ g}}{12.0 \text{ g/mol}} = 6.89 \text{ mol C}$$

①
x2

$$\text{mol H} = \frac{17.3 \text{ g}}{1.01 \text{ g/mol}} = 17.1 \text{ mol}$$

②.5
x2

C_2H_5 FORMULA MINIMA $MM_{\text{min}} = 29 \text{ g/mol}$

↓ x2

C_4H_{10} FORMULA MOLECOLARE

Ⓟ

EX 6

$$C = 85.7\%$$

$$H = 14.3\%$$

$$d = 1.13 \text{ g/L}$$

$$p = 1 \text{ atm}$$

$$T = 30^\circ\text{C}$$

Formula minima

Formula molecolare

$$30 + 273 = 303 \text{ K}$$

$$pV = nRT$$

$$\Rightarrow pV = \frac{m}{MM} \cdot R \cdot T$$

$$MM = \left(\frac{m}{V} \right) \cdot \frac{R \cdot T}{p}$$

$$MM = \frac{1.13 \text{ g/L} \cdot 0.0821 \frac{\text{atm} \cdot \text{L}}{\text{mol} \cdot \text{K}} \cdot 303 \text{ K}}{1 \text{ atm}} = \boxed{28 \text{ g/mol}}$$

9

85.7% C

14.3% H

$$\text{mol C} = \frac{85.7 \text{ g}}{12.0 \text{ g/mol}} = 7.1 \text{ mol} \quad (1)$$

$$\text{mol H} = \frac{14.3 \text{ g}}{1.01 \text{ g/mol}} = 14.1 \text{ mol} \quad (2)$$

CH_2

FORMULA MINIMA

$\text{MM}_{\text{min}} \approx 14 \text{ g/mol}$

$\text{MM}_{\text{vero}} = 280 \text{ g/mol}$

$$\downarrow \times 2 \quad \frac{\text{MM}_{\text{vero}}}{\text{MM}_{\text{min}}} = \frac{280}{14} = (2)$$

C_2H_4 FORMULA MOLECOLARE

(10)