

P.141. Act. 1.

$$35 \text{ g Ba(OH)}_2$$

$$M = 137,2 + (16+1) \times 2 = 171,2 \text{ g/mol}$$

$$a) 35 \text{ g Ba(OH)}_2 \cdot \frac{1 \text{ mol de Ba(OH)}_2}{171,2 \text{ g de Ba(OH)}_2} = 0,20 \text{ mol Ba(OH)}_2$$

$$b) 0,20 \text{ mol Ba(OH)}_2 \cdot \frac{6,022 \cdot 10^{23} \text{ moléculas de Ba(OH)}_2}{1 \text{ mol Ba(OH)}_2} \cdot \frac{2 \text{ átomos O}}{1 \text{ molécula Ba(OH)}_2} = 2,4 \cdot 10^{23} \text{ átomos O}$$

$$c) 0,20 \text{ mol Ba(OH)}_2 \cdot \frac{2 \text{ mol H}}{1 \text{ mol Ba(OH)}_2} = 0,40 \text{ mol H}$$

$$d) 0,20 \text{ mol Ba(OH)}_2 \cdot \frac{1 \text{ mol Ba}}{1 \text{ mol Ba(OH)}_2} = 0,20 \text{ mol Ba} \cdot \frac{137,2 \text{ g Ba}}{1 \text{ mol Ba}} = 27,5 \text{ g Ba}$$

$$e) \frac{171,2 \text{ g Ba(OH)}_2}{1 \text{ mol Ba(OH)}_2} \cdot \frac{1 \text{ mol}}{6,022 \cdot 10^{23} \text{ eq. molec.}} = 2,84 \cdot 10^{22} \text{ g/eq. molec.}$$

$$f) 5 \text{ g de O} \cdot \frac{1 \text{ mol O}}{16 \text{ g O}} \cdot \frac{1 \text{ mol Ba(OH)}_2}{2 \text{ mol O}} \cdot \frac{171,2 \text{ g Ba(OH)}_2}{1 \text{ mol Ba(OH)}_2} = 26,80 \text{ g Ba(OH)}_2$$

P.143 Act. 2

$$(\text{NH}_4)_2\text{SO}_4 \quad M = (14+4) \times 2 + 32 + 16 \times 4 = 132 \text{ g/mol}$$

$$\frac{32 \text{ g de S}}{132 \text{ g (NH}_4)_2\text{SO}_4} \cdot 100 = 24,24\%$$

$$\frac{2 \times 14 \text{ g de N}}{132 \text{ g (NH}_4)_2\text{SO}_4} \cdot 100 = 21,21\%$$

$$\frac{2 \times 1 \text{ g de H}}{132 \text{ g (NH}_4)_2\text{SO}_4} \cdot 100 = 6,06\%$$

$$\frac{4 \times 16 \text{ g O}}{132 \text{ g (NH}_4)_2\text{SO}_4} \cdot 100 = 48,48\%$$

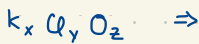
P 143 Act 3

$$MH_{CuSO_4 \cdot 5H_2O} = 249,61 \text{ g/mol}$$

$$MH_{H_2O} = 18 \text{ g/mol}$$

$$\%_{AGUA} = \frac{5 \cdot 18}{249,61} \cdot 100 = 36\%$$

P 143 Act 4



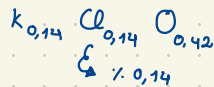
$$5,6 \text{ g K} + 5,1 \text{ g Cl} + x \text{ g O} = 17,5 \text{ g}$$

$$x = 6,8 \text{ g O}$$

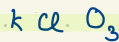
$$5,6 \text{ g de K} \frac{1 \text{ mol K}}{39,1 \text{ g K}} = 0,14 \text{ mol K}$$

$$5,1 \text{ g de Cl} \frac{1 \text{ mol Cl}}{35,5 \text{ g Cl}} = 0,14 \text{ mol Cl}$$

$$6,8 \text{ g de O} \frac{1 \text{ mol O}}{16 \text{ g O}} = 0,42 \text{ mol O}$$



$$\cdot \frac{1}{0,14}$$



MASA MOLAR 78 g/mol

Fórmula empírica:  $12 \text{ g} \frac{1 \text{ mol C}}{12 \text{ g de C}} = 1 \text{ mol C}$

CH

$$1 \text{ g} \frac{1 \text{ mol H}}{1 \text{ g de H}} = 1 \text{ mol H}$$

fórmula molecular =  $n \cdot$  fórmula empírica  $\frac{78}{13} = 6$

 $\text{C}_6\text{H}_6$ 

$$M_{\text{C}_x\text{H}_y} = 200 \text{ g/mol}$$

$$3,14 \text{ g CO}_2 \frac{12 \text{ g C}}{44 \text{ g CO}_2} = 0,86 \text{ g C}$$

$$M_{\text{CO}_2} = 44 \text{ g/mol}$$

$$3,14 \text{ g CO}_2 \frac{1 \text{ mol CO}_2}{44 \text{ g CO}_2} \cdot \frac{1 \text{ mol C}}{1 \text{ mol CO}_2} = 0,071 \text{ mol C} \quad \text{todo el C viene de C}_x\text{H}_y$$

$$1 \text{ g muestra} - 0,86 \text{ g C} = 0,14 \text{ g de H} = 0,14 \text{ mol de H}$$

 $\text{C}_{0,071} \text{H}_{0,14}$ 

$$12x + 1 \cdot 2 \cdot x = 200 \Rightarrow x = 14$$

F. empírica

 $\text{C}_1 \text{H}_2$  $\text{C}_{14} \text{H}_{28}$ 

F. molecular

$O_2$   
 $5L$   
 $730 \text{ mm Hg}$   
 $50^\circ C$

$PV = nRT$  (b)  $\frac{730}{760} \cdot 5 = n \cdot 0,082 \cdot (273,15 + 50)$   
 $n = 0,18 \text{ moles } O_2$   
 CONDICIONES INICIALES

¿TPE y VOLUMEN?

$10^5 \text{ Pa}$   
 $273,15 \text{ K}$

$\frac{P_1 V_1}{T_1} = \frac{P_2 V_2}{T_2}$

$\frac{\frac{730}{760} \cdot 5}{(273,15 + 50)} = \frac{1 \cdot V_2}{273,15}$  a)  $V_2 = 4L$

$3g/L$   
 $800 \text{ mm Hg}$   
 $70^\circ C$

$PV = nRT$

$PV = \frac{m}{MH} \cdot RT$

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

CONDICIONES (1)

$\frac{800}{760} \cdot MH = 3 \cdot 0,082 \cdot (70 + 273,15)$

$MH = 80,2 \text{ g/mol}$

CONDICIONES (2)

$1 \cdot 80 = d \cdot 0,082 (273,15)$

$d = 3,57 \text{ g/L}$

- 12 Una mezcla de gases contiene 1 g de He, 2 g de  $H_2$  y 10 g de  $CO_2$ . ¿Cuál es la presión correspondiente a cada gas si la presión total es de 600 mmHg? Determina la composición de la mezcla expresada como porcentaje en masa y como porcentaje en volumen.

S:  $p_{He} = 102 \text{ mmHg}$ ;  $p_{H_2} = 408 \text{ mmHg}$ ;  $p_{CO_2} = 90 \text{ mmHg}$ ;  
 % masa: 7,7 % He; 15,4 %  $H_2$ ; 76,9 %  $CO_2$ ;  
 % volumen: 17 % He; 68 %  $H_2$ ; 15 %  $CO_2$

$$1 \text{ g He} \frac{1 \text{ mol}}{4,003 \text{ g}} = 0,25 \text{ mol He}$$

$$2 \text{ g } H_2 \frac{1 \text{ mol}}{2 \text{ gramol}} = 1 \text{ mol } H_2$$

$$10 \text{ g } CO_2 \frac{1 \text{ mol}}{44 \text{ gramos}} = 0,23 \text{ mol } CO_2$$

$$\text{Los moles totales son: } 0,23 + 1 + 0,23 = 1,48$$

$$X_{He} = \frac{0,23}{1,48} = 0,17$$

$$P_{He} = X_{He} P_T = 102 \text{ mmHg}$$

$$X_{H_2} = \frac{1}{1,48} = 0,68$$

$$P_{H_2} = X_{H_2} P_T = 408 \text{ mmHg}$$

$$X_{CO_2} = 1 - 0,17 - 0,68 = 0,15$$

$$P_{CO_2} = X_{CO_2} P_T = 90 \text{ mmHg}$$

FOR ROUNDED  
 NO DA  $P_T = 600$   
 mmHg

$$\% \text{ masa} = \frac{\text{masa componente}}{\text{masa total}} \cdot 100 \quad \% He = \frac{1}{1,48} \cdot 100 = 7,7\%$$

$$\% H_2 = \frac{2}{1,48} \cdot 100 = 15,4\%$$

$$\% CO_2 = \frac{10}{1,48} \cdot 100 = 76,9\%$$

$$\% He \text{ volumen} = X_{He} \cdot 100 = 17\%$$

$$\% H_2 \text{ volumen} = X_{H_2} \cdot 100 = 68\%$$

$$\% CO_2 \text{ volumen} = X_{CO_2} \cdot 100 = 15\%$$

- 13 Una mezcla de gases tiene un 30 % en masa de oxígeno y un 70 % de dióxido de azufre. Si la presión que ejerce la mezcla es de 1000 mmHg, ¿cuánto valdrá la presión correspondiente a cada componente?

S:  $p_{O_2} = 460 \text{ mmHg}$ ;  $p_{SO_2} = 540 \text{ mmHg}$

$$O_2 \Rightarrow 30\%$$

$$SO_2 \Rightarrow 70\%$$

$$100 \text{ g mezcla} \begin{cases} 30 \text{ g } O_2 \Rightarrow n = \frac{30 \text{ g}}{32 \text{ g/mol}} = 0,9375 \text{ mol } O_2 \\ 70 \text{ g } SO_2 \Rightarrow n = \frac{70 \text{ g}}{64 \text{ g/mol}} = 1,094 \text{ mol } SO_2 \end{cases}$$

$$X_{O_2} = \frac{n_{O_2}}{n_T} = \frac{0,9375}{0,9375 + 1,094} = 0,46$$

$$P_{O_2} = X_{O_2} \cdot P_T = 0,46 \cdot 1000 = 460 \text{ mmHg}$$

$$P_{SO_2} = 1000 - 460 = 540 \text{ mmHg}$$

15



64% RIQUEZA

1,45 g/mL

250 mL }  $\text{HNO}_3$   
1,5M

PM = 63 g/mol

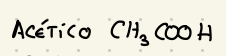
$$M = \frac{n}{V} \quad n = 1,5 \cdot 0,25 = 0,375 \text{ moles } \text{HNO}_3$$

$$0,375 \text{ moles } \text{HNO}_3 \cdot \frac{63 \text{ g } \text{HNO}_3}{1 \text{ mol } \text{HNO}_3} = 23,625 \text{ g } \text{HNO}_3$$

$$d = \frac{m}{V} \quad V = \frac{23,625}{1,45} = 16,3 \text{ mL } \text{HNO}_3$$

$$16,3 \text{ mL } \text{HNO}_3 \cdot \frac{100 \text{ g COMERCIAL}}{64 \text{ g Puros}} = 25,47 \text{ mL } \text{HNO}_3 \text{ COMERCIAL}$$

17



2M

1,03 g/mL

$$m = \frac{n_s}{\text{Kg disolvente}}$$

1 L  $\Rightarrow$  1000 mL

$$d = \frac{m}{V} \quad m = 1,03 \cdot 1000 = 1030 \text{ g disolución}$$

$$M = \frac{n}{V} \quad n = 2 \cdot 1 = 2 \text{ moles } \text{CH}_3\text{COOH}$$

$$2 \text{ moles } \text{CH}_3\text{COOH} \cdot \frac{64 \text{ g } \text{CH}_3\text{COOH}}{1 \text{ mol}} = 128 \text{ g } \text{CH}_3\text{COOH}$$

$$m_{\text{disolvente}} = m_{\text{disolución}} - m_{\text{solute}} = 1030 - 128 = 902 \text{ g disolvente}$$

$$m = \frac{2}{0,902} = 2,2 \text{ m}$$

$$902 \text{ g } \text{H}_2\text{O} \cdot \frac{1 \text{ mol } \text{H}_2\text{O}}{18 \text{ g}} = 50,1 \text{ mol } \text{H}_2\text{O}$$

$$n_T = 50,1 + 2 = 52,1$$

$$X_{\text{Ac}} = 0,04$$

$$\% \text{ASA} = \frac{128}{1030} \cdot 100 = 12,4\%$$

19)  $\frac{V}{d}$  HCl ?  
 Dis 0,5 M  
 Dis 100 mL 0,2 M  
 PREPARO ESO PARTIENDO DE HCl 0,5 M

$$M = \frac{n}{V} \Rightarrow n_{\text{HCl}} = M_2 V_2 = 0,02 \text{ mol HCl}$$

necesito para preparar 2  
 los mols en las  
 disoluciones no  
 cambian.

$$M_1 = \frac{n}{V_1} \Rightarrow 0,5 = \frac{0,02}{V} \Rightarrow V = 0,04 \text{ L}$$

40 mL de la disolución  
 inicial

20) 10 mL  
 $\text{HNO}_3$   
 64%  
 1,45 g/mL

$$V_{\text{FINAL}} = 100 \text{ mL}$$

$d M_{\text{FINAL}} ?$   $\Rightarrow$  necesito saber los mols  
 con los muros que en  
 la inicial.

$$d = \frac{m}{V} \quad 1,45 = \frac{m}{10} \quad m = 14,5 \text{ g de disolución}$$

$$\text{No es pura}$$

$$14,5 \text{ g} \cdot \frac{64 \text{ g HNO}_3}{100 \text{ g muestra}} = 9,28 \text{ g HNO}_3$$

$$9,28 \text{ g HNO}_3 \cdot \frac{1 \text{ mol}}{61 \text{ g}} = 0,152 \text{ mol HNO}_3$$

$$M = \frac{0,152}{0,1} = 1,52 \text{ M}$$

25.



a)  $200^\circ\text{C}$  }  $P_{\text{aire}}$  1 kg de blenda 85% ZnS  
 $3 \text{ atm}$   $P_{\text{H}_{\text{ZnS}}} = 97,5 \text{ g/mol}$

$$1 \text{ kg} \cdot \frac{85}{100} = 0,85 \text{ kg} = 850 \text{ g}$$

$$850 \text{ g} \cdot \frac{1 \text{ mol ZnS}}{97,5 \text{ g}} \cdot \frac{\frac{3}{2} \text{ mol O}_2}{1 \text{ mol ZnS}} = 13,1 \text{ mol O}_2$$

Ec. Gases IDEALES

$$pV = nRT \quad 3 \cdot V = 13,1 \cdot 0,082 \cdot 473$$

$$V = 169,1 \text{ L de O}_2$$

$$169,1 \text{ L de O}_2 \cdot \frac{100 \text{ l aire}}{21 \text{ l O}_2} = 806,2 \text{ L}$$

$$\textcircled{b} \quad 850 \text{ g} \cdot \frac{1 \text{ mol ZnS}}{97,5 \text{ g}} \cdot \frac{1 \text{ mol ZnO}}{1 \text{ mol ZnS}} \cdot \frac{81 \text{ g ZnO}}{1 \text{ mol ZnO}} = 706 \text{ g}$$

$$\textcircled{c} \quad 850 \text{ g} \cdot \frac{1 \text{ mol ZnS}}{97,5 \text{ g}} \cdot \frac{1 \text{ mol SO}_2}{1 \text{ mol ZnS}} = 8,71 \text{ moles}$$

$$p_{250} = 8,71 \cdot 0,082 \cdot (80 + 273) \quad p = 1 \text{ atm}$$



$$5 \text{ L O}_2 \cdot \frac{1 \text{ mol O}_2}{22,7 \text{ L}} \cdot \frac{1 \text{ mol KClO}_3}{\frac{3}{2} \text{ mol O}_2} \cdot \frac{122,5 \text{ g KClO}_3}{1 \text{ mol KClO}_3} \cdot \frac{100 \text{ g KClO}_3 \text{ total}}{95 \text{ g KClO}_3 \text{ puro}} = 19 \text{ g}$$

$$5 \text{ L O}_2 \cdot \frac{1 \text{ mol O}_2}{22,7 \text{ L}} \cdot \frac{1 \text{ mol KCl}}{1 \text{ mol O}_2} \cdot \frac{74,5 \text{ g KCl}}{1 \text{ mol KCl}} = 11 \text{ g KCl}$$

(27)



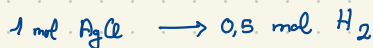
$$100 \text{ g} \quad \begin{array}{c} 5 \text{ L} \\ 20^\circ \text{C} \\ 750 \text{ mmHg} \end{array}$$

$$PV = nRT$$

$$\frac{750}{760} \cdot 5 = n \cdot 0,082 \cdot (20 + 273,15)$$

$$n = 0,2 \text{ mol H}_2$$

$$100 \text{ g AgCl} \cdot \frac{1 \text{ mol AgCl}}{143,32 \text{ g AgCl}} = 0,7 \text{ mol AgCl}$$



tengo 0,2  $\Rightarrow$  H<sub>2</sub> REACTIVO LIMITANTE



$$i \quad 0,7 \quad 0,2$$

$$f \quad 0,3 \quad 0 \quad 0,4 \quad 0,4$$

$$49 \text{ g} \quad 0 \quad 14,6 \quad 43,12$$

(28)



$$i \quad 0,2 \quad 0,15$$

$$f \quad 0 \quad 0,05$$

$$0,1$$

$$PV = nRT$$

$$1 \cdot V = 0,1 \cdot 0,082 \cdot (273 + 27)$$

$$0,2 \cdot \frac{1}{2} = 0,1$$

$$\eta \approx 81\%$$

$$\text{HCl} \quad \frac{100 \text{ mL}}{2}$$

$$n = M \cdot V = 0,2 \text{ mol}$$

$$15 \text{ g CaCO}_3 \quad n = 0,15$$

$$PV = nRT$$

$$1 \cdot 2 = n \cdot 0,082 \cdot 300$$

$$0,081$$

(35)



$$0,5 \text{ g BaCO}_3 \cdot \frac{1 \text{ mol BaCO}_3}{171,3 \text{ g BaCO}_3} \cdot \frac{1 \text{ mol CO}_2}{1 \text{ mol BaCO}_3} \cdot \frac{44 \text{ g CO}_2}{1 \text{ mol CO}_2} = 0,12 \text{ g CO}_2$$

(36)

Cu Ag 57% PLATA

están en disolución



$$1,1 \text{ g AgCl} \cdot \frac{1 \text{ mol AgCl}}{143,32 \text{ g AgCl}} \cdot \frac{1 \text{ mol AgCu}}{1 \text{ mol AgCl}} \cdot \frac{1 \text{ mol Ag}^+}{1 \text{ mol AgCu}} \cdot \frac{107,8 \text{ g}}{1 \text{ mol Ag}^+} \cdot \frac{100 \text{ g AgCl}}{57 \text{ g Ag}} = 1,45 \text{ g AgCl}$$

37.



$$5\text{L} = 5000 \text{ mL}$$

80% masa

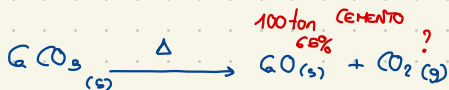
$$d = 0,84 \text{ g/mL}$$

$$d = \frac{m}{V} \quad 0,84 = \frac{m}{5000} \quad m = 4200 \text{ g de disolución}$$

$$4200 \text{ g disolución} \cdot \frac{80 \text{ g C}_2\text{H}_6\text{O}}{100 \text{ g disolución}} \cdot \frac{1 \text{ mol C}_2\text{H}_6\text{O}}{46 \text{ g C}_2\text{H}_6\text{O}} \cdot \frac{2 \text{ mol CO}_2}{1 \text{ mol C}_2\text{H}_6\text{O}} \cdot \frac{44 \text{ g}}{1 \text{ mol CO}_2} = 6427 \text{ g}$$

$$= 6,43 \text{ Kg}$$

38.



$$1.000.000 \text{ g} \cdot \frac{65 \text{ g CaO}}{100 \text{ g cemento}} \cdot \frac{1 \text{ mol CaO}}{56 \text{ g CaO}} \cdot \frac{1 \text{ mol CO}_2}{1 \text{ mol CaO}} = 11.607 \text{ mol}$$

$$pV = nRT$$

$$\frac{770}{760} \cdot V = 11.607 \cdot 0,082 \cdot (18 + 273)$$

$$V = 2,73 \cdot 10^3 \text{ L}$$



$$187 \text{ g muestra} \cdot \frac{83 \text{ g KClO}_3}{100 \text{ g muestra}} \cdot \frac{1 \text{ mol KClO}_3}{122,5 \text{ g KClO}_3} \cdot \frac{3/2 \text{ mol O}_2}{1 \text{ mol KClO}_3} = 1,9 \text{ mol O}_2$$

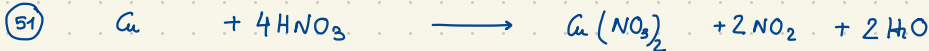
$$\frac{780}{760} \cdot V = 1,9 \cdot 0,082 \cdot (125 + 273)$$

$$V = 60,4 \text{ L}$$

$$1,9 \text{ mol O}_2 \cdot \frac{6,023 \cdot 10^{23} \text{ moléculas}}{1 \text{ mol O}_2} = 1,14 \cdot 10^{24} \text{ moléculas}$$



$$10 \text{ g Cu} \cdot \frac{1 \text{ mol Cu}}{63,5 \text{ g Cu}} \cdot \frac{2 \text{ mol H}_2\text{SO}_4}{1 \text{ mol Cu}} \cdot \frac{98 \text{ g H}_2\text{SO}_4}{1 \text{ mol H}_2\text{SO}_4} \cdot \frac{100 \text{ dilucon}}{95 \text{ g H}_2\text{SO}_4} \cdot \frac{1 \text{ mL}}{1,98 \text{ g dilucon}} = 16,4 \text{ mL}$$



$$5 \text{ g Cu} \cdot \frac{1 \text{ mol Cu}}{63,5 \text{ g}} \cdot \frac{4 \text{ mol HNO}_3}{1 \text{ mol Cu}} \cdot \frac{63 \text{ g HNO}_3^{\text{PURO}}}{1 \text{ mol HNO}_3} \cdot \frac{100 \text{ g \u00c1.C. COMERCIAL}}{68 \text{ g \u00c1.C. PURO}} = 29,18 \text{ g \u00c1.C. COMERCIAL}$$

$$d = \frac{m}{V} \Rightarrow V = \frac{29,18}{1,56} = 18,71 \text{ mL Ácido}$$

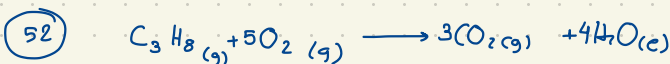
$$5 \text{ g Cu} \cdot \frac{1 \text{ mol Cu}}{63,5 \text{ g}} \cdot \frac{2 \text{ mol NO}_2}{1 \text{ mol Cu}} = 0,1574 \text{ mol NO}_2$$

Teórico

$$PV = nRT$$

$$\frac{780}{760} \cdot 1,5 = n \quad 0,082 \cdot 299,15 \quad n = 0,064 \text{ mol REAL NO}_2$$

$$\eta = 40,6 \%$$



0,1 · 0,4 · LIMITANTE

$$V_T = 10L$$

$$P_{\text{prop}} = 0,25 \text{ atm}$$

$$P_{P_{O_2}} = 1 \text{ atm}$$

$$0,41 \text{ mol O}_2 \cdot \frac{1 \text{ mol C}_3\text{H}_8}{5 \text{ mol O}_2} = 0,08 \text{ mol C}_3\text{H}_8 \text{ SE GASTAN}$$

$$PV = nRT$$

0,018

0,246

0,328

$$0,25 \cdot 10 = \eta_{\text{PROP}} \cdot 0,082 \cdot 298$$

0,88g  $C_3H_8$

10,8g CO<sub>2</sub>

59 g  $H_2O$

$$n_{prop} = 0,1$$

$$n_{O_2} = 0,4$$

$$Pv = nRT$$

$$\text{molar GAS} = 0,07 + 0,296$$

$$P = 0,6499 \approx 0,65 \text{ atm}$$