① $\tilde{\pi} = i\, M R T$ $\qquad i = 1$

$M = \tilde{\pi} / RT = 1.827\ 10^{-5}\ M$

$M = \frac{n}{V} \Rightarrow n = M \cdot V$

$= 1.827\ 10^{-5} \cdot 50\ 10^{-3}$

$= 5.48\ 10^{-7}\ mol$

$PM = \frac{MASSA}{moli} = \frac{10\ 10^{-3}}{5.48\ 10^{-7}} = 18244\ g/mol$

B

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② CONSIDERO 100 gr

MASSA Cu = 50.6 gr

$n_{Cu} = \frac{50.6}{63.55} = 0.796\ moli$

$$n_N = \frac{11.2}{14} = 0.799 \text{ mol}$$

$$n_O = \frac{38.2}{16} = 2.39 \text{ mol}$$

$$n_O / n_N \cong 3 \quad \text{quindi}$$

$$n_N \cong N_{Cu}$$

$CuNO_3$ **B**

↳ Cu^+ NO_3^-

---

(3) **C** AD ESEMPIO $O=C=O$

---

(4)

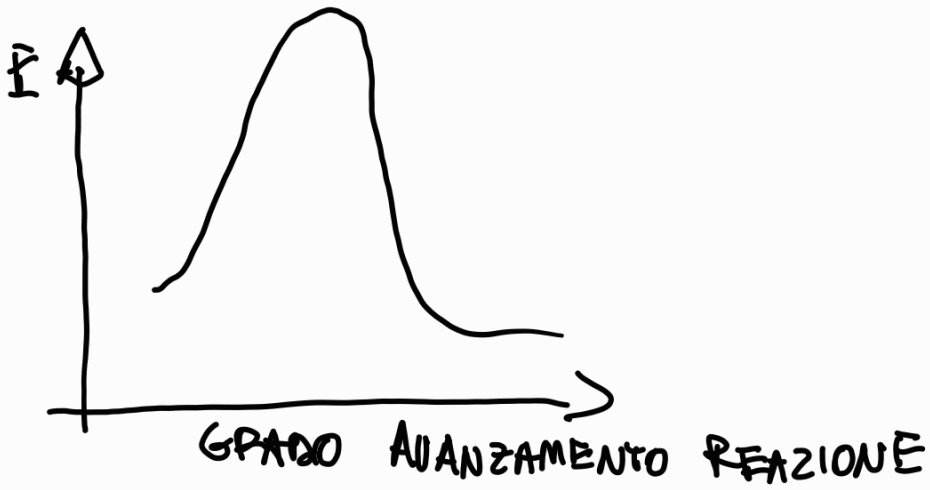
$HN_3 \rightleftharpoons H^+ + N_3^-$

$0.1\ M$ ↳ $1.2\ 10^{-3}\ M$ ↳ $1.2\ 10^{-3}\ M$

ACIDO DEBOLE

A

5



$$V = p \cdot f \cdot z$$

$$f = e^{-E_a/RT}$$

↳ VARI CON ENERGIA SUFF.

A

6

$$CaF_2 + H_2SO_4 \rightarrow 2\,HF + CaSO_4$$

$$M = \frac{n}{V} \Rightarrow n_{H_2SO_4} = M \cdot V = 150\,10^{-3} \cdot 0.5 = 0.075 \text{ moli}$$

$$n_{HF} = n_{H_2SO_4} \cdot 2 = 0.15 \text{ mol}$$

$PV = nRT \qquad V_{HF} = \frac{n_{HF} R \cdot T}{P} = 4.28\ L$

D

---

(7)

$MgCl_2$

$\hookrightarrow Mg^{2+} \quad 2Cl^-$

$\frac{19}{150} = \frac{x}{350}$ grammi $\quad x = 44.3$ gr

$n_{MgCl_2} = \frac{44.3}{PM} = \frac{44.3}{95.2} = 0.465$ moli

$n_{Cl^-} = 2 \cdot n_{MgCl_2} = 2 \cdot 0.465 = 0.93$ mol

C

---

(8)

CONSIDERO $1\ kg = 1000$ gr

$V_{sol} = \frac{1000}{1.22} = 819,6\ mL$

15 % di 1000 g = 150 g MASSA DI KOH

$$M_{KOH} = \frac{150}{56.1} = 2.67 \text{ moli}$$

$$[KOH] = \frac{2.67}{819.6\ 10^{-3}} = 3.26\ M$$

C

---

(9)

$$Co(NO_3)_2 \rightarrow Co^{2+} + 2NO_3^-$$

$$[NO_3^-] = 2.0\ 10^{-3}\ M$$

$$[Co^{2+}] = 1.0\ 10^{-3}\ M \quad \text{DATA}$$

$$KOH \rightarrow K^+ + OH^-$$

$$n_{OH^-} = n_{KOH} = \frac{0.675}{PM_{KOH}} = 0.00134 \text{ mol}$$

$$[OH^-] = \frac{n_{OH^-}}{1} = 0.00134\ M$$

$$Co(OH)_2 \rightleftharpoons Co^{2+} + 2OH^-$$

$$K_{PS} = [Ce^{2+}]_{eq} [OH^-]^2_{eq} = 3.5\ 10^{-6}$$

$$Q = [Ce^{2+}]\ [OH^-]^2 = 1.79\ 10^{-9}$$

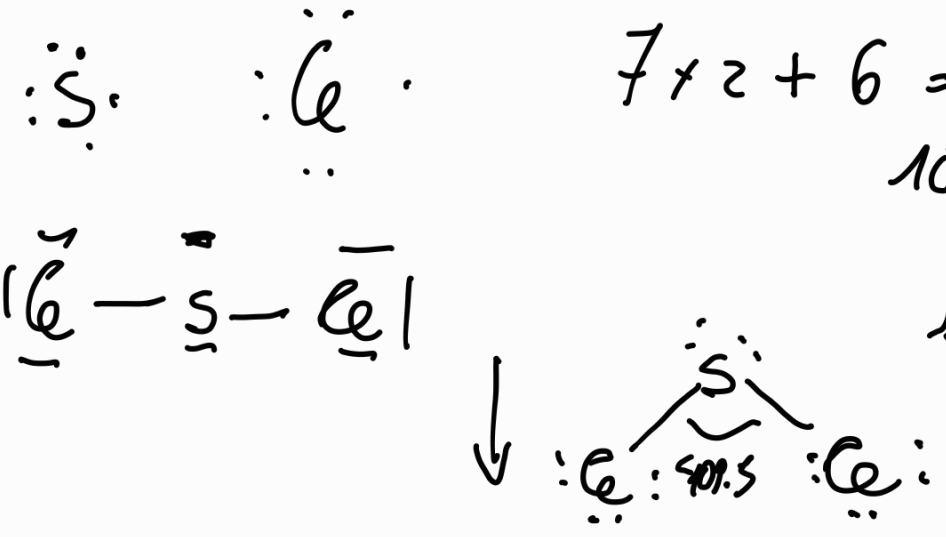
$$Q < K_{PS}$$

D

10

$7 \times 2 + 6 = 20$

10 COPPIE



sp^3

11

$$[H^+] = \sqrt{K_a \cdot C_0}$$

$C_0 = 0.0020\ M$

$K_a \simeq 1.8\ 10^{-4}$

$pH = -\log([H^+]) = 3.22$

C

12

$$\Delta G^\circ = -nF E^\circ$$

$E^\circ < 0 \quad \Delta G^\circ > 0$ NON SPONTANEA

E° DI RIDUZIONE < 0 ALLORA FORTE RIDUCENTE
SI OSSIDA FACILMENTE

D

13

$$B_2O_3 + 3\,Mg \rightarrow 2B + 3MgO$$

$$PM(B_2O_3) = 16 \times 3 + 2 \times 10.81$$
$$= 69.62 \text{ UMA}$$

$$n_{B_2O_3} = \frac{348.1}{69.62} = 5 \text{ moli}$$

$$n_{Mg} = \frac{145.8}{24.3} = 6 \text{ moli}$$

$$n_B = 2 \cdot n_{B_2O_3} = 10 \text{ mol.}$$

$n_B = n_{Mg} \cdot \frac{2}{3} = 4$ mol. $\quad$ Mg LIMITANTE

MASSA B $= n_B \cdot 10.81 = 4 \cdot 10.81$

$= 43.24$ gr

B

14

$C(s) + CO_2(g) \rightleftharpoons 2CO(g)$

~	0.5	0
	$-x$	$+2x$
	$0.5 - x$	$2x$

$P_{CO} = 2x = 0.34$ atm

$x = \frac{0.34}{2} = 0.17$

$K_p = (P_{CO})^2 / P_{CO_2}$

$P_{CO} = 0.34$

$P_{CO_2} = 0.5 - X = 0.5 - 0.17$

$= 0.33$

$$K_p = (0.34)^2 / 0.33 = 0.35$$

[A]

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(15)

$$2CO + 3H_2 \rightleftharpoons CH_2OHCH_2OH$$

$$\Delta H^\circ = \Delta H^\circ_f(CH_2OHCH_2OH) - 3\Delta H^\circ_f(H_2) - 2\Delta H^\circ_f(CO)$$

$\rightleftharpoons 0$

$= -454.8 + 221$

$= -233.8 \text{ kJ}$

$$\Delta S^\circ = S^\circ_f(CH_2OHCH_2OH) - 3 \cdot S^\circ_f(H_2) - 2S^\circ_f(CO)$$

$= 168 - 392.1 - 395.4$

$= -619.5 \text{ J}$

$$\Delta G^\circ = \Delta H^\circ - T\Delta S^\circ$$

$$= -233.8 - (300)\cdot(-619.5\cdot 10^{-3})$$

$$= -47.95 \ kJ$$

B

16

IDRACIDI H_nX_m

OSSIACIDI $H_nX_mO_p$

D