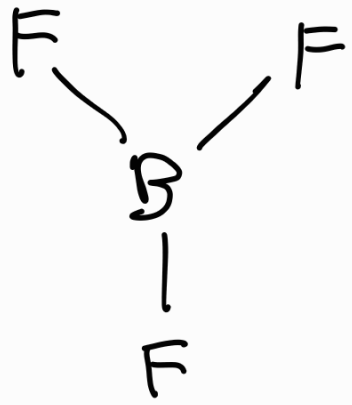
(1)

[C] EX $BF_3$




(2)

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

$$pOH = 14 - pH = 5.41$$

$$[OH^-] = 10^{-5.41} = 3.89\ 10^{-6}\ M$$

$$K_{PS} = [OH^-]^2\ [Zn^{2+}]$$

$$[Zn^{2+}] = \frac{[OH^-]}{2} = 1.94\ 10^{-6}\ M$$

$$K_{PS} = 1.94\ 10^{-6} \cdot (3.89\ 10^{-6})^2$$

$$= 2.93\ 10^{-17}$$

[C]

(3)

$$m = \frac{n_{UREA}}{kg \text{ di } H_2O}$$

CONSIDERO 1000 g di $H_2O$

E QUINDI AVRO' 20.52 moli DI UREA

$$n_{H_2O} = \frac{1000}{18} = 55.55 \text{ moli}$$

$$X_{UREA} = \frac{20.52}{20.52 + 55.55} = 0.27$$

[D]

---

(4)

$$2\,CO(g) \rightleftarrows CO_2(g) + C(s)$$

$$K = P_{CO_2} / P_{CO}^2 = \frac{0.76}{(0,05)^2} = 304$$

$$\Delta G^\circ = -RT \ln K$$

$$= -8.314 \cdot 773 \cdot \ln K$$

$$= -36,741 \text{ kJ/mol}$$

[B]

5

$$V = K [A]^2 [B]$$

SE RADDOPPIO [B]

$$V_0 = K [A]_0^2 [B]_0$$

$$V_1 = K [A]_0^2 (2 [B]_0)$$

$$V_1 / V_0 = \frac{K [A]_0^2 (2 [B]_0)}{K [A]_0^2 [B]_0} = 2$$

RADDOPPIA

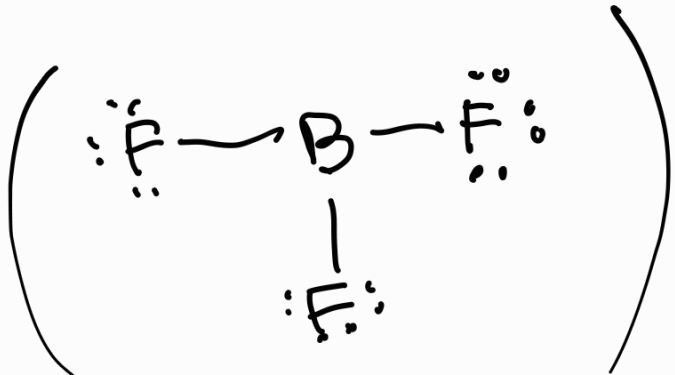
[D]

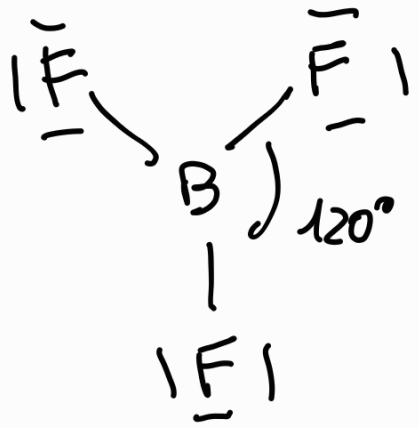
6

·B· :F·

$7 \cdot 3 + 3 = 24$

12 COPPIE






$sp^2$

A

---

(7) $2\,NO\,(g) + Br_2\,(g) \rightleftharpoons 2\,NOBr\,(g)$

$\Delta H^\circ = -16.1\ kJ/mol < 0$

CEDE CALORE IL CALORE E' UN PRODOTTO DI REAZIONE

A

---

(8)

$PM\,(Na\,CH_3CH_2CO) = 96\ uma$

$n_{NaA} = \frac{240}{96} = 2.5\ moli$

$[NaA] = \frac{2.5}{0.5} = 5\ M$

$$K_b = \frac{K_w}{K_a}$$

$$\gg 1.3\ 10^{-5}$$

$$[OH^-] = \sqrt{K_b \cdot S}$$

$$pOH = -\log([OH^-]) \quad \text{DA CUI}$$

$$pH = 14 - pOH = 9.72$$

[D]

---

(9)

$$M = \frac{n}{V} \quad \text{DA CUI} \quad n = M \cdot V$$

LE MOLI DI SOLUTO NON CAMBIANO

E QUINDI:

$$n_i = n_f \qquad M_i \cdot V_i = M_f \cdot V_f$$

$$0.188 \cdot 135 = M_f \cdot 216$$

$$M_f = \frac{0.188 \cdot 135}{216}$$

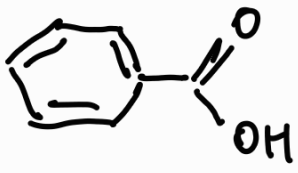
$$\simeq 0.118\ M$$

[C]

(9)

$$2\,C_6H_5COOH + Be(OH)_2 \rightarrow (C_6H_5COO)Be + 2H_2O$$

$PM(C_6H_5COOH) = 72 + 12 + 32 + 6 = 122$ UMA



$$n_{ACIDO} = \frac{0.816}{122} \simeq 0.0067 \text{ moli}$$

$$n_{Be(OH)_2} = \frac{n_{ACIDO}}{2} = 0.0033 \text{ moli}$$

$$M = \frac{n}{V} \rightarrow V = \frac{n}{M} = \frac{0.0033}{0.113} = 0.0296\ L$$

$V = 29.6$ mL

D

(11)

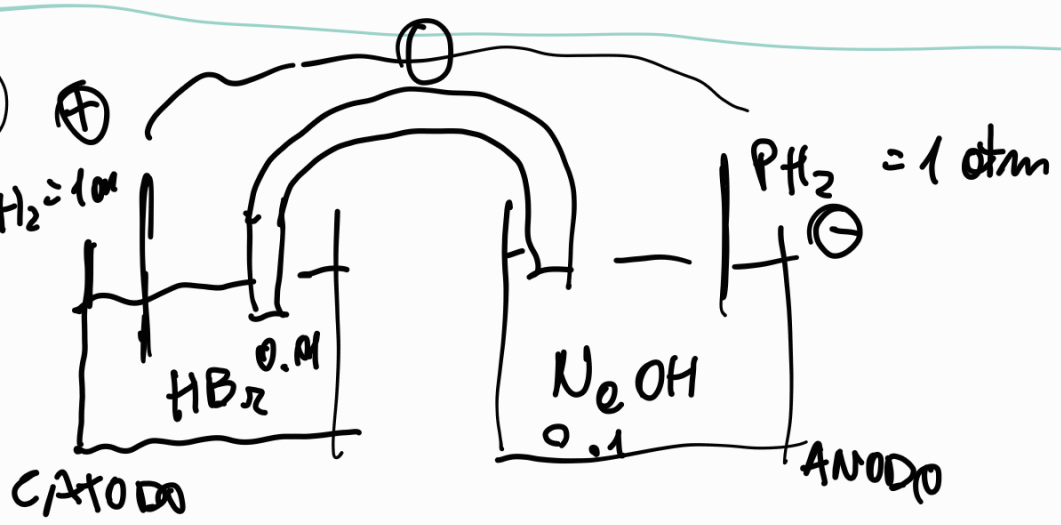
$Na_2S_2O_6$ $PM = 206$ UMA

$$\% O = 96/206 \cdot 100 = 46.6\ \%$$

$$\%S = \frac{64}{206} \cdot 100 = 31.1\%$$

D

12




$HBr$ 0.01 M $\Rightarrow [H^+] \simeq 0.01$ M

$NaOH$ 0.1 M $\Rightarrow [OH^-] \simeq 0.1$ M $\Rightarrow [H^+] = 10^{-13}$ M

$H^+(0.01\ M) \rightarrow H^+(10^{-13}\ M)$

ANODO $\frac{1}{2} H_2 \rightarrow H^+(10^{-13}\ M) + e^-$
(SOLUZIONE $NaOH$)

CATODO $H^+(0.01\ M) + e^- \rightarrow \frac{1}{2} H_2$
(SOLUZIONE $HBr$)

$$E = E^\circ_{CELLA} - \frac{0,0592}{1} \log(Q)$$

$H^+ (0.1\ M) \rightarrow H^+ (10^{-13}\ M)$

$Q = \frac{10^{-13}}{0.01}$ OVVIAMENTE $E^\circ_{CELLA} = 0V$

$E = 0.65\ V$

C

$Pt \mid H_2\ (1\ atm) \mid H^+ (10^{-13}\ M) \parallel H^+ (0.01\ M) \mid H_2\ (1\ atm) \mid Pt$

---

13

$$\overset{+7}{MnO_4^-} + Cl^- \rightarrow Mn^{+2} + Cl_2$$

$$MnO_4^- + 5e^- \rightarrow Mn^{2+}$$

↓ CARICA

$$MnO_4^- + 5e^- + 8H^+ \rightarrow Mn^{2+}$$

↓ MASSA

$MnO_4^- + 5e^- + 8H^+ \rightarrow Mn^{2+} + 4H_2O$

$2Cl^- \rightarrow Cl_2 + 2e^-$

30 mmo

$(2Cl^- \rightarrow Cl_2 + 2e^-) \times 5$

$(MnO_4^- + 5e^- + 8H^+ \rightarrow Mn^{2+} + 4H_2O) \times 2$

---

$2MnO_4^- + 10Cl^- + 16H^+ \rightarrow 2Mn^{2+} + 5Cl_2 + 8H_2$

2 10 2 5

**A**

---

(14) O $1s^2 2s^2 2p^4$

$O^{2-}$ $1s^2 2s^2 2p^6$

$[He]\ 2s^2\ 2p^6$

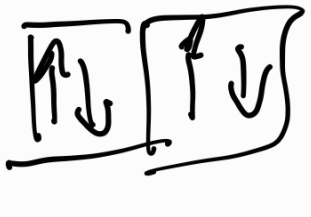
DIAMAGNETICO

D

$O_2\ \sigma_{2s}^2\ \sigma_{2s}^{*2}\ \pi_{2p}^4\ \sigma_{2p}^2\ \pi_{2p}^{*2}$

$O_2^{2-}\ \sigma_{2s}^2\ \sigma_{2s}^{*2}\ \pi_{2p}^4\ \sigma_{2p}^2\ \pi_{2p}^{*4}$

ORDINE LEGAME $\frac{8-6}{2} = 1$

$\pi_{2p}^*$ 

B

16

HF F è l'atomo con RAGGIO MINORE

RICORDA ORDINE ACIDITÀ'

B