



UNIVERSIDADE DE SÃO PAULO
INSTITUTO DE QUÍMICA DE SÃO CARLOS
SQF0319 - LABORATÓRIO DE QUÍMICA GERAL



EXPERIMENTO 10

REAÇÕES DE ÓXIDO-REDUÇÃO

Monitor: **MSc. Ricardo Sgarbi**
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▶ **Parte A** **A1 A2 A3 A4 A5**

▶ **Parte B**

▶ **Parte C** ~~**C1**~~ **C2**



Pure copper wire



Copper wire in dilute AgNO_3 solution after several hours



Blue color due to Cu^{2+} ions formed in redox reaction

Silver crystals formed after several weeks

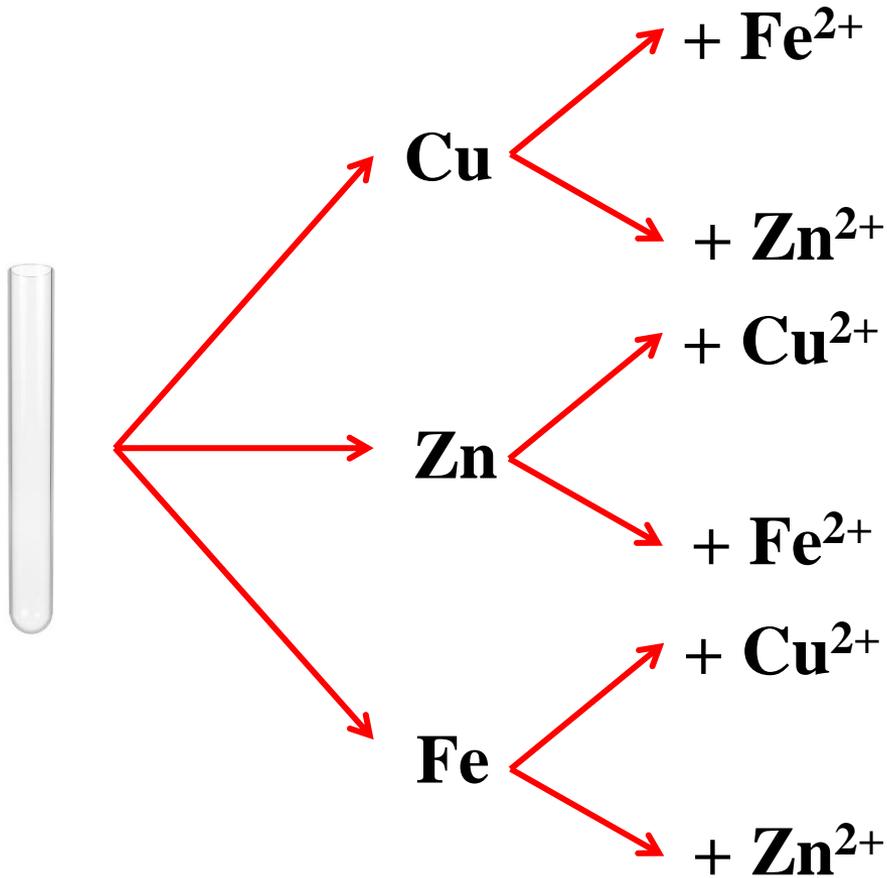
► Comparação entre os pares redox:



Anotações

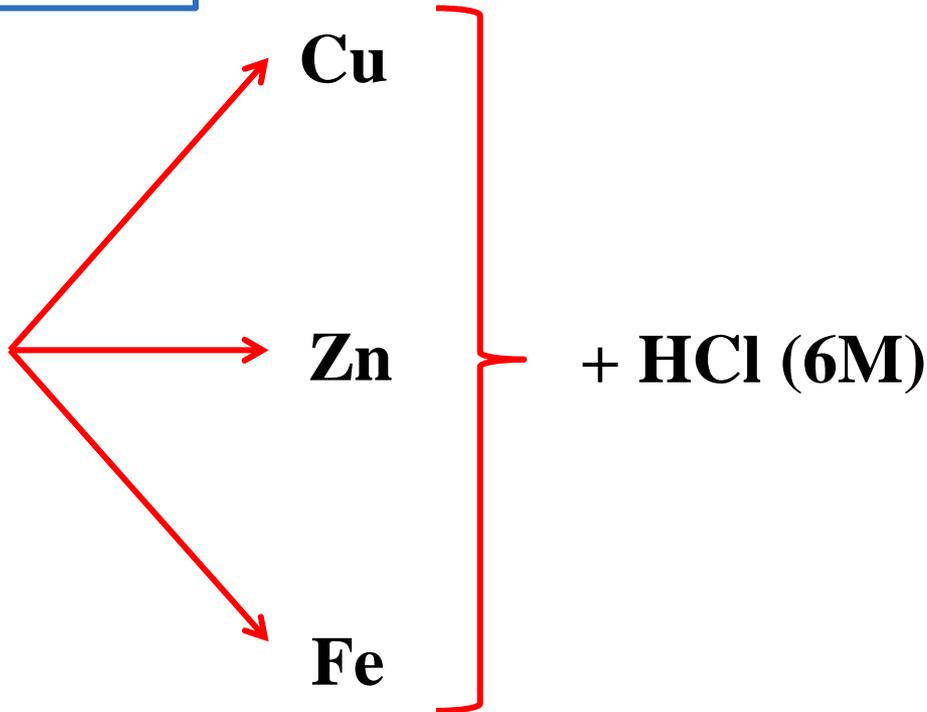
Parte A1

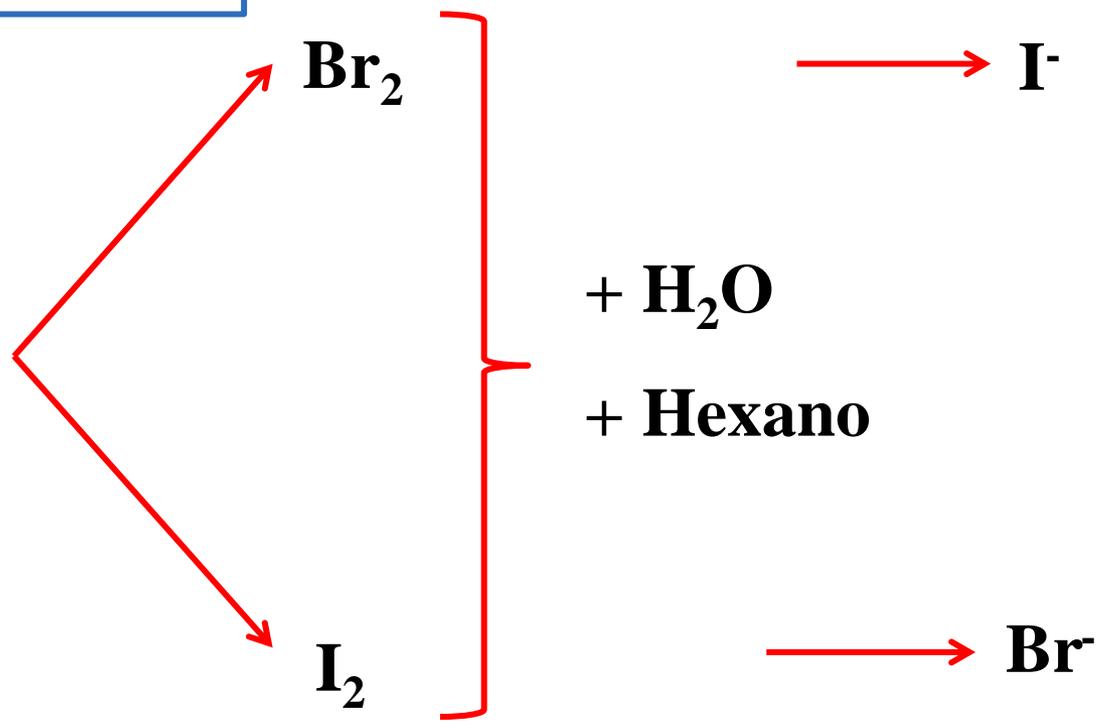
Cu/Cu²⁺ Zn/Zn²⁺ Fe/Fe²⁺



Parte A2

H⁺/H₂ Metais



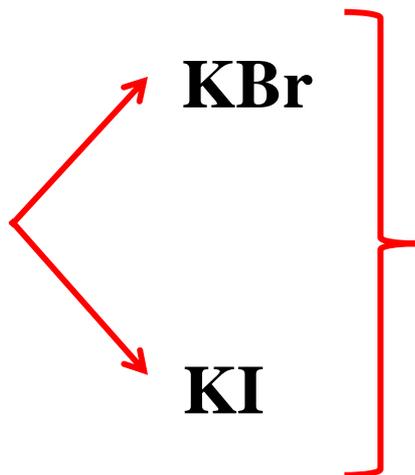


Parte A4

$\text{Fe}^{3+}/\text{Fe}^{2+}$

Br_2/Br^-

I_2/I^-

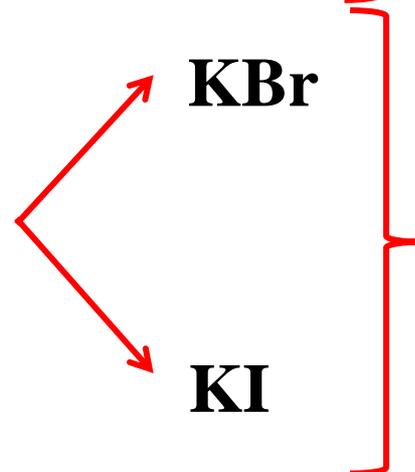


KBr

+ **FeCl_3**

+ **Hexano**

KI



KBr

+ **FeCl_3**

+ **Hexacianoferrato (III) de**

potássio



► Resultados

**Reações
Redox**

**Construção
Série Redox**

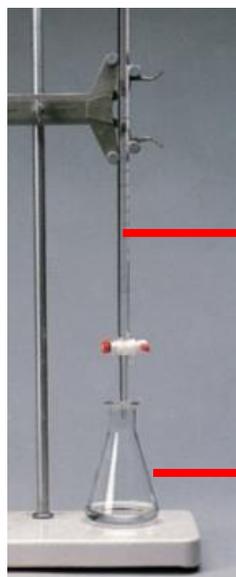
TABLE 4.5 • Activity Series of Metals in Aqueous Solution

Metal	Oxidation Reaction
Lithium	$\text{Li}(s) \longrightarrow \text{Li}^+(aq) + e^-$
Potassium	$\text{K}(s) \longrightarrow \text{K}^+(aq) + e^-$
Barium	$\text{Ba}(s) \longrightarrow \text{Ba}^{2+}(aq) + 2e^-$
Calcium	$\text{Ca}(s) \longrightarrow \text{Ca}^{2+}(aq) + 2e^-$
Sodium	$\text{Na}(s) \longrightarrow \text{Na}^+(aq) + e^-$
Magnesium	$\text{Mg}(s) \longrightarrow \text{Mg}^{2+}(aq) + 2e^-$
Aluminum	$\text{Al}(s) \longrightarrow \text{Al}^{3+}(aq) + 3e^-$
Manganese	$\text{Mn}(s) \longrightarrow \text{Mn}^{2+}(aq) + 2e^-$
Zinc	$\text{Zn}(s) \longrightarrow \text{Zn}^{2+}(aq) + 2e^-$
Chromium	$\text{Cr}(s) \longrightarrow \text{Cr}^{3+}(aq) + 3e^-$
Iron	$\text{Fe}(s) \longrightarrow \text{Fe}^{2+}(aq) + 2e^-$
Cobalt	$\text{Co}(s) \longrightarrow \text{Co}^{2+}(aq) + 2e^-$
Nickel	$\text{Ni}(s) \longrightarrow \text{Ni}^{2+}(aq) + 2e^-$
Tin	$\text{Sn}(s) \longrightarrow \text{Sn}^{2+}(aq) + 2e^-$
Lead	$\text{Pb}(s) \longrightarrow \text{Pb}^{2+}(aq) + 2e^-$
Hydrogen	$\text{H}_2(g) \longrightarrow 2\text{H}^+(aq) + 2e^-$
Copper	$\text{Cu}(s) \longrightarrow \text{Cu}^{2+}(aq) + 2e^-$
Silver	$\text{Ag}(s) \longrightarrow \text{Ag}^+(aq) + e^-$
Mercury	$\text{Hg}(l) \longrightarrow \text{Hg}^{2+}(aq) + 2e^-$
Platinum	$\text{Pt}(s) \longrightarrow \text{Pt}^{2+}(aq) + 2e^-$
Gold	$\text{Au}(s) \longrightarrow \text{Au}^{3+}(aq) + 3e^-$

Ease of oxidation increases



► Análise de Soluções de H_2O_2 com MnO_4^-



KMnO_4 (0,02M)

**Solução de H_2O_2
+ H_2SO_4 (6M)**

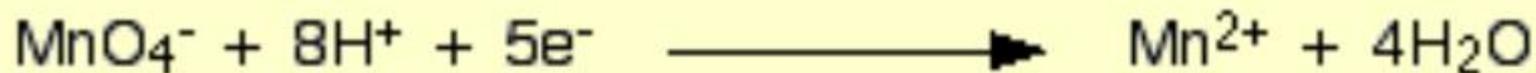
Conhecida

Desconhecida

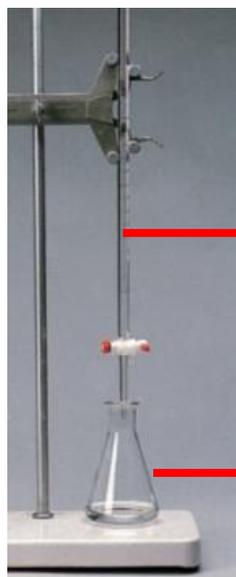
► Resultados



Atenção com n° de elétrons



► Capacidade oxidativa da Água Sanitária



Tiosulfato de Sódio

**Solução de Água Sanitária + KI +
H₂SO₄ (1 M) +**

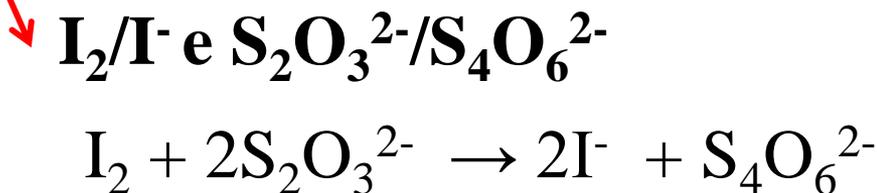
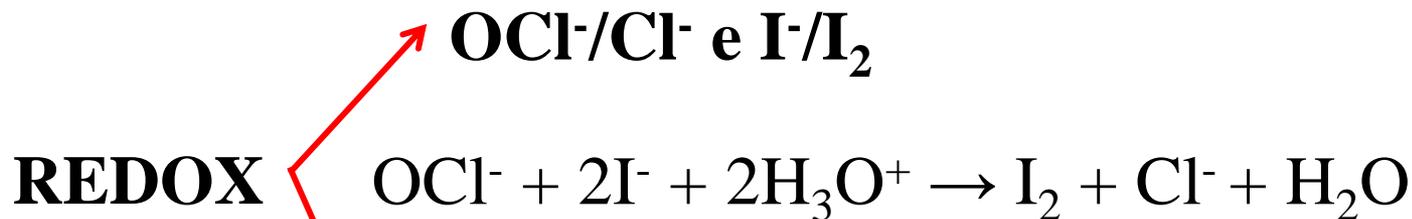
Molibdato de Amônio + Amido

► Resultados

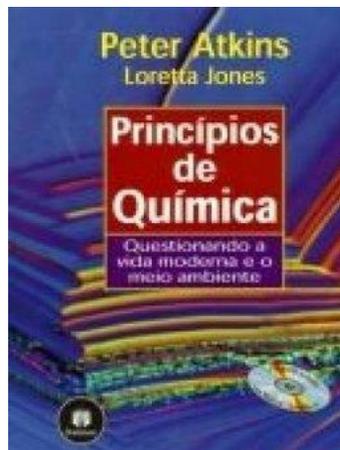


NaOCl

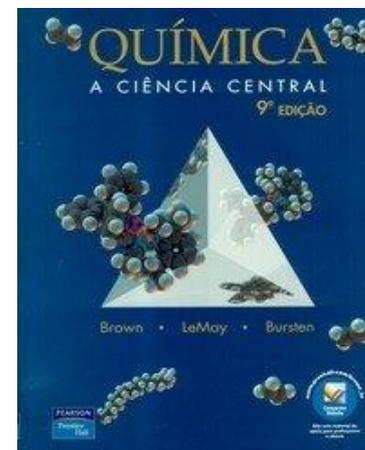
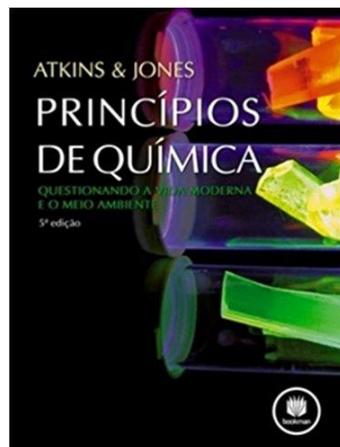
(74,4 g mol⁻¹)



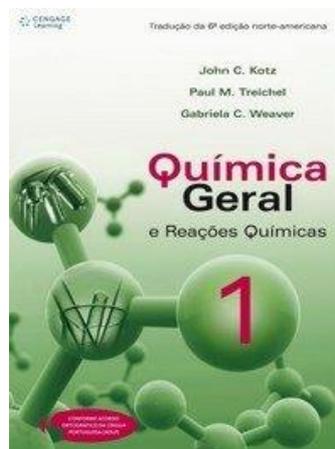
Material para Consulta



Princípios de Química: Questionando a Vida Moderna e o Meio Ambiente (Peter Atkins)



Química: A Ciência Central (Theodore Brown)



Química Geral e Reações Químicas (John Kotz)