

Lösungen zu den Übungsaufgaben – Redoxreaktionen

Zu 1)

- a) +V
- b) +VIII
- c) +III
- d) +I

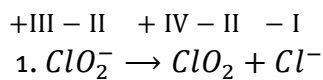
Zu 2)

Das Element, dessen Oxidationszahl zunimmt wird oxidiert; es wirkt als Reduktionsmittel. Wenn die Oxidationszahl abnimmt, wird es reduziert und es wirkt als Oxidationsmittel.

	Oxidationsmittel	Reduziert wird	Reduktionsmittel	Oxidiert wird
a)	ReCl ₅	Re(V)	SbCl ₃	Sb
b)	H ⁺	H ⁺	Zn	Zn
c)	NO ₃ ⁻	N	H ₂ S	S

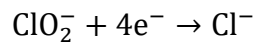
Zu 3)

a)

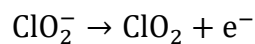


2./3.

Reduktion:

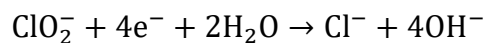


Oxidation:

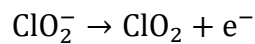


4.

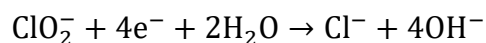
Reduktion:



Oxidation:



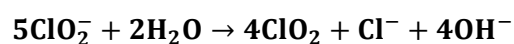
5./6. Reduktion:



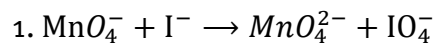
7./8. Oxidation:



Redox:

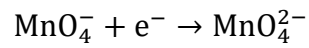


b) +VII – II – I + VI – II + VII – II

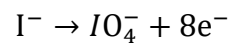


2./3.

Reduktion:

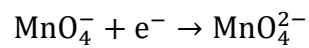


Oxidation:

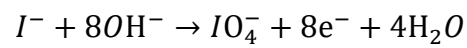


4.

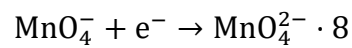
Reduktion:



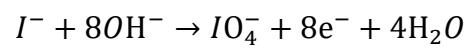
Oxidation:



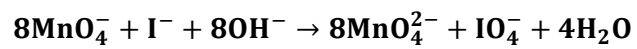
5./6. Reduktion:



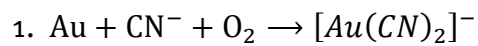
7./8. Oxidation:



Redox:

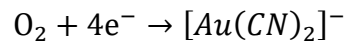


c) 0 + II - III 0 + I + II - III

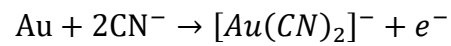


2./3.

Reduktion:

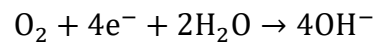


Oxidation:

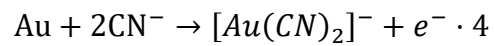


4.

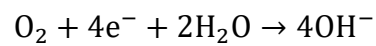
Reduktion:



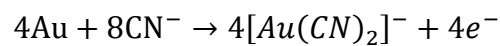
Oxidation:



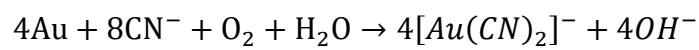
5./6. Reduktion:



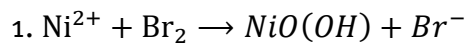
7./8. Oxidation:



Redox:

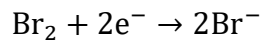


d) +II 0 + III – II – I – I



2./3.

Reduktion:

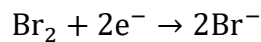


Oxidation:



4.

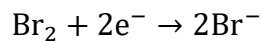
Reduktion:



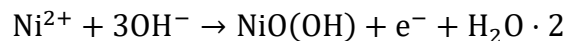
Oxidation:



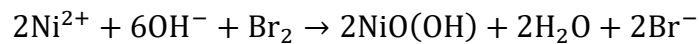
5./6. Reduktion:



7./8. Oxidation:



Redox:



Zu 4)

Die verbrauchte Stoffmenge des Permanganats ist:

$$\begin{aligned} n(\text{MnO}_4^-) &= c(\text{MnO}_4^-) \cdot V(\text{MnO}_4^- \text{ - Lösung}) \\ &= 0,02496 \text{ mmol} \cdot \text{ml}^{-1} \cdot 27,35 \text{ ml} = 0,6827 \text{ mmol} \end{aligned}$$

Nach der Reaktionsgleichung kommen 5 mmol Fe^{2+} -Ionen auf 1 mmol MnO_4^- -Ionen:

$$n(\text{Fe}^{2+}) = 5 \cdot n(\text{MnO}_4^-) = 3,4135 \text{ mmol}$$

Die Masse Eisen in der Probe ist dann entsprechend:

$$\begin{aligned} m(\text{Fe}^{2+}) &= M(\text{Fe}^{2+}) \cdot n(\text{Fe}^{2+}) \\ &= 55,85 \text{ mg} \cdot \text{mmol}^{-1} \cdot 3,4135 \text{ mmol} = 190,6 \text{ mg} \end{aligned}$$

Der Eisenerzgehalt ist:

$$\frac{190,6 \text{ mg}}{430,8 \text{ mg}} \cdot 100\% = 44,24\% = 44,24 \text{ cg} \cdot \text{g}^{-1}$$