

Reduction & Oxidation

1. In the reaction $2\text{Fe}^{2+}(\text{aq}) + \text{Br}_2(\text{l}) \rightarrow 2\text{Fe}^{3+}(\text{aq}) + 2\text{Br}^{-}(\text{aq})$, the chemical $\text{Fe}^{2+}(\text{aq})$ has _____ electrons and has undergone _____.

a	Gained	Reduction
b	Gained	Oxidation
c	Lost	Reduction
d	Lost	oxidation

2. The products in the spontaneous reaction between $\text{Sn}^{2+}(\text{aq})$ and $\text{Cu}^{2+}(\text{aq})$ will be _____ and _____

a	$\text{Cu}(\text{s})$	$\text{Sn}(\text{s})$
b	$\text{Cu}(\text{s})$	$\text{Sn}^{4+}(\text{aq})$
c	$\text{Cu}^{2+}(\text{aq})$	$\text{Sn}(\text{s})$
d	$\text{Cu}^{2+}(\text{aq})$	$\text{Sn}^{2+}(\text{aq})$

3. The reducing agent capable of converting 1.0 mol/L $\text{Sn}^{4+}(\text{aq})$ ions to $\text{Sn}^{2+}(\text{aq})$, but not capable of converting 1.0 mol/L.

$\text{Sn}^{2+}(\text{aq})$ to $\text{Sn}(\text{s})$ is _____

a	$\text{Pb}(\text{s})$
b	$\text{Ni}(\text{s})$
c	$\text{Cu}(\text{s})$
d	$\text{Cr}(\text{s})$

4. If fluorine gas is bubbled through $\text{NaI}(\text{aq})$, then _____ is _____.

a	$\text{Na}^{+}(\text{aq})$	Reduced
b	$\text{I}^{-}(\text{aq})$	Oxidized
c	$\text{F}_2(\text{g})$	Oxidized
d	$\text{I}^{-}(\text{aq})$	Reduced

5. The **balanced net ionic equation** for the reaction that occurs when

a piece of potassium is dropped into a container of water is _____

a	$2\text{K(s)} + 2\text{H}_2\text{O(l)} \rightarrow \text{H}_2\text{(g)} + 2\text{K}^+\text{(aq)} + 2\text{OH}^-\text{(aq)}$
b	$\text{K(s)} + 2\text{H}_2\text{O(l)} \rightarrow \text{H}_2\text{(g)} + \text{K}^+\text{(aq)} + 2\text{OH}^-\text{(aq)}$
c	$\text{K(s)} + 2\text{H}_2\text{O(l)} \rightarrow \text{H}^+\text{(aq)} + \text{K}^+\text{(aq)} + \text{OH}^-\text{(aq)}$
d	$2\text{K(s)} + 2\text{H}_2\text{O(l)} \rightarrow \text{H}^+\text{(aq)} + 2\text{K}^+\text{(aq)} + 2\text{OH}^-\text{(aq)}$

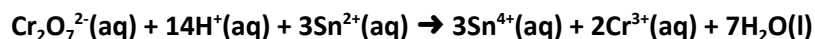
6. When Fe(s) is placed in a solution containing $\text{Cu(NO}_3)_2\text{(aq)}$ and $\text{MgCl}_2\text{(aq)}$ the most likely balanced redox reaction is _____

a	$3\text{Cu}^{2+}\text{(aq)} + 2\text{Fe(s)} \rightarrow 2\text{Fe}^{3+}\text{(aq)} + 3\text{Cu(s)}$
b	$\text{Cu}^{2+}\text{(aq)} + \text{Fe(s)} \rightarrow \text{Fe}^{2+}\text{(aq)} + \text{Cu(s)}$
c	$\text{Cu(s)} + 2\text{Fe}^{3+}\text{(aq)} \rightarrow 2\text{Fe}^{2+}\text{(aq)} + \text{Cu}^{2+}\text{(aq)}$
d	$\text{Mg}^{2+}\text{(aq)} + 2\text{Cl}^-\text{(aq)} \rightarrow \text{Mg(s)} + \text{Cl}_2\text{(g)}$

7. A student gathers information to determine the reactivity of fluorine gas. If the information is accurate, then a **correct statement** is that _____

a	Li(s) gains electrons more easily than does $\text{F}_2\text{(g)}$
b	$\text{F}_2\text{(g)}$ loses electrons more easily than does Li(s)
c	$\text{F}_2\text{(g)}$ loses electrons more easily than does $\text{Cl}_2\text{(g)}$
d	$\text{F}_2\text{(g)}$ gains electrons more easily than does $\text{Cl}_2\text{(g)}$

8. The species that is reduced in the reaction given below is _____.



a	$\text{Cr}_2\text{O}_7^{2-}\text{(aq)}$
b	$\text{Cr}^{3+}\text{(aq)}$
c	$\text{Sn}^{2+}\text{(aq)}$
d	$\text{Sn}^{4+}\text{(aq)}$

9. A solution of acidified potassium permanganate is stored in an iron container. The net ionic equation for a reaction that occurs is _____

a	$\text{MnO}_4^-\text{(aq)} + 8\text{H}^+\text{(aq)} + 5\text{K(s)} \rightarrow \text{Mn}^{2+}\text{(aq)} + 2\text{H}_2\text{O(l)} + 5\text{K}^+\text{(aq)}$
b	$2\text{MnO}_4^-\text{(aq)} + 16\text{H}^+\text{(aq)} + 5\text{Fe(s)} \rightarrow 2\text{Mn}^{2+}\text{(aq)} + 8\text{H}_2\text{O(l)} + 5\text{Fe}^{2+}\text{(aq)}$
c	$\text{MnO}_4^-\text{(aq)} + 8\text{H}^+\text{(aq)} + \text{Fe}^{2+}\text{(aq)} \rightarrow \text{Mn}^{2+}\text{(aq)} + 4\text{H}_2\text{O(l)} + \text{Fe}^{3+}\text{(aq)}$
d	$\text{MnO}_4^-\text{(aq)} + 8\text{H}^+\text{(aq)} + \text{Fe(s)} \rightarrow \text{Mn}^{2+}\text{(aq)} + 4\text{H}_2\text{O(l)} + \text{Fe}^{2+}\text{(aq)}$

10. The unbalanced equation that represents a reduction half-reaction is _____

a	$X^{2+}(aq) \rightarrow X^{3+}(aq)$
b	$R^{2+}(aq) \rightarrow R^+(aq)$
c	$Z(s) \rightarrow Z^{3+}(aq)$
d	$2M^+(aq) \rightarrow M_2(g)$

11. The balanced net ionic equation for the most probable spontaneous reaction of iron (II) chloride with acidified potassium nitrate is _____

a	$2Fe^{2+}(aq) + 4H^+(aq) + 2NO_3^-(aq) \rightarrow 2Fe^{3+}(aq) + N_2O_4(g) + 2H_2O(l)$
b	$2Fe^{2+}(aq) + 8H^+(aq) + 4NO_3^-(aq) \rightarrow 2Fe(s) + 2N_2O_4(g) + 4H_2O(l)$
c	$Fe^{2+}(aq) + 2H_2O(l) \rightarrow Fe(s) + 4H^+(aq) + O_2(g)$
d	$Fe^{2+}(aq) + 2Cl^-(aq) \rightarrow Fe(s) + Cl_2(g)$

12. **Numerical response question:** Left justify your answer in the boxes provided.

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Consider the four equations listed below

1	$C_3H_{8(g)} + 5O_{2(g)} \rightarrow 3CO_{2(g)} + 4H_2O_{(g)}$
2	$3Ni(NO_3)_{2(aq)} + 2Al_{(s)} \rightarrow 2Al(NO_3)_{3(aq)} + 3Ni_{(s)}$
3	$NaCl_{(s)} + HNO_{3(aq)} \rightarrow HCl_{(aq)} + NaNO_{3(aq)}$
4	$4HCN_{(g)} + 9O_{2(g)} \rightarrow 4CO_{2(g)} + 2H_2O_{(g)} + 4NO_{2(g)}$

Choose **all** the reactions above that are oxidation-reduction reactions. List the answer(s) in ascending order.

Solutions:

1. D
2. B
3. A
4. B
5. A
6. B
7. D
8. A
9. B
10. B
11. A
12. 124