

# Chem12 Oxidation/Reduction : Test - 80

Part 1) 1) Define the following terms :

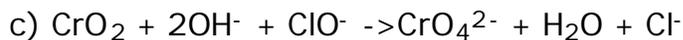
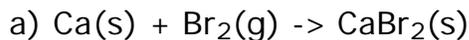
Oxidation -

Reduction -

Oxidizing agent -

Reducing agent -

2) Indicate which element is reduced in the following reactions :



Part 2) Multiple choice questions.

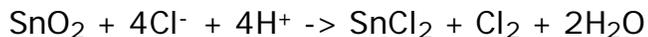
1) In a particular redox reaction, the oxidation number of phosphorus changed from -3 to 0. From this it may be concluded that phosphorus:

- a) lost 3 electrons and was reduced.
- b) lost 3 electrons and was oxidized.
- c) gained 3 electrons and was reduced.
- d) gained 3 electrons and was oxidized.

2) Which species will most readily act as the reducing agent in becoming  $\text{Mn}^{2+}$  ?

- a) Mn                      b)  $\text{MnO}_2$                       c)  $\text{MnO}_4^-$                       d)  $\text{Mn(OH)}_2$

3) Which species is losing electrons in the following redox reaction?



- a)  $\text{H}^+$                       b)  $\text{Cl}^-$                       c) O                      d) Sn

4) What is the oxidation number of N in  $\text{NH}_2\text{OH}$  ?

- a) -2                      b) -1                      c) 0                      d) +1

5) Which of the following represents a redox reaction ?

- a)  $2\text{HCl} + \text{Na}_2\text{SO}_3 \rightarrow 2\text{NaCl} + \text{H}_2\text{O} + \text{SO}_2$       b)  $\text{CuS} + \text{H}_2 \rightarrow \text{H}_2\text{S} + \text{Cu}$   
 c)  $\text{AgNO}_3 + \text{NaCl} \rightarrow \text{AgCl} + \text{NaNO}_3$                       d)  $\text{H}_2\text{CO}_3 \rightarrow \text{H}_2\text{O} + \text{CO}_2$

6) Copper has an oxidation number of +1 in :

- a)  $\text{Cu}(\text{CH}_3\text{COO})_2$       b)  $\text{CuBr}$                       c)  $\text{CuC}_2\text{O}_4$                       d)  $\text{CuO}$

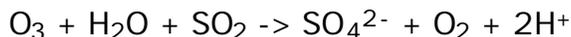
7) When  $\text{ClO}_3^-$  is oxidized, a possible product is :

- a)  $\text{Cl}^-$                       b)  $\text{ClO}^-$                       c)  $\text{ClO}_2^-$                       d)  $\text{ClO}_4^-$

8) Which of the following is an equation representing a redox reaction ?

- a)  $2\text{NO}_2(\text{g}) \rightarrow \text{N}_2\text{O}_4(\text{g})$                       b)  $\text{Mg}(\text{s}) + \text{Cl}_2(\text{g}) \rightarrow \text{MgCl}_2(\text{s})$   
 c)  $\text{Ag}^+(\text{aq}) + \text{Cl}^-(\text{aq}) \rightarrow \text{AgCl}(\text{s})$                       d)  $\text{NH}_3(\text{aq}) + \text{H}^+(\text{aq}) \rightarrow \text{NH}_4^+(\text{aq})$

9) Consider the following :



In the redox equation above, the chemical species which is oxidized is :

- a)  $\text{H}^+$                       b)  $\text{O}_3$                       c)  $\text{SO}_2$                       d)  $\text{SO}_4^{2-}$

10) A product of the oxidation of  $\text{NO}_2$  is :

- a)  $\text{NO}$                       b)  $\text{N}_2\text{O}$                       c)  $\text{NO}_2^-$                       d)  $\text{NO}_3^-$

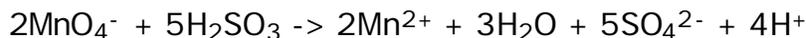
11) At standard conditions,  $\text{Ni}(\text{s})$  will react spontaneously with

- a)  $\text{Cl}^-$                       b)  $\text{Ag}^+$                       c)  $\text{Cr}^{3+}$                       d)  $\text{Co}^{2+}$

12) Electrons are lost by the

- a) reducing agent as it undergoes oxidation
- b) reducing agent as it undergoes reduction
- c) oxidizing agent as it undergoes oxidation
- d) oxidizing agent as it undergoes reduction

13) Consider the following reaction :



The species that undergoes reduction is

- a) S
- b) H
- c) O
- d) Mn

14) In which of the following unbalanced reactions does chromium undergo oxidation ?

- a)  $\text{Cr}^{3+} \rightarrow \text{Cr}$
- b)  $\text{Cr}^{3+} \rightarrow \text{Cr}^{2+}$
- c)  $\text{Cr}^{3+} \rightarrow \text{Cr}_2\text{O}_7^{2-}$
- d)  $\text{CrO}_4^{2-} \rightarrow \text{Cr}_2\text{O}_7^{2-}$

15) Which of the following is a balanced half-reaction in base ?

- a)  $\text{Cl}_2 + 3\text{H}_2\text{O} \rightarrow \text{ClO}_3^- + 6\text{H}^+ + 5\text{e}^-$
- b)  $\text{Cl}_2 + 6\text{OH}^- \rightarrow \text{ClO}_3^- + 5\text{e}^- + 3\text{H}_2\text{O}$
- c)  $\text{Cl}_2 + 6\text{H}_2\text{O} \rightarrow 2\text{ClO}_3^- + 12\text{H}^+ + 10\text{e}^-$
- d)  $\text{Cl}_2 + 12\text{OH}^- \rightarrow 2\text{ClO}_3^- + 6\text{H}_2\text{O} + 10\text{e}^-$

16) Which of the following reactions is spontaneous ?

- a)  $\text{Fe}^{2+} + \text{Sn} \rightarrow \text{Fe} + \text{Sn}^{2+}$
- b)  $\text{Fe}^{3+} + \text{Sn} \rightarrow \text{Fe}^{2+} + \text{Sn}^{2+}$
- c)  $\text{Fe}^{2+} + \text{Sn}^{2+} \rightarrow \text{Fe} + \text{Sn}^{4+}$
- d)  $\text{Fe}^{2+} + \text{Sn}^{4+} \rightarrow \text{Fe}^{3+} + \text{Sn}^{2+}$

17) Samples of Uranium, Vanadium and Yttrium (U, V, Y) were placed in solutions containing one of the metallic ions,  $\text{U}^{3+}$ ,  $\text{V}^{2+}$  and  $\text{Y}^{3+}$ . The following observations were recorded.

Trial	Ion	Metal	Observation
1	$\text{U}^{3+}$	Y	reaction
2	$\text{V}^{2+}$	U	reaction
3	$\text{V}^{2+}$	Y	reaction
4	$\text{Y}^{3+}$	V	no reaction

The oxidizing agents from strongest to weakest are :

- a)  $V^{2+}$ ,  $U^{3+}$ ,  $Y^{3+}$   
 c)  $Y^{3+}$ ,  $U^{3+}$ ,  $V^{2+}$

- b)  $U^{3+}$ ,  $V^{2+}$ ,  $Y^{3+}$   
 d)  $V^{2+}$ ,  $Y^{3+}$ ,  $U^{3+}$

Part 3 Written Response Problems.

1) In an experiment to determine the relative strengths of oxidizing agents, each metal, (cadmium, platinum, and nickel) was separately placed into two solutions, each containing a cation of the other two metals. The following table has the results of two such combinations.

	$Cd^{2+}(aq)$	$Pt^{2+}(aq)$	$Ni^{2+}(aq)$
$Cd(s)$	no reaction		reaction
$Pt(s)$		no reaction	no reaction
$Ni(s)$			no reaction

Complete the above table. Write reaction or no reaction.

2) Balance the following half-reaction in acid.



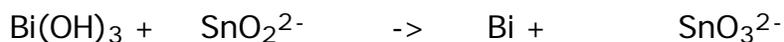
3) Balance the following oxidation-reduction equation.



4) Balance the following in acid.



5) Balance the following in base.



Answers :

- Part 1) 1) Oxidation - It is the loss of electrons  
 Reduction - It is the gain of electrons  
 Oxidizing agent - It is the species that accepts electrons

Reducing agent - It is the species that donates electrons

2) a) Br, b) Mn, c) Cl

Part 2) 1) b, 2) a, 3) b, 4) b, 5) b, 6) b, 7) d, 8) b, 9) c, 10) d, 11) b, 12) a, 13) d, 14) c, 15) d, 16) b, 17) a,

Part 3) 1) Arrange in order of oxidizing strength.



no reaction

reaction

reaction

no reaction

no reaction

no reaction

no reaction

reaction

no reaction

