

Chem.G11-Q3W4-Oxidation Reduction Reactions-Qs. Bank

True/False

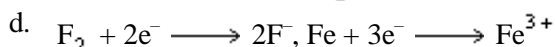
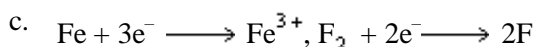
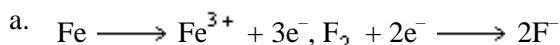
Indicate whether the statement is true or false.

_____ 1. $\text{Fe} + \text{CuSO}_4 \longrightarrow \text{Cu} + \text{Fe}_2(\text{SO}_4)_3$ is a balanced equation for the redox reaction.

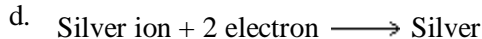
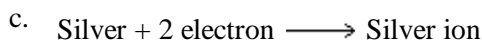
Multiple Choice

Identify the choice that best completes the statement or answers the question.

_____ 2. What are the oxidation and reduction half-reactions for the redox reaction of $\text{Fe} + \text{F}_2 \longrightarrow \text{FeF}_3$?



_____ 3. Identify the oxidation half-reactions for the redox reaction of 2 Silver(s) + Chlorine(g) \longrightarrow 2 Silver chloride.



_____ 4. An oxidation reaction occurs only in the presence of _____.

a. oxygen

c. a metal

b. hydrogen

d. a reduction reaction

_____ 5. When an element is reduced, its oxidation number _____.

a. stays the same

c. increases

b. decreases

d. may increase or decrease

_____ 6. The substance that is oxidized in the reaction $\text{Fe}_2\text{O}_3 + 2\text{Al} \rightarrow \text{Al}_2\text{O}_3 + 2\text{Fe}$ is _____.

a. Fe_2O_3

c. Al

b. Al_2O_3

d. Fe

_____ 7. A silver vase exposed to the air for a long time is most likely to have an outer coating of _____.

a. silver metal

c. silver oxide

b. silver sulfide

d. hydrogen sulfide

_____ 8. An element or compound losing electrons to a more electronegative element is _____.

a. oxidation

c. redox

b. reduction

d. combination

_____ 9. For every oxidation reaction that occurs, a _____ reaction must also take place.

a. combustion

c. reduction

b. decomposition

d. synthesis

_____ 10. Electrons gained and lost during a redox reaction can be determined by examining the _____ of the elements involved.

a. symbols

c. formulas

b. oxidation number

d. coefficients

22. A substance that oxidizes another substance by accepting its electron is called a(n) _____ agent.
23. A _____ is one of the two parts of a redox reaction-the oxidation half alone or the reduction half alone.
24. The equation $2\text{C}_2\text{H}_6(\text{g}) + 7\text{O}_2(\text{g}) \rightarrow 4\text{CO}_2(\text{g}) + 6\text{H}_2\text{O}(\text{g})$ is a typical _____ in which ethane gas (C_2H_6) is burned to produce carbon dioxide and water.
25. In an oxidation-reduction reaction, oxygen gas is the _____ and ethane is the _____.

26. Because carbon atoms in ethane lose electrons in an oxidation-reduction reaction, they can be said to have undergone _____.
27. In the equation $2\text{C}_2\text{H}_6(\text{g}) + 7\text{O}_2(\text{g}) \rightarrow 4\text{CO}_2(\text{g}) + 6\text{H}_2\text{O}(\text{g})$, the oxidation number of oxygen has gone from 0 to 2-, so it has undergone _____.
28. A substance that gains electrons in a chemical reaction is known as a(n) _____.
29. In the reaction $2\text{Fe} + \text{O}_2 \rightarrow 2\text{FeO}$, iron loses electrons to oxygen and is, therefore, a(n) _____.
30. A reaction like $2\text{Fe} + \text{O}_2 \rightarrow 2\text{FeO}$, in which electrons are gained and lost by the reactants, is known as a(n) _____.
31. Hydrogen gas is used for some industrial operations because of its tendency to give up electrons, bringing about the chemical reaction known as _____ in some other substance.
32. Chlorine gas can be used to bring about the reaction known as _____ because of its tendency to take electrons from another substance.

Matching

Match each item with the correct item below.

- | | |
|--|-------------------------|
| a. reducing agent | f. rust |
| b. $\text{Ag}^0 \rightarrow \text{Ag}^+ + e^-$ | g. oxidation number = 0 |
| c. a common oxidizing agent | h. reduction |
| d. oxidation | i. 2- |
| e. $\text{Fe}^{3+} + 3e^- \rightarrow \text{Fe}^0$ | j. redox reaction |

- _____ 33. loss of electrons
- _____ 34. gain of electrons
- _____ 35. Fe_2O_3
- _____ 36. combustion
- _____ 37. an element in its free form
- _____ 38. oxide ion
- _____ 39. formation of tarnish
- _____ 40. blast furnace
- _____ 41. always oxidized
- _____ 42. oxygen

Match each item with the correct item below.

- a. oxidizing agent
- b. reducing agent
- c. both

- _____ 43. O_2
- _____ 44. SO_2
- _____ 45. O_2^{2-}
- _____ 46. F_2
- _____ 47. K^+
- _____ 48. Cl^-
- _____ 49. H_2

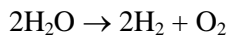
- ___ 50. CO
- ___ 51. Na
- ___ 52. Ca^{2+}
- ___ 53. Cu^+
- ___ 54. Fe^{3+}
- ___ 55. I_2
- ___ 56. S^{2-}
- ___ 57. Cr^{3+}

Short Answer

58. Define the type of the half-reaction in $\text{Fe} \longrightarrow \text{Fe}^{3+} + 3\text{e}^-$.
59. Derive oxidation and reduction half-reactions from the redox equation of $\text{NH}_3(\text{g}) + \text{NO}_2(\text{g}) \longrightarrow \text{N}_2(\text{g}) + \text{H}_2\text{O}(\text{l})$.
60. Tell whether the following equation represents an oxidation or reduction half-reaction, then write in the correct value for X in the equation: $\text{O}_2 + X \rightarrow 2\text{O}^{2-}$
61. Tell whether the following equation represents an oxidation or reduction half-reaction, then write in the correct value for X in the equation: $\text{Fe}^{3+} + \text{e}^- \rightarrow X$
62. Tell whether the following equation represents an oxidation or reduction half-reaction, then write in the correct value for X in the equation: $\text{OCl}^- + X \rightarrow \text{Cl}^-$
63. Tell whether the following equation represents an oxidation or reduction half-reaction, then write in the correct value for X in the equation: $\text{H}_2\text{S} \rightarrow \text{SO}_2 + X$
64. Tell whether the following equation represents an oxidation or reduction half-reaction, then write in the correct value for X in the equation: $X \rightarrow \text{Cu}^{2+} + 2\text{e}^-$
65. Tell whether the following equation represents an oxidation or reduction half-reaction, then write in the correct value for X in the equation: $\text{ClO}_3^- + 6\text{e}^- \rightarrow \text{Cl}^X$
66. The dark spots on a photographic film consist entirely of silver atoms formed when silver ions are reduced by light. What is incorrect about this statement?

Balance each equation for a half-reaction by rewriting the equation and inserting the correct coefficients needed.

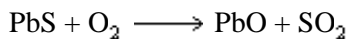
67. $2\text{Al}^{3+}(\text{aq}) + \text{e}^- \rightarrow \text{Al}(\text{s})$
68. $\text{Mn}^{2+}(\text{aq}) + 4\text{H}_2\text{O}(\text{l}) \rightarrow \text{MnO}_4^-(\text{aq}) + 8\text{H}^+(\text{aq}) + \text{e}^-$
69. In the following reaction, tell which element is oxidized and which is reduced. $2\text{Na} + \text{Cl}_2 \rightarrow 2\text{NaCl}$
70. In the following reaction, tell which element is oxidized and which is reduced. $\text{MgCl}_2 \rightarrow \text{Mg} + \text{Cl}_2$
71. In the following reaction, tell which element is oxidized and which is reduced. $\text{C} + 2\text{S} \rightarrow \text{CS}_2$
72. In the following reaction, tell which element is oxidized and which is reduced.
 $2\text{Al} + 6\text{HCl} \rightarrow 2\text{AlCl}_3 + 3\text{H}_2$
73. In the following reaction, tell which element is oxidized and which is reduced.



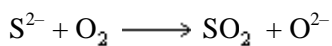
74. In the following reaction, tell which element is oxidized and which is reduced. $\text{C} + \text{O}_2 \rightarrow \text{CO}_2$
75. In the following reaction, tell which element is oxidized and which is reduced.
 $\text{Cl}_2 + 2\text{NaBr} \rightarrow 2\text{NaCl} + \text{Br}_2$
76. In the equation $\text{Al} + \text{Cl}_2 \rightarrow \text{AlCl}_3$, what element is reduced?
77. In the equation $\text{Al} + \text{Cl}_2 \rightarrow \text{AlCl}_3$, what element is the reducing agent?
78. In the equation $\text{Al} + \text{Cl}_2 \rightarrow \text{AlCl}_3$, write the balanced equation for the reduction half-reaction.
79. In the equation $\text{Al} + \text{Cl}_2 \rightarrow \text{AlCl}_3$, write a balanced equation for the redox reaction.

Problem

80. When lead sulfide reacts with oxygen, the precipitate of lead oxide is formed and sulfur dioxide gas is evolved. Balance the redox equation by the half-reaction method.



The net ionic equation for the redox reaction is

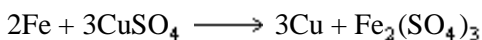


Chem.G11-Q3W4-Oxidation Reduction Reactions-Qs. Bank Answer Section

TRUE/FALSE

1. ANS: F

The balanced equation for the redox reaction is represented as:



PTS: 1 DIF: 1 REF: Page 555

OBJ: 16.1.1 Analyze the characteristics of an oxidation-reduction reaction.

TOP: Analyze the characteristics of an oxidation-reduction reaction.

KEY: Balancing equation MSC: 2

NOT: /T/ In a balanced equation, the number of atoms should be equal in a forward and backward reaction.

/F/ Correct!

MULTIPLE CHOICE

2. ANS: A

In an oxidation half-reaction, an atom is oxidized by losing electrons and in a reduction half-reaction, an atom is reduced by gaining electrons.

	Feedback
A	Correct!
B	When an atom loses electrons, an oxidation half-reaction occurs.
C	The oxidation number of an atom increases, when an atom loses electrons.
D	In a reduction half-reaction, the oxidation number of an atom decreases.

PTS: 1 DIF: 2 REF: Page 557 | Page 558

OBJ: 16.1.3 Identify the substances that are oxidized and those that are reduced in a redox reaction.

TOP: Identify the substances that are oxidized and those that are reduced in a redox reaction.

KEY: Half-reaction MSC: 2

3. ANS: A

In an oxidation half-reaction, an atom is oxidized by losing electrons and in a reduction half-reaction, an atom is reduced by gaining electrons.

	Feedback
A	Correct!
B	When an atom loses electron, an oxidation half-reaction occurs.
C	The oxidation number of an atom increases, when an atom loses electrons.
D	In a reduction half-reaction, the oxidation number of an atom decreases.

PTS: 1 DIF: 2 REF: Page 557 | Page 558

OBJ: 16.1.3 Identify the substances that are oxidized and those that are reduced in a redox reaction.

TOP: Identify the substances that are oxidized and those that are reduced in a redox reaction.

KEY: Half-reaction MSC: 2

4. ANS: D PTS: 1 DIF: B OBJ: 16-1

5. ANS: B	PTS: 1	DIF: B	OBJ: 16-1
6. ANS: A	PTS: 1	DIF: B	OBJ: 16-1
7. ANS: B	PTS: 1	DIF: B	OBJ: 16-5
8. ANS: A	PTS: 1	DIF: B	OBJ: 16-2
9. ANS: C	PTS: 1	DIF: B	OBJ: 16-1
10. ANS: B	PTS: 1	DIF: B	OBJ: 16-1
11. ANS: C	PTS: 1	DIF: B	OBJ: 16-2
12. ANS: A	PTS: 1	DIF: B	OBJ: 16-1
13. ANS: C	PTS: 1	DIF: B	OBJ: 16-1
14. ANS: A	PTS: 1	DIF: B	OBJ: 16-4
15. ANS: D	PTS: 1	DIF: A	OBJ: 16-4
16. ANS: B	PTS: 1	DIF: B	OBJ: 16-1
17. ANS: C	PTS: 1	DIF: B	OBJ: 16-6
18. ANS: B	PTS: 1	DIF: B	OBJ: 16-2
19. ANS: C	PTS: 1	DIF: A	OBJ: 16-4
20. ANS: C	PTS: 1	DIF: A	OBJ: 16-6
21. ANS: D	PTS: 1	DIF: B	OBJ: 16-6

COMPLETION

22. ANS: oxidizing

PTS: 1 DIF: 1 REF: Page 562
 OBJ: 16.1.4 Distinguish oxidizing and reducing agents in redox reactions.
 TOP: Distinguish oxidizing and reducing agents in redox reactions.
 KEY: Oxidizing agent MSC: 1

23. ANS: half-reaction

PTS: 1 DIF: 1 REF: Page 557 | Page 558
 OBJ: 16.1.3 Identify the substances that are oxidized and those that are reduced in a redox reaction.
 TOP: Identify the substances that are oxidized and those that are reduced in a redox reaction.
 KEY: Half-reaction MSC: 1

24. ANS: oxidation-reduction reaction

PTS: 1 DIF: B OBJ: 16-1

25. ANS: oxidizing agent; reducing agent

PTS: 1 DIF: B OBJ: 16-4

26. ANS: oxidation

PTS: 1 DIF: B OBJ: 16-2

27. ANS: reduction

PTS: 1 DIF: B OBJ: 16-2

28. ANS: oxidizing agent

PTS: 1 DIF: B OBJ: 16-4

29. ANS: reducing agent

PTS: 1 DIF: B OBJ: 16-4
30. ANS: oxidation-reduction reaction

PTS: 1 DIF: B OBJ: 16-1
31. ANS: reduction

PTS: 1 DIF: B OBJ: 16-4
32. ANS: oxidation

PTS: 1 DIF: B OBJ: 16-4

MATCHING

33. ANS: D	PTS: 1	DIF: B	OBJ: 16-2
34. ANS: H	PTS: 1	DIF: B	OBJ: 16-2
35. ANS: F	PTS: 1	DIF: B	OBJ: 16-3
36. ANS: J	PTS: 1	DIF: B	OBJ: 16-1
37. ANS: G	PTS: 1	DIF: B	OBJ: 16-3
38. ANS: I	PTS: 1	DIF: B	OBJ: 16-3
39. ANS: B	PTS: 1	DIF: B	OBJ: 16-3
40. ANS: E	PTS: 1	DIF: B	OBJ: 16-5
41. ANS: A	PTS: 1	DIF: B	OBJ: 16-2
42. ANS: C	PTS: 1	DIF: B	OBJ: 16-5

43. ANS: A	PTS: 1	DIF: B	OBJ: 16-4
44. ANS: C	PTS: 1	DIF: B	OBJ: 16-4
45. ANS: C	PTS: 1	DIF: B	OBJ: 16-4
46. ANS: A	PTS: 1	DIF: B	OBJ: 16-4
47. ANS: A	PTS: 1	DIF: B	OBJ: 16-4
48. ANS: B	PTS: 1	DIF: B	OBJ: 16-4
49. ANS: B	PTS: 1	DIF: B	OBJ: 16-4
50. ANS: C	PTS: 1	DIF: B	OBJ: 16-4
51. ANS: B	PTS: 1	DIF: B	OBJ: 16-4
52. ANS: A	PTS: 1	DIF: B	OBJ: 16-4
53. ANS: C	PTS: 1	DIF: B	OBJ: 16-4
54. ANS: A	PTS: 1	DIF: B	OBJ: 16-4
55. ANS: C	PTS: 1	DIF: B	OBJ: 16-4
56. ANS: B	PTS: 1	DIF: B	OBJ: 16-4
57. ANS: C	PTS: 1	DIF: B	OBJ: 16-4

SHORT ANSWER

58. ANS:
The given half-reaction is an oxidation half-reaction.

PTS: 1 DIF: 1 REF: Page 557 | Page 558

OBJ: 16.1.3 Identify the substances that are oxidized and those that are reduced in a redox reaction.

TOP: Identify the substances that are oxidized and those that are reduced in a redox reaction.

KEY: Half-reaction

MSC: 1

59. ANS:

The oxidation half-reaction is $2\text{N}^{3-} \longrightarrow \text{N}_2 + 6e^-$

The reduction half-reaction is $2\text{N}^{4+} + 8e^- \longrightarrow \text{N}_2$

PTS: 1

DIF: 2

REF: Page 557 | Page 558

OBJ: 16.1.3 Identify the substances that are oxidized and those that are reduced in a redox reaction.

TOP: Identify the substances that are oxidized and those that are reduced in a redox reaction.

KEY: Half-reaction

MSC: 2

60. ANS:

reduction; $X = 4e^-$

PTS: 1

DIF: B

OBJ: 16-2

61. ANS:

reduction; $X = \text{Fe}^{2+}$

PTS: 1

DIF: B

OBJ: 16-2

62. ANS:

reduction; $X = 2e^-$

PTS: 1

DIF: B

OBJ: 16-2

63. ANS:

oxidation; $X = 6e^-$

PTS: 1

DIF: B

OBJ: 16-2

64. ANS:

oxidation; $X = \text{Cu}^0$

PTS: 1

DIF: B

OBJ: 16-2

65. ANS:

reduction; $X = -$

PTS: 1

DIF: B

OBJ: 16-2

66. ANS:

Many silver ions are activated only by light and then reduced later by the developer.

PTS: 1

DIF: A

OBJ: 16-5

67. ANS:

$2\text{Al}^{3+}(\text{aq}) + 6e^- \rightarrow 2\text{Al}(\text{s})$

PTS: 1

DIF: B

OBJ: 16-1

68. ANS:

$\text{Mn}^{2+}(\text{aq}) + 4\text{H}_2\text{O}(\text{l}) \rightarrow \text{MnO}_4^-(\text{aq}) + 8\text{H}^+(\text{aq}) + 5e^-$

PTS: 1

DIF: B

OBJ: 16-1

69. ANS:

Na is oxidized; Cl is reduced.

PTS: 1 DIF: B OBJ: 16-3
70. ANS:
Cl is oxidized; Mg is reduced.

PTS: 1 DIF: B OBJ: 16-3
71. ANS:
C is oxidized; S is reduced.

PTS: 1 DIF: B OBJ: 16-3
72. ANS:
Al is oxidized; H is reduced.

PTS: 1 DIF: B OBJ: 16-3
73. ANS:
O is oxidized; H is reduced.

PTS: 1 DIF: B OBJ: 16-3
74. ANS:
C is oxidized; O is reduced.

PTS: 1 DIF: B OBJ: 16-3
75. ANS:
Br is oxidized; Cl is reduced.

PTS: 1 DIF: B OBJ: 16-3
76. ANS:
 Cl_2

PTS: 1 DIF: B OBJ: 16-3
77. ANS:
Al

PTS: 1 DIF: B OBJ: 16-4
78. ANS:
 $3\text{Cl}_2 + 6e^- \rightarrow 6\text{Cl}^-$

PTS: 1 DIF: A OBJ: 16-2
79. ANS:
 $2\text{Al} + 3\text{Cl}_2 \rightarrow 2\text{AlCl}_3$

PTS: 1 DIF: B OBJ: 16-2

PROBLEM

80. ANS:
 $2\text{PbS} + 3\text{O}_2 \longrightarrow 2\text{PbO} + 2\text{SO}_2$

PTS: 1 DIF: 3 REF: Page 557

OBJ: 16.1.3 Identify the substances that are oxidized and those that are reduced in a redox reaction.

TOP: Identify the substances that are oxidized and those that are reduced in a redox reaction.

KEY: Half-reaction MSC: 2

NOT: First, write the oxidation half-reaction and reduction half-reaction for the net ionic equation, then balance the atoms and charge in each half-reaction. Adjust the coefficients so that the number of electrons lost in oxidation equals the number of electrons gained in reduction. Add the balanced half-reaction and return the spectator ion.