Redox 1 practice test

1. Given the oxidation-reduction reaction:

$H_2 + 2\,Fe^{3+} \rightarrow 2\,H^+ + 2\,Fe^{2+}$

Which species undergoes reduction?

A) Fe^{3+} B) H_2 C) Fe^{2+} D) H^+

2. What species is reduced in the reaction below?

$Zn^0 + 2\,Ag^+ \rightarrow Zn^{2+} + 2\,Ag^0$?

A) Ag^+ B) Zn^0 C) Ag^0 D) Zn^{2+}

3. Which expression correctly represents a balanced reduction half-reaction?

A) $Na \rightarrow Na^+ + e^-$ B) $2\,Cl^- \rightarrow Cl_2 + 2e^-$
C) $Na^+ + e^- \rightarrow Na$ D) $Cl_2 + 2e^- \rightarrow Cl^-$

4. In which substance does chlorine have an oxidation number of +1?

A) HClO B) HCl
C) Cl_2 D) $HClO_2$

5. According to Reference Table J, which species is most easily reduced?

A) F^- B) $F_2(g)$ C) Li(s) D) Li^+

6. Which balanced equation represents a redox reaction?

A) $LiBr \rightarrow Li^+ + Br^-$
B) $PCl_5 \rightarrow PCl_3 + Cl_2$
C) $Ca^{2+} + SO_4^{2-} \rightarrow CaSO_4$
D) $KOH + HCl \rightarrow KCl + H_2O$

7. Which half-reaction correctly represents reduction?

A) $Fe^{2+} + e^- \rightarrow Fe^{3+}$ B) $F_2 \rightarrow 2\,F^- + 2e^-$
C) $Ag \rightarrow Ag^+ + e^-$ D) $Au^{3+} + 3e^- \rightarrow Au$

8. What is the oxidation state of phosphorus in the compound Na_3PO_3?

A) +3 B) –3 C) +5 D) 0

9. In a redox reaction, there is a conservation of

A) mass, only
B) both mass and charge
C) neither mass nor charge
D) charge, only

10. When the equation

$\_\_Pb^2 + \_\_ Au^{3+} \rightarrow \_\_ Pb^{4+} + \_\_ Au$

is correctly balanced using the smallest whole number coefficients, the coefficient of the Pb^{2+} will be

A) 1 B) 2 C) 3 D) 4

11. Which metal reacts spontaneously with a solution containing zinc ions?

A) copper B) silver
C) nickel D) magnesium

12. Given the redox reaction:

$2\,Cr(s) + 3\,Sn^{2+}(aq) \rightarrow 2\,Cr^{3+}(aq) + 3\,Sn(s)$

Which species serves as the reducing agent?

A) Sn B) Cr^{3+} C) Sn^{2+} D) Cr

13. According to Reference Table *J*, which of these metals will react most readily with 1.0 M HCl to produce $H_2(g)$?

A) Mg B) K C) Ca D) Zn

14. Given the reaction:

$Mg(s) + Cl_2(g) \rightarrow MgCl_2(s)$

Which half-reaction correctly represents the reduction that occurs?

A) $Mg^{2+} \rightarrow Mg(s) + 2e^-$
B) $2\,Cl^- \rightarrow Cl_2 + 2e^-$
C) $Cl_2(g) + 2e^- \rightarrow 2\,Cl^-$
D) $Mg(s) + 2e^- \rightarrow Mg^{2+}$

15. How many moles of electrons would be required to completely reduce 1.5 moles of Al^{3+} to Al?

A) 0.50 B) 1.5 C) 3.0 D) 4.5

16. Which balanced equation represents an oxidation-reduction reaction?

A) $H_3PO_4 + 3KOH \rightarrow K_3PO_4 + 3H_2O$
B) $NH_3(g) + HCl(g) \rightarrow NH_4Cl(s)$
C) $Fe(s) + S(s) \rightarrow FeS(s)$
D) $Ba(NO_3)_2 + Na_2SO_4 \rightarrow BaSO_4 + 2NaNO_3$

24. Given the reaction:

$$\_\_Cl_2(g) + \_\_Fe^{2+}(aq) \rightarrow \_\_Fe^{3+}(aq) + \_\_Cl^-(aq)$$

When the equation is correctly balanced using *smallest* whole numbers, the coefficient of $Cl^-(aq)$ will be

A) 1 B) 2 C) 6 D) 7

25. Given the balanced equation:

$$3\ Fe^{3+}(aq) + Al(s) \rightarrow 3\ Fe^{2+}(aq) + Al^{3+}(aq)$$

What is the total number of moles of electrons lost by 2 moles of Al(s)?

A) 1 mole B) 6 moles
C) 3 moles D) 9 moles

26. When an equation is correctly balanced, it must show conservation of

A) charge but not of mass
B) mass but not of charge
C) both charge and mass
D) neither charge nor mass

27. What is the oxidation number of oxygen in OF_2?

A) +1 B) +2 C) –1 D) –2

28. What are the two oxidation states of nitrogen in NH_4NO_2?

A) –3 and –3 B) –3 and +3
C) +3 and +5 D) +3 and –5

29. According to Reference Table J, which species is the strongest oxidizing agent?

A) $F_2(g)$ B) F^- C) Li^+ D) Li(s)

30. In the reaction:

$$2\ CrO_4^{2-}(aq) + 2\ H^+(aq) \rightarrow Cr_2O_7^{2-}(aq) + H_2O(l),$$

the oxidation number of chromium

A) decreases B) increases
C) remains the same

31. Which equation shows conservation of charge?

A) $Fe \rightarrow Fe^{2+} + e^-$ B) $Fe + 2e^- \rightarrow Fe^{2+}$
C) $Fe + 2e^- \rightarrow Fe^{3+}$ D) $Fe \rightarrow Fe^{2+} + 2e^-$

32. Given the redox reaction:

$$Fe^{2+}(aq) + Zn(s) \rightarrow Zn^{2+}(aq) + Fe(s)$$

Which species acts as a reducing agent?

A) $Zn^{2+}(aq)$ B) Fe(s)
C) Zn(s) D) $Fe^{2+}(aq)$

33. Given the reaction:

$$Zn(s) + 2\ HCl(aq) \rightarrow ZnCl_2(aq) + H_2(g)$$

Which equation represents the correct oxidation half-reaction?

A) $2\ H + 2e^- \rightarrow H_2(g)$
B) $Zn(s) \rightarrow Zn^{2+} + 2e^-$
C) $2\ Cl^- \rightarrow Cl_2(g) + 2e^-$
D) $Zn^{2+} + 2e \rightarrow Zn(s)$

34. Given the reaction:

$$Zn(s) + 2\ HCl(aq) \rightarrow ZnCl_2(aq) + H_2(g)$$

Which statement correctly describes what occurs when this reaction takes place in a closed system?

A) Atoms of Zn(s) gain electrons and are reduced.
B) There is a net gain of mass.
C) Atoms of Zn(s) lose electrons and are oxidized.
D) There is a net loss of mass.

35. Given the reaction:

$$\_\_Mg + \_\_Cr^{3+} \rightarrow \_\_Mg^{2+} + \_\_Cr$$

When the equation is correctly balanced using smallest whole numbers, the sum of the coefficients will be

A) 10 B) 7 C) 5 D) 4

Answer Key
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1. A
2. A
3. C
4. A
5. B
6. B
7. D
8. A
9. B
10. C
11. D
12. D
13. B
14. C
15. D
16. C
17. B
18. A
19. B
20. B
21. D
22. C
23. D
24. B
25. B
26. C
27. B
28. B
29. A
30. C
31. D
32. C
33. B
34. C
35. A