Q1. The oxidation number of Cr in $K_2Cr_2O_7$ is:

A. +6
B. +3
C. +2
D. +7

Answer: A. +6

Explanation:
Let oxidation number of Cr = x
$K_2Cr_2O_7 \Rightarrow 2(+1) + 2x + 7(-2) = 0$
$2 + 2x - 14 = 0 \rightarrow 2x = 12 \rightarrow x = +6$

Q2. Which of the following species acts as both oxidising and reducing agent?

A. Cl_2
B. NaCl
C. HCl
D. Cl^-

Answer: A. Cl_2

Explanation:
Cl_2 can gain electrons to become Cl^- (oxidising) and lose electrons to become Cl^+ (reducing). Hence, disproportionation is possible.

Q3. Which of the following is not a redox reaction?

A. $Zn + H_2SO_4 \rightarrow ZnSO_4 + H_2$
B. $H_2 + Br_2 \rightarrow 2HBr$
C. $BaCl_2 + H_2SO_4 \rightarrow BaSO_4 + 2HCl$
D. $Cu + 2AgNO_3 \rightarrow Cu(NO_3)_2 + 2Ag$

Answer: C. $BaCl_2 + H_2SO_4 \rightarrow BaSO_4 + 2HCl$

Explanation:
There is no change in oxidation states, just a double displacement.

Q4. Which is the oxidizing agent in the reaction:

$Zn + Cu^{2+} \rightarrow Zn^{2+} + Cu$?

A. Zn
B. Cu^{2+}
C. Cu
D. Zn^{2+}

Answer: B. Cu^{2+}

Explanation:
Cu^{2+} gains electrons → reduced → acts as oxidizing agent.

Q5. In which of the following compounds is the oxidation number of nitrogen not –3?

A. NH_3
B. N_2H_4
C. NO_3^-
D. $(NH_4)_2SO_4$

Answer: C. NO_3^-

Explanation:
In NO_3^-, N = +5; in other options, N is –3.

Q6. In a redox reaction, reducing agent:

A. Gets oxidized
B. Gets reduced
C. Gains electrons
D. Increases oxidation number of others

Answer: A. Gets oxidized

Explanation:
Reducing agent donates electrons → itself oxidized.

Q7. Which of the following undergoes disproportionation?

A. F_2
B. Cl_2
C. I_2
D. Br_2

Answer: B. Cl_2

Explanation:
$Cl_2 \rightarrow Cl^- + ClO^-$
Element oxidised and reduced → disproportionation.

Q8. What is the oxidation number of Mn in $KMnO_4$?

A. +2
B. +4
C. +6
D. +7

Answer: D. +7

Explanation:
K = +1, O = –2, Let Mn = x
+1 + x + 4(–2) = 0 → x = +7

Q9. Oxidation involves:

A. Gain of electrons
B. Loss of electrons
C. Gain of protons
D. Loss of neutrons

Answer: B. Loss of electrons

Explanation:
OILRIG: Oxidation Is Loss, Reduction Is Gain of electrons.

Q10. In the reaction

$H_2O_2 + 2KI + H_2SO_4 \rightarrow I_2 + 2H_2O + K_2SO_4$
Which is the reducing agent?

A. H_2O_2
B. KI
C. H_2SO_4
D. I_2

Answer: B. KI

Explanation:
I^- is oxidized to I_2 → acts as reducing agent.

Q11. Which of the following is the correct oxidation number of S in H_2SO_4?

A. +4
B. +6
C. +2
D. –2

Answer: B. +6

Explanation:
H = +1 × 2 = +2, O = –2 × 4 = –8
Total = 0 → +2 + S –8 = 0 → S = +6

Q12. What is the number of electrons involved in the following half-reaction?

$Fe^{2+} \rightarrow Fe^{3+}$

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

Answer: A. 1

Explanation:
$Fe^{2+} \rightarrow Fe^{3+} + 1e^{-}$ → Loss of 1 electron

Q13. The correct set of oxidising agents is:

A. F_2, Cl_2, O_3
B. H_2, CH_4, Na
C. I^-, Br^-, Fe^{2+}
D. H_2O, CO_2, NH_3

Answer: A. F_2, Cl_2, O_3

Explanation:
These substances accept electrons → oxidising agents.

Q14. The oxidation number of Fe in Fe_3O_4 is:

A. +2
B. +3
C. Both +2 and +3
D. +8/3

Answer: C. Both +2 and +3

Explanation:
$Fe_3O_4 = FeO.Fe_2O_3$ → contains Fe^{2+} and Fe^{3+} both.

Q15. Which of the following reactions is disproportionation?

A. $2Cu^+ \rightarrow Cu^{2+} + Cu$
B. $Cu + 2AgNO_3 \rightarrow Cu(NO_3)_2 + 2Ag$
C. $Zn + HCl \rightarrow ZnCl_2 + H_2$
D. $Na + H_2O \rightarrow NaOH + H_2$

Answer: A. $2Cu^+ \rightarrow Cu^{2+} + Cu$

Explanation:

Same species (Cu^{+}) oxidizes to Cu^{2+} and reduces to Cu^{0}.

Q16. In acidic medium, MnO_4^- is reduced to Mn^{2+}. The number of electrons gained per Mn atom is:

A. 3
B. 5
C. 7
D. 2

Answer: B. 5

Explanation:
Mn in MnO_4^- = +7, Mn in Mn^{2+} = +2 → gain of 5 electrons.

Q17. In a redox reaction, the substance undergoing increase in oxidation number is:

A. Oxidised
B. Reduced
C. Oxidising agent
D. Catalyst

Answer: A. Oxidised

Explanation:
Increase in oxidation number = loss of electrons = oxidation.

Q18. Which of the following is the best reducing agent?

A. F_2
B. Cl_2
C. Na
D. H_2O_2

Answer: C. Na

Explanation:
Na easily loses electrons → strong reducing agent.

Q19. Which of the following represents autoredox (disproportionation) reaction?

A. $2H_2O \rightarrow 2H_2 + O_2$
B. $2Cu^+ \rightarrow Cu + Cu^{2+}$
C. $Zn + Cu^{2+} \rightarrow Zn^{2+} + Cu$
D. $H_2 + Cl_2 \rightarrow 2HCl$

Answer: B. $2Cu^+ \rightarrow Cu + Cu^{2+}$

Explanation:
Same element oxidised and reduced → disproportionation.

Q20. Which one of the following does not represent a redox reaction?

A. $H_2 + Br_2 \rightarrow 2HBr$
B. $BaCl_2 + H_2SO_4 \rightarrow BaSO_4 + 2HCl$
C. $Zn + CuSO_4 \rightarrow ZnSO_4 + Cu$
D. $C + O_2 \rightarrow CO_2$

Answer: B. $BaCl_2 + H_2SO_4 \rightarrow BaSO_4 + 2HCl$

Explanation:
It is a double displacement reaction, not redox.

Q21. The oxidation number of Fe in $K_4[Fe(CN)_6]$ is:

A. +2
B. +3
C. +6
D. 0

Answer: A. +2

Explanation:
$K_4[Fe(CN)_6]$: CN = –1, 6 CN = –6, K = +1 × 4 = +4
→ +4 + x –6 = 0 ⇒ x = +2

Q22. Which of the following statements is correct for a redox reaction?

A. Oxidation is gain of electrons
B. Reduction is increase in oxidation number
C. Oxidising agent is itself reduced
D. Reducing agent is itself reduced

Answer: C. Oxidising agent is itself reduced

Explanation:
Oxidising agent gains electrons → reduced.

Q23. Which of the following is not a disproportionation reaction?

A. $Cl_2 + H_2O \rightarrow HCl + HOCl$
B. $2Cu^+ \rightarrow Cu^{2+} + Cu$
C. $2NO_2 \rightarrow NO_3^- + NO$
D. $Zn + Cu^{2+} \rightarrow Zn^{2+} + Cu$

Answer: D. $Zn + Cu^{2+} \rightarrow Zn^{2+} + Cu$

Explanation:
This is a redox reaction, but not disproportionation.

Q24. In alkaline medium, which ion reduces MnO_4^- to MnO_2?

A. NO_2^-
B. SO_4^{2-}
C. $C_2O_4^{2-}$
D. OH^-

Answer: A. NO_2^-

Explanation:
NO_2^- acts as reducing agent in alkaline $KMnO_4$ reactions.

Q25. What is the equivalent weight of $KMnO_4$ in acidic medium?

A. Molar mass / 1
B. Molar mass / 5
C. Molar mass / 3
D. Molar mass / 7

Answer: B. Molar mass / 5

Explanation:
In acidic medium, $KMnO_4$ gains 5 electrons → n = 5.

Q26. Which one is a redox couple?

A. Fe^{3+} / Fe^{2+}
B. H_2O / OH^-
C. NH_4^+ / NH_3
D. All of these

Answer: D. All of these

Explanation:
All represent oxidised and reduced forms → redox couples.

Q27. In the reaction

$HClO \rightarrow HCl + HClO_3$,
Cl is undergoing:

A. Oxidation only
B. Reduction only
C. Both oxidation and reduction
D. No redox change

Answer: C. Both oxidation and reduction

Explanation:
HClO disproportionates: Cl goes to +1 in HClO to –1 in HCl and +5 in $HClO_3$.

Q28. The change in oxidation number of sulphur in the conversion

$H_2S \rightarrow H_2SO_4$ is:

A. –2 to +6
B. +2 to +4
C. 0 to +4
D. +4 to +6

Answer: A. –2 to +6

Explanation:
S in H_2S = –2, in H_2SO_4 = +6 → increase of 8 units.

Q29. What is the oxidation number of chromium in $Cr_2O_7^{2-}$?

A. +2
B. +3
C. +6
D. +7

Answer: C. +6

Explanation:
$2x + 7(-2) = -2 \rightarrow x = +6$

Q30. Which of the following is not a correct redox pair?

A. Mn^{2+} / MnO_4^-
B. Fe^{2+} / Fe^{3+}
C. NO_2^- / NO_3^-
D. Zn^{2+} / $ZnSO_4$

Answer: D. Zn^{2+} / $ZnSO_4$

Explanation:
Zn^{2+} and $ZnSO_4$ are not a redox pair; SO_4^{2-} is spectator ion.

Q31. Which of the following does not involve oxidation?

A. Loss of hydrogen
B. Loss of electrons
C. Addition of oxygen
D. Gain of electrons

Answer: D. Gain of electrons

Explanation:
Gain of electrons = reduction, not oxidation.

Q32. Which of the following is not a redox reaction?

A. $H_2 + Cl_2 \rightarrow 2HCl$
B. $NaOH + HCl \rightarrow NaCl + H_2O$
C. $Cu + 2AgNO_3 \rightarrow Cu(NO_3)_2 + 2Ag$
D. $C + O_2 \rightarrow CO_2$

Answer: B. $NaOH + HCl \rightarrow NaCl + H_2O$

Explanation:
It's an acid-base neutralisation, not redox.

Q33. In the reaction:

$Cr_2O_7^{2-} + 14H^+ + 6e^- \rightarrow 2Cr^{3+} + 7H_2O$,
$Cr_2O_7^{2-}$ is:

A. Reducing agent
B. Oxidising agent
C. Catalyst
D. Base

Answer: B. Oxidising agent

Explanation:
It gains electrons (gets reduced) → oxidises others.

Q34. The oxidation number of S in $Na_2S_2O_3$ is:

A. +2
B. +6
C. +3
D. +2 and +6

Answer: D. +2 and +6

Explanation:
One S is in –2 (terminal), other in +6 → average = +2.

Q35. What is the oxidation number of nitrogen in NO_3^-?

A. +3
B. +5
C. +2
D. –1

Answer: B. +5

Explanation:
O = –2, 3O = –6 → x – 6 = –1 ⇒ x = +5

Q36. Identify the correct ionic equation for the redox reaction:

$Zn + Cu^{2+} \rightarrow Zn^{2+} + Cu$

A. $Zn \rightarrow Zn^{2+} + 2e^-$
B. $Cu^{2+} + 2e^- \rightarrow Cu$
C. Both A and B
D. None

Answer: C. Both A and B

Explanation:
Zn loses electrons (oxidation), Cu^{2+} gains (reduction).

Q37. Which of the following shows a redox change?

A. $NH_3 + HCl \rightarrow NH_4Cl$
B. $CaCO_3 \rightarrow CaO + CO_2$
C. $2H_2 + O_2 \rightarrow 2H_2O$
D. $AgNO_3 + NaCl \rightarrow AgCl + NaNO_3$

Answer: C. $2H_2 + O_2 \rightarrow 2H_2O$

Explanation:
H is oxidised, O is reduced → redox.

Q38. In a galvanic cell, the anode is:

A. Site of reduction
B. Positively charged
C. Site of oxidation
D. Does not participate

Answer: C. Site of oxidation

Explanation:
Anode is where oxidation occurs and electrons are released.

Q39. Which of the following reactions is a combination and redox reaction?

A. $2H_2 + O_2 \rightarrow 2H_2O$
B. $AgNO_3 + NaCl \rightarrow AgCl + NaNO_3$
C. $BaCl_2 + H_2SO_4 \rightarrow BaSO_4 + 2HCl$
D. $NaOH + HCl \rightarrow NaCl + H_2O$

Answer: A. $2H_2 + O_2 \rightarrow 2H_2O$

Explanation:
Combination of elements + oxidation/reduction.

Q40. Which of the following is not a correct statement?

A. Oxidation involves gain of oxygen
B. Reduction involves gain of electrons
C. Oxidising agent is oxidised
D. Reducing agent loses electrons

Answer: C. Oxidising agent is oxidised

Explanation:
Oxidising agent is reduced, not oxidised.

Q41. Identify the oxidising agent in the following reaction:

$Zn + H_2SO_4 \rightarrow ZnSO_4 + H_2$

A. Zn
B. H_2SO_4
C. H_2
D. SO_4^{2-}

Answer: B. H_2SO_4

Explanation:
H^+ in H_2SO_4 is reduced → H_2SO_4 is oxidising agent.

Q42. In acidic medium, the correct half reaction for $Cr_2O_7^{2-}$ is:

A. $Cr_2O_7^{2-} + 14H^+ + 6e^- \rightarrow 2Cr^{3+} + 7H_2O$
B. $Cr_2O_7^{2-} + 6e^- \rightarrow Cr^{3+}$
C. $Cr_2O_7^{2-} \rightarrow 2Cr^{3+} + 7H_2O + 14H^+$
D. $Cr_2O_7^{2-} + 3e^- \rightarrow Cr^{2+}$

Answer: A. $Cr_2O_7^{2-} + 14H^+ + 6e^- \rightarrow 2Cr^{3+} + 7H_2O$

Explanation:
This is the balanced half reaction in acidic medium.

Q43. The change in oxidation number of chlorine in:

$Cl_2 + 2NaOH \rightarrow NaCl + NaClO + H_2O$ is:

A. 0 to –1 and 0 to +1
B. 0 to –1 only
C. 0 to +1 only
D. –1 to +1

Answer: A. 0 to –1 and 0 to +1

Explanation:
Cl_2 disproportionates → forms NaCl (–1) and NaClO (+1).

Q44. Identify the species that is oxidised in the reaction:

$Fe + CuSO_4 \rightarrow FeSO_4 + Cu$

A. Fe
B. Cu
C. Cu^{2+}
D. SO_4^{2-}

Answer: A. Fe

Explanation:
$Fe \rightarrow Fe^{2+}$ = loss of electrons = oxidation.

Q45. Which of the following is the correct statement for a redox reaction?

A. Oxidising agent is electron donor
B. Reducing agent is electron acceptor
C. Oxidation is electron gain
D. Reducing agent loses electrons

Answer: D. Reducing agent loses electrons

Explanation:
Reducing agent donates electrons (gets oxidised).