

Multiple Choice-choose the best answer.

- 1) What is the oxidation state of **Cr** in the compound, $K_2Cr_2O_7$?
1) 0 2) +3 3) +6 4) +12
- 2) What is the oxidation state of **S** in the ion, SO_3^{-2} ?
1) 0 2) -2 3) +4 4) +6
- 3) When an atom gets _____ it loses electrons and, as a result, its oxidation number _____.
1) oxidized, decreases 3) reduced, increases
2) oxidized, increases 4) reduced, decreases
- 4) In a redox reaction, the _____ agent gets reduced, while the _____ agent gets oxidized.
1) oxidizing, reducing 2) reducing, oxidizing 3) It depends on the reaction.
- 5) All redox reactions conserve
1) time & energy 3) mass & charge
2) electricity & gas 4) nothing; conservation doesn't apply to redox.
- 6) Which of the following is a redox reaction?
- 1) $HCl + NaOH \rightarrow NaCl + H_2O$
2) $AgCl + 2 NH_3 \rightarrow Ag(NH_3)_2^+ + Cl^-$
3) $2 H_2O \rightarrow 2 H_2 + O_2$
4) $CuSO_4 + 5 H_2O \rightarrow CuSO_4 \cdot 5 H_2O$
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Answer questions 7-9 using **Table J**.

- 7) Which of the following is the strongest reducing agent?
1) Pb 2) Ni 3) Fe 4) Zn
- 8) Which of the following is the strongest oxidizing agent?
1) F_2 2) Cl_2 3) Br_2 4) I_2
- 9) Which of the following pairs will react spontaneously?
1) $Fe + ZnSO_4$ 2) $Na + BaCl_2$ 3) $Sr + Ni(NO_3)_2$ 4) $I_2 + NaF$
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Answer questions 10-13 based on the following equation:



10) The species oxidized is 1) Ca 2) Zn^{+2} 3) Zn 4) Ca^{+2}

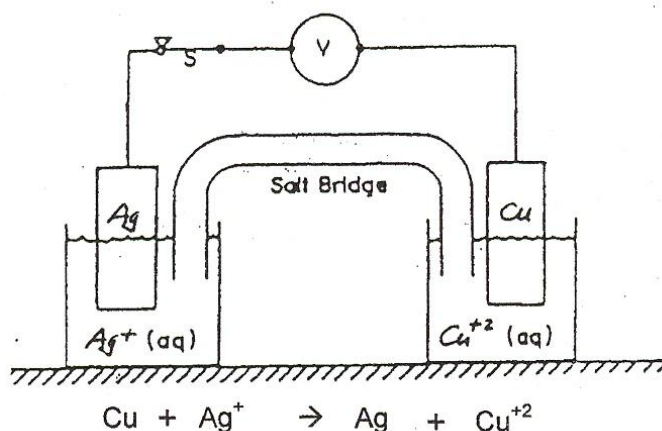
11) The oxidizing agent is 1) Ca 2) Zn^{+2} 3) Zn 4) Ca^{+2}

12) The correct oxidation half reaction is



13) The moles of electrons transferred is 1) 1 2) 2 3) 3 4) 4

Refer to the diagram below to answer questions 14-17.



14) The best description of this diagram is

- 1) an electrolytic cell 3) a Voltaic cell
2) electrolysis 4) electroplating

15) When the switch is closed, in which direction do the electrons flow?

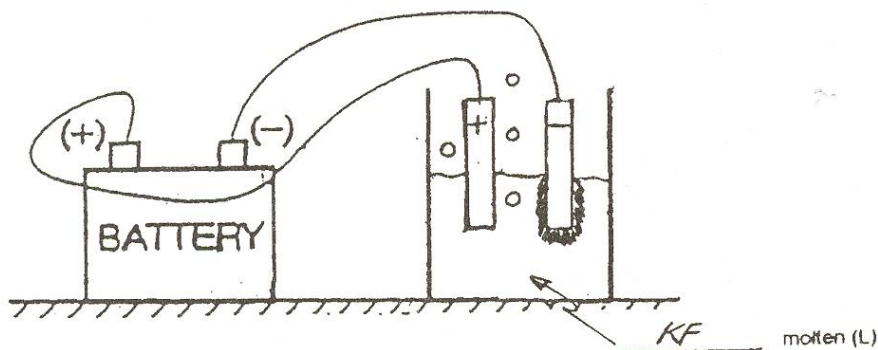
- 1) Ag to Cu 2) Cu to Ag 3) Ag to Ag^+ 4) Cu^{+2} to Cu

16) What takes place at the negative (-) electrode?

- 1) oxidation 3) oxidation & reduction
2) reduction 4) neither oxidation nor reduction

17) As time passes, what happens to the $[\text{Ag}^+]$? 1) increases 2) decreases 3) remains the same

Refer to the diagram below to answer questions 18-21.



18) The best description of this diagram is

- 1) a battery
- 2) electrolysis
- 3) an electrochemical cell
- 4) electroplating

19) The reaction that takes place is

- 1) spontaneous
- 2) non-spontaneous
- 3) at equilibrium

20) What takes place at the positive (+) electrode?

- 1) oxidation
- 2) reduction
- 3) oxidation & reduction
- 4) neither oxidation nor reduction

21) What is the identity of the substance that plates the negative (-) electrode?

- 1) potassium metal
- 2) potassium ion
- 3) fluoride ion
- 4) fluorine gas

Nitric acid reacts with copper metal according to the following chemical equation:



Answer questions 22- 25 based on this reaction.

22) What is unusual about this reaction?

- 1) The production of water.
- 2) Mass isn't conserved.
- 3) An acid is behaving as an oxidizing agent.
- 4) The change in nitrogen's oxidation state.

23) Which is the species undergoing oxidation?

- 1) H^+
- 2) NO_3^-
- 3) Cu
- 4) Cu^{+2}

24) What is the correct half reaction corresponding to the reduction that occurs?

- 1) $\text{N}^{+5} \rightarrow \text{N}^{+6} + \text{e}^-$
- 2) $\text{N}^{+5} + \text{e}^- \rightarrow \text{N}^{+4}$
- 3) $\text{Cu} + 2\text{e}^- \rightarrow \text{Cu}^{-2}$
- 4) $\text{Cu} \rightarrow \text{Cu}^{+2} + 2\text{e}^-$

25) Which species shows no change in oxidation state? 1) H^+ 2) NO_3^- 3) Cu 4) Cu^{+2}