Standardized Test Prep

Answer the following items on a separate piece of paper.

MULTIPLE CHOICE

1. In the following reaction, which species is reduced?

$$2K + Br_2 \longrightarrow 2K^+ + 2Br^-$$

A. K
B. Br_2
C. All of the above
D. None of the above

2. The oxidation number of the sulfur atom in the SO_4^{2-} ion is
A. +2.
B. –2.
C. +6.
D. +4.

3. A half-reaction
A. involves a change in the oxidation state of an element.
B. always contains H_2O molecules.
C. always contains H^+ ions.
D. All of the above

4. In the following reaction, which is the oxidizing agent?

$$AgNO_2 + Cl_2 + 2KOH \longrightarrow AgNO_3 + 2KCl + H_2O$$

A. $AgNO_2$
B. Cl_2
C. KOH
D. KCl

5. What are the oxidation states (in increasing order) of the element that undergoes disproportionation in the following reaction:

$$Cl_2 + H_2O \longrightarrow HCl + HOCl$$

A. –1, 0, +2
B. –1, 0, +1
C. –2, –1, 0
D. None of the above

6. Which reaction is a redox reaction?
A. $Al_2O_3 + 6HCl \longrightarrow 2AlCl_3 + 3H_2O$
B. $2HCO_3^- \longrightarrow CO_2 + CO_3^{2-} + H_2O$
C. $SiBr_4 + 3H_2O \longrightarrow H_2SiO_3 + 4HBr$
D. $H_2O + PbO_2 + NaOH + KCl \longrightarrow KClO + NaPb(OH)_3$

7. Arrange the following in order of increasing oxidation number of the sulfur atom: $S_2O_3^{2-}$, $S_4O_6^{2-}$, HSO_4^-, and H_2S.
A. H_2S, $S_2O_3^{2-}$, $S_4O_6^{2-}$, HSO_4^-
B. $S_2O_3^{2-}$, H_2S, $S_4O_6^{2-}$, HSO_4^-
C. H_2S, $S_2O_3^{2-}$, HSO_4^-, $S_4O_6^{2-}$
D. HSO_4^-, $S_2O_3^{2-}$, $S_4O_6^{2-}$, H_2S

8. Which answer contains the correct information about the following reaction:

$$2Pb(NO_3)_2 \longrightarrow 2PbO + 4NO_2 + O_2$$

A. This reaction is a decomposition reaction and not a redox reaction.
B. This reaction is a redox reaction in which the lead is reduced and the oxygen is oxidized.
C. This reaction is a disproportionation reaction.
D. This reaction is a redox reaction in which the nitrogen is reduced and the oxygen is oxidized.

SHORT ANSWER

9. Determine the oxidation numbers for Cu in the superconductor $YBa_2Cu_3O_7$. Yttrium (Y) has an oxidation number of +3. (Cu does not have oxidation numbers greater than +3.) Give only integer oxidation numbers.

10. What is an oxidizing agent?

EXTENDED RESPONSE

11. B, F, K, and L are four unknown reducing agents that oxidize to singly charged cations. Using the following information, construct a table showing the relative strengths of the oxidizing and reducing agents. Data: F reduces K^+, B^+, and L^+. B^+ oxidizes K and F, but not L.

12. Balance the equation for the following reaction in basic solution:

$$ClO_2 \longrightarrow KClO_3 + KClO_2$$

Give the balanced equation for each half-reaction and for the overall reaction. Give the oxidizing agent and the reducing agent.

Test TIP If you are short on time, quickly scan the unanswered questions to see which might be easiest to answer.