P H5 (pg 1 of 2) Sythesis and Decomposition Reactions

Name_____Per____

Write correct skeleton equations for these synthesis or decomposition reactions, then balance. Determine if the reaction is also an oxidation reduction (redox) reaction. If so, identify the oxidation numbers of all elements, determine which element is oxidized, and which is reduced, and then determine the total number of electrons transferred.

1. Nickel(II) chlorate decomposes when heated into nickel chloride and oxygen gas.

2. Cesium carbonate decomposes upon heating into cesium oxide and carbon dioxide.

3. Phosphoric acid forms when water is poured over diphosphorus pentoxide.

4. Silver oxide decomposes into its elements.

5. Magnesium bromide reacts with oxygen gas to produce magenesium bromate.

6. Gaseous dinitrogen trioxide and liquid water are the products of the decomposition of aqueous nitrous acid.

7. Water and oxygen gas are the products of the decomposition of hydrogen peroxide, H_2O_2.

8. Iron(III) oxide and liquid water are the products from the decomposition of of iron(III) hydroxide.

9. Barium oxide reacts with carbon dioxide to produce barium carbonate.

10. Hydrogen and oxygen gas react explosively to produce water.

11. Gallium oxide reacts with water to produce gallium hydroxide.

12. Aluminum oxide is produced from its elements.

 Synthesis and Decomposition Reactions ***ANSWERS***

1. skeleton: $Ni(ClO_3)_2 \rightarrow NiCl_2 + O_2$ balanced: $Ni(ClO_3)_2 \rightarrow NiCl_2 + 3\ O_2$ decomposition, redox
   oxidation #'s: Ni 2+ → 2+ neither oxidized nor reduced
   Cl 5+ → 1− (6e− gained ×2) reduced
   O 2− → 0 (2e− lost ×6) oxidized 12 e− transferred

2. skeleton: $Cs_2CO_3 \rightarrow Cs_2O + CO_2$ already balanced decomoposition, NOT redox

3. skeleton: $P_2O_5 + H_2O \rightarrow H_3PO_4$ balanced: $P_2O_5 + 3\ H_2O \rightarrow 2\ H_3PO_4$ synthesis, NOT redox

4. skeleton: $Ag_2O \rightarrow Ag + O_2$ balanced: $2\ Ag_2O \rightarrow 4\ Ag + O_2$ decomposition, redox
   oxidation #'s: Ag 1+ → 0 (1e− gained ×4) reduced
   O 2− lost → 0 (2e− ×2) oxidized 4 e− transferred

5. skeleton: $MgBr_2 + O_2 \rightarrow Mg(BrO_3)_2$ balanced: $MgBr_2 + 3\ O_2 \rightarrow Mg(BrO_3)_2$ synthesis, redox
   oxidation #'s: Mg 2+ → 2+ neither oxidized nor reduced
   Br 1− → 5+ (6e− lost ×2) oxidized
   O 0 → 2− (2e− gained ×6) reduced 12 e− transferred

6. skeleton: $HNO_2 \rightarrow N_2O_3 + H_2O$ balanced: $2\ HNO_{2(aq)} \rightarrow N_2O_{3(g)} + H_2O_{(L)}$ decomposition, NOT redox

7. skeleton: $H_2O_2 \rightarrow O_2 + H_2O$ balanced: $2\ H_2O_2 \rightarrow O_2 + H_2O$ decomposition, redox
   oxidation #'s: H 1+ → 1+ neither oxidized nor reduced
   O 1− → 0 (1e− lost ×2) oxidized
   O 1− → 2− (1e− gained ×2) also reduced 2 e− transferred

8. skeleton: $Fe(OH)_3 \rightarrow Fe_2O_3 + H_2O$ balanced: $2\ Fe(OH)_3 \rightarrow Fe_2O_{3(s)} + 3\ H_2O$ decomposition, NOT redox

9. skeleton: $BaO + CO_2 \rightarrow BaCO_3$ already balanced synthesis, NOT redox

10. skeleton: $O_2 + H_2 \rightarrow H_2O$ balanced: $O_2 + 2\ H_2 \rightarrow 2\ H_2O$ synthesis, redox
    oxidation #'s: H is 1+ → 0 (1e− lost ×4) oxidation
    O 0 → 2− (2e− gained ×2) reduction 4 e− transferred

11. skeleton: $Ga_2O_3 + H_2O \rightarrow Ga(OH)_3$ balanced: $Ga_2O_3 + 3\ H_2O \rightarrow 2\ Ga(OH)_3$ synthesis, not redox

12. skeleton: $Al + O_2 \rightarrow Al_2O_3$ balanced: $4\ Al + 3\ O_2 \rightarrow 2\ Al_2O_3$ decomposition, redox
    oxidation #'s: Al 0 → 3+ (3e−lost ×2) oxidized
    O 0 → 2− (2e− gained ×6) reduced 12 e− transferred