Practice Problems (Chapter 5): Balancing and Reactions

CHEM 30A

I suggest that you complete these practice problems in **pencil** because you may need to erase and change coefficients as you balance the chemical equations.

Balance the following equations (show your check), and answer the accompanying questions.

1. ___ SO_2 + ___ O_2 → ___ SO_3

What type of reaction is this? (circle one)
combination, decomposition, single replacement, double replacement, combustion, acid-base

2. ___ Al + ___ MnO_2 $\xrightarrow{\Delta}$ ___ Mn + ___ Al_2O_3

What does the delta symbol (triangle) over the arrow mean? _____

What type of reaction is this? (circle one)
combination, decomposition, single replacement, double replacement, combustion, acid-base

3. ___ Bi_2S_3 + ___ HCl → ___ $BiCl_3$ + ___ H_2S

What type of reaction is this? (circle one)
combination, decomposition, single replacement, double replacement, combustion, acid-base

4. ___ PbO_2 $\xrightarrow{\Delta}$ ___ PbO + ___ O_2

What type of reaction is this? (circle one)
combination, decomposition, single replacement, double replacement, combustion, acid-base

5. ___ H_2SO_4 + ___ $Al(OH)_3$ → ___ H_2O + ___ $Al_2(SO_4)_3$

What type of reaction is this? (circle one)
combination, decomposition, single replacement, double replacement, combustion, acid-base

6. ___ C_3H_8 + ___ O_2 → ___ CO_2 + ___ H_2O

What type of reaction is this? (circle one)
combination, decomposition, single replacement, double replacement, combustion, acid-base

Write formula equations from the following word equations, then balance them (show your check).

7. phosphoric acid + calcium hydroxide → calcium phosphate + water

___ _____ + ___ _____ → ___ _____ + ___ _____

8. zinc carbonate + hydrochloric acid → zinc chloride + water + carbon dioxide

___ _____ + ___ _____ → ___ _____ + ___ _____ + ___ _____

9. silver nitrate + aluminum chloride → silver chloride + aluminum nitrate

___ _____ + ___ _____ → ___ _____ + ___ _____

10. silver oxide $\xrightarrow{\Delta}$ silver + oxygen

___ _____ $\xrightarrow{\Delta}$ ___ _____ + ___ _____

Predict the products for the following combination reactions and balance them (show your check). The product of each reaction is a charge neutral ionic compound.

11. ___ $Mg_{(s)}$ + ___ $O_{2(g)}$ →

12. ___ $Al_{(s)}$ + ___ $Br_{2(l)}$ →

Predict the products for the following single replacement reactions and balance them (show your check). If no reaction occurs, write "no reaction" on the product side of the arrow.

13. ___ $Cu_{(s)}$ + ___ $FeCl_{3(aq)}$ →

14. ___ $Al_{(s)}$ + ___ $HBr_{(aq)}$ →

15. ___ $H_{2(g)}$ + ___ $Al_2O_{3(aq)}$ →

16. ___ $Cl_{2(g)}$ + ___ $HBr_{(aq)}$ →

17. ___ $I_{2(s)}$ + ___ $HCl_{(aq)}$ →

Activity Series:

Metals (and Hydrogen) form cations	**Non-Metals (Halogens)** form anions
K	F_2
Ca	Cl_2
Na	Br_2
Mg	I_2
Al	
Zn	
Fe	
Ni	
Sn	
Pb	
H	
Cu	
Ag	
Hg	
Au	

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Predict the products for the following double replacement reactions and balance them (show your check). Use the solubility rules to determine if a precipitate (solid) will form. Label the phase of insoluble products as solid and soluble products as aqueous.

18. ___ $Cu(NO_3)_{2(aq)}$ + ___ $FeCl_{3(aq)}$ →

19. ___ $Ba(C_2H_3O_2)_{2(aq)}$ + ___ $(NH_4)_2SO_{4(aq)}$ →

20. ___ $KCl_{(aq)}$ + ___ $Pb(NO_3)_{2(aq)}$ →

21. ___ $Na_2CO_{3(aq)}$ + ___ $CaBr_{2(aq)}$ →

22. ___ $CaCl_{2(aq)}$ + ___ $AgNO_{3(aq)}$ →

Complete the following combustion reactions (in air) and balance them (show your check).

23. ___ $C_2H_{2(g)}$ + ___ _____$_{(g)}$ →

24. ___ $C_3H_{8(g)}$ + ___ _____$_{(g)}$ →

25. ___ $C_2H_5OH_{(l)}$ + ___ _____$_{(g)}$ →

26. ___ $CH_{4(g)}$ + ___ _____$_{(g)}$ →

Predict the products for the following acid-base neutralization reactions and balance them (show your check).

27. ___ $HBr_{(aq)}$ + ___ $Al(OH)_{3(s)}$ →

28. ___ $HCl_{(aq)}$ + ___ $CaCO_{3(s)}$ →

29. ___ $H_2SO_{4(aq)}$ + ___ $KOH_{(aq)}$ →

30. ___ $H_3PO_{4(aq)}$ + ___ $Ba(OH)_{2(aq)}$ →