More #1

1. $\boxed{2}H_2 + \boxed{\ }O_2 \rightarrow \boxed{2}H_2O$
2. $\boxed{3}H_2 + \boxed{\ }N_2 \rightarrow \boxed{2}NH_3$
3. $\boxed{2}Al_2O_3 \rightarrow \boxed{4}Al + \boxed{3}O_2$
4. $\boxed{2}KClO_3 \rightarrow \boxed{2}KCl + \boxed{3}O_2$
5. $\boxed{\ }S_8 + \boxed{8}O_2 \rightarrow \boxed{8}SO_2$
6. $\boxed{2}C_2H_6 + \boxed{7}O_2 \rightarrow \boxed{4}CO_2 + \boxed{6}H_2O$
7. $\boxed{\ }Al_2(SO_4)_3 + \boxed{3}Ca(OH)_2 \rightarrow \boxed{2}Al(OH)_3 + \boxed{3}CaSO_4$
8. $\boxed{\ }P_4 + \boxed{5}O_2 \rightarrow \boxed{2}P_2O_5$
9. $\boxed{16}Ag + \boxed{\ }S_8 \rightarrow \boxed{8}Ag_2S$
10. $\boxed{2}Al + \boxed{3}Br_2 \rightarrow \boxed{2}AlBr_3$
11. $\boxed{4}Cr + \boxed{3}O_2 \rightarrow \boxed{2}Cr_2O_3$
12. $\boxed{2}NaClO_3 \rightarrow \boxed{2}NaCl + \boxed{3}O_2$
13. $\boxed{2}AlBr_3 + \boxed{3}Cl_2 \rightarrow \boxed{2}AlCl_3 + \boxed{3}Br_2$
14. $\boxed{2}Na + \boxed{2}H_2O \rightarrow \boxed{2}NaOH + \boxed{\ }H_2$
15. $\boxed{2}AlI_3 + \boxed{3}HgCl_2 \rightarrow \boxed{2}AlCl_3 + \boxed{3}HgI_2$
16. $\boxed{3}Ca(OH)_2 + \boxed{2}H_3PO_4 \rightarrow \boxed{\ }Ca_3(PO_4)_2 + \boxed{6}H_2O$
17. $\boxed{3}AgNO_3 + \boxed{\ }K_3PO_4 \rightarrow \boxed{\ }Ag_3PO_4 + \boxed{3}KNO_3$
18. $\boxed{\ }C_3H_8 + \boxed{5}O_2 \rightarrow \boxed{3}CO_2 + \boxed{4}H_2O$
19. $\boxed{2}C_2H_2 + \boxed{5}O_2 \rightarrow \boxed{4}CO_2 + \boxed{2}H_2O$
20. $\boxed{2}C_6H_6 + \boxed{15}O_2 \rightarrow \boxed{12}CO_2 + \boxed{6}H_2O$

Problems with * are the most difficult. If you can balance these, you can balance any equation given in class.**

More #2

1. $C_3H_8 + 5\,O_2 \rightarrow 3\,CO_2 + 4\,H_2O$

2. $Al_2(SO_3)_3 + 6\,NaOH \rightarrow 3\,Na_2SO_3 + 2\,Al(OH)_3$

3. $4\,Al_2O_3 + 9\,Fe \rightarrow 3\,Fe_3O_4 + 8\,Al$

4. $2\,KClO_3 \rightarrow 2\,KCl + 3\,O_2$

5. $NH_4NO_3 \rightarrow N_2O + 2\,H_2O$

6. $2\,NaHCO_3 \rightarrow Na_2CO_3 + H_2O + CO_2$

7. $P_4O_{10} + 6\,H_2O \rightarrow 4\,H_3PO_4$

8. $2\,Al + 3\,H_2SO_4 \rightarrow Al_2(SO_4)_3 + 3\,H_2$

9. $Be_2C + 4\,H_2O \rightarrow 2\,Be(OH)_2 + CH_4$

10.*** $S + 6\,HNO_3 \rightarrow H_2SO_4 + 6\,NO_2 + 2\,H_2O$

11. $2\,NH_3 + 3\,CuO \rightarrow 3\,Cu + N_2 + 3\,H_2O$

12.*** $3\,Cu + 8HNO_3 \rightarrow 3\,Cu(NO_3)_2 + 2\,NO + 4\,H_2O$

Balancing Equations Worksheet – Answers

Note to students: It is acceptable to leave spaces blank when balancing equations – blank spaces are interpreted as containing the number "1".

More #3

1) **1** Na_3PO_4 + **3** KOH → **3** NaOH + **1** K_3PO_4

2) **1** MgF_2 + **1** Li_2CO_3 → **1** $MgCO_3$ + **2** LiF

3) **1** P_4 + **3** O_2 → **2** P_2O_3

4) **2** $RbNO_3$ + **1** BeF_2 → **1** $Be(NO_3)_2$ + **2** RbF

5) **2** $AgNO_3$ + **1** Cu → **1** $Cu(NO_3)_2$ + **2** Ag

6) **1** CF_4 + **2** Br_2 → **1** CBr_4 + **2** F_2

7) **2** HCN + **1** $CuSO_4$ → **1** H_2SO_4 + **1** $Cu(CN)_2$

8) **1** GaF_3 + **3** Cs → **3** CsF + **1** Ga

9) **1** BaS + **1** PtF_2 → **1** BaF_2 + **1** PtS

10) **1** N_2 + **3** H_2 → **2** NH_3

11) **2** NaF + **1** Br_2 → **2** NaBr + **1** F_2

12) **1** $Pb(OH)_2$ + **2** HCl → **2** H_2O + **1** $PbCl_2$

13) **2** $AlBr_3$ + **3** K_2SO_4 → **6** KBr + **1** $Al_2(SO_4)_3$

14) **1** CH_4 + **2** O_2 → **1** CO_2 + **2** H_2O

15) **2** Na_3PO_4 + **3** $CaCl_2$ → **6** NaCl + **1** $Ca_3(PO_4)_2$

16) **2** K + **1** Cl_2 → **2** KCl

17) **2** Al + **6** HCl → **3** H_2 + **2** $AlCl_3$

18) **1** N_2 + **3** F_2 → **2** NF_3

19) **1** SO_2 + **2** Li_2Se → **1** SSe_2 + **2** Li_2O

20) **2** NH_3 + **1** H_2SO_4 → **1** $(NH_4)_2SO_4$

Answers

More #4

Question 1

a. $2\ Cu_{(s)} + O_{2\,(g)} \rightarrow 2\ CuO_{(s)}$ **(formation)**

b. $2\ H_2O_{(l)} \rightarrow 2\ H_{2\,(g)} + O_{2\,(g)}$ **(decomposition)**

c. $3\ Fe_{(s)} + 4\ H_2O_{(g)} \rightarrow 4\ H_{2\,(g)} + Fe_3O_{4\,(s)}$ **(single replacement)**

d. $2\ AsCl_{3\,(aq)} + 3\ H_2S_{(aq)} \rightarrow As_2S_{3\,(s)} + 6\ HCl_{(aq)}$ **(double replacement)**

e. $CuSO_4 \bullet 5\ H_2O_{(s)} \rightarrow CuSO_{4\,(s)} + 5\ H_2O_{(g)}$ **(other – dehydration or decomposition)**

f. $Fe_2O_{3\,(s)} + 3\ H_{2\,(g)} \rightarrow 2\ Fe_{(s)} + 3\ H_2O_{(l)}$ **(single replacement)**

g. $CaCO_{3\,(s)} \rightarrow CaO_{(s)} + CO_{2\,(g)}$ **(other or decomposition)**

h. $8\ Fe_{(s)} + S_{8\,(s)} \rightarrow 8\ FeS_{(s)}$ **(formation)**

i. $H_2S_{(aq)} + 2\ KOH_{(aq)} \rightarrow 2\ H_2O_{(l)} + K_2S_{(aq)}$ **(double replacement)**

j. $2\ NaCl_{(l)} \rightarrow 2\ Na_{(l)} + Cl_{2\,(g)}$ **(decomposition)**

k. $2\ Al_{(s)} + 3\ H_2SO_{4\,(aq)} \rightarrow 3\ H_{2\,(g)} + Al_2(SO_4)_{3\,(aq)}$ **(single replacement)**

l. $H_3PO_{4\,(aq)} + 3\ NH_4OH_{(aq)} \rightarrow 3\ H_2O_{(l)} + (NH_4)_3PO_{4\,(aq)}$ **(double replacement)**

m. $C_3H_{8\,(g)} + 5\ O_{2\,(g)} \rightarrow 3\ CO_{2\,(g)} + 4\ H_2O_{(l)}$ **(hydrocarbon combustion)**

n. $4\ Al_{(s)} + 3\ O_{2\,(g)} \rightarrow 2\ Al_2O_{3\,(s)}$ **(formation)**

o. $CH_{4\,(g)} + 2\ O_{2\,(g)} \rightarrow CO_{2\,(g)} + 2\ H_2O_{(l)}$ **(hydrocarbon combustion)**

p. $K_2SO_{4\,(aq)} + BaCl_{2\,(aq)} \rightarrow 2\ KCl_{(aq)} + BaSO_{4\,(s)}$ **(double replacement)**

q. $C_5H_{12\,(l)} + 8\ O_{2\,(g)} \rightarrow 5\ CO_{2\,(g)} + 6\ H_2O_{(g)}$ **(hydrocarbon combustion)**

r. $Ca(OH)_{2\,(aq)} + 2\ NH_4Cl_{(aq)} \rightarrow 2\ NH_4OH_{(aq)} + CaCl_{2\,(aq)}$ **(double replacement)**

s. $V_2O_{5\,(s)} + 5\ Ca_{(s)} \rightarrow 5\ CaO_{(s)} + 2\ V_{(s)}$ **(single replacement)**

t. $2\ Na_{(s)} + ZnI_{2\,(aq)} \rightarrow 2\ NaI_{(aq)} + Zn_{(s)}$ **(single replacement)**

u. $C_7H_6O_{3\,(l)} + 7\ O_{2\,(g)} \rightarrow 7\ CO_{2\,(g)} + 3\ H_2O_{(l)}$ **(hydrocarbon combustion)**

v. $3\ Ca_{(s)} + N_{2\,(g)} \rightarrow Ca_3N_{2\,(s)}$ **(formation)**

w. $Fe_2O_{3\,(s)} + 3\ H_{2\,(g)} \rightarrow 2\ Fe_{(s)} + 3\ H_2O_{(l)}$ **(single replacement)**

x. $2\ C_{15}H_{30\,(l)} + 45\ O_{2\,(g)} \rightarrow 30\ CO_{2\,(g)} + 30\ H_2O_{(g)}$ **(hydrocarbon combustion)**

y. $2\ BN_{(s)} + 3\ F_{2\,(g)} \rightarrow 2\ BF_{3\,(s)} + N_{2\,(g)}$ **(single replacement)**

z. $2\ C_{12}H_{26\,(l)} + 37\ O_{2\,(g)} \rightarrow 24\ CO_{2\,(g)} + 26\ H_2O_{(g)}$ **(hydrocarbon combustion)**

Question 2

a. $Pb(NO_3)_{2\,(aq)} + 2\ NaI_{(aq)} \rightarrow PbI_{2\,(s)} + 2\ NaNO_{3\,(aq)}$ **(double replacement)**

b. $8\ ZnS_{(s)} + 4\ O_{2\,(g)} \rightarrow 8\ ZnO_{(s)} + S_{8\,(s)}$ **(single replacement)**

c. $2\ C_4H_{10\,(l)} + 13\ O_{2\,(g)} \rightarrow 8\ CO_{2\,(g)} + 10\ H_2O_{(g)}$ **(hydrocarbon combustion)**

d. $Ba(OH)_{2\,(aq)} + 2\ HCl_{(aq)} \rightarrow BaCl_{2\,(aq)} + 2\ H_2O_{(l)}$ **(double replacement)**

e. $Cu_{(s)} + 2\ AgNO_{3\,(aq)} \rightarrow Cu(NO_3)_{2\,(aq)} + 2\ Ag_{(s)}$ **(single replacement)**

f. $S_{8\,(s)} + 8\ O_{2\,(g)} \rightarrow 8\ SO_{2\,(g)}$ **(formation)**

g. $Al_2(SO_4)_{3\,(aq)} + 3\ Ca(OH)_{2\,(aq)} \rightarrow 2\ Al(OH)_{3\,(s)} + 3\ CaSO_{4\,(s)}$ **(double replacement)**

h. $Zn_{(s)} + H_2SO_{4\,(aq)} \rightarrow ZnSO_{4\,(aq)} + H_{2\,(g)}$ **(single replacement)**

i. $2\ Al_{(s)} + 3\ Cl_{2\,(g)} \rightarrow 2\ AlCl_{3\,(s)}$ **(formation)**

j. $C_{12}H_{22}O_{11\,(s)} + 12\ O_{2\,(g)} \rightarrow 12\ CO_{2\,(g)} + 11\ H_2O_{(l)}$ **(hydrocarbon combustion)**

Solutions for the Balancing Equations Practice Worksheet

MORE #5

1) $2\ NaNO_3 + PbO \rightarrow Pb(NO_3)_2 + Na_2O$

2) $6\ AgI + Fe_2(CO_3)_3 \rightarrow 2\ FeI_3 + 3\ Ag_2CO_3$

3) $C_2H_4O_2 + 2\ O_2 \rightarrow 2\ CO_2 + 2\ H_2O$

4) $ZnSO_4 + Li_2CO_3 \rightarrow ZnCO_3 + Li_2SO_4$

5) $V_2O_5 + 5\ CaS \rightarrow 5\ CaO + V_2S_5$

6) $Mn(NO_2)_2 + BeCl_2 \rightarrow Be(NO_2)_2 + MnCl_2$

7) $3\ AgBr + GaPO_4 \rightarrow Ag_3PO_4 + GaBr_3$

8) $3\ H_2SO_4 + 2\ B(OH)_3 \rightarrow B_2(SO_4)_3 + 6\ H_2O$

9) $S_8 + 8\ O_2 \rightarrow 8\ SO_2$

10) $Fe + 2\ AgNO_3 \rightarrow Fe(NO_3)_2 + 2\ Ag$

Balancing Chemical Equations – Answer Key

Balance the equations below:

MORE #6.

1) **1** N_2 + **3** H_2 → **2** NH_3

2) **2** $KClO_3$ → **2** KCl + **3** O_2

3) **2** NaCl + **1** F_2 → **2** NaF + **1** Cl_2

4) **2** H_2 + **1** O_2 → **2** H_2O

5) **1** $Pb(OH)_2$ + **2** HCl → **2** H_2O + **1** $PbCl_2$

6) **2** $AlBr_3$ + **3** K_2SO_4 → **6** KBr + **1** $Al_2(SO_4)_3$

7) **1** CH_4 + **2** O_2 → **1** CO_2 + **2** H_2O

8) **1** C_3H_8 + **5** O_2 → **3** CO_2 + **4** H_2O

9) **2** C_8H_{18} + **25** O_2 → **16** CO_2 + **18** H_2O

10) **1** $FeCl_3$ + **3** NaOH → **1** $Fe(OH)_3$ + **3** NaCl

11) **4** P + **5** O_2 → **2** P_2O_5

12) **2** Na + **2** H_2O → **2** NaOH + **1** H_2

13) **2** Ag_2O → **4** Ag + **1** O_2

14) **1** S_8 + **12** O_2 → **8** SO_3

15) **6** CO_2 + **6** H_2O → **1** $C_6H_{12}O_6$ + **6** O_2

16) **1** K + **1** MgBr → **1** KBr + **1** Mg

17) **2** HCl + **1** $CaCO_3$ → **1** $CaCl_2$ + **1** H_2O + **1** CO_2

18) **1** HNO_3 + **1** $NaHCO_3$ → **1** $NaNO_3$ + **1** H_2O + **1** CO_2

19) **2** H_2O + **1** O_2 → **2** H_2O_2

20) **2** NaBr + **1** CaF_2 → **2** NaF + **1** $CaBr_2$

21) **1** H_2SO_4 + **2** $NaNO_2$ → **2** HNO_2 + **1** Na_2SO_4