Answer Key

Chemical Reactions Review

Balance and classify the following reactions. Use S for synthesis, C for combustion, D for decomposition, SR for single replacement and DR for double replacement.

1. 6 Na_2O + ___ P_4O_{10} → 4 Na_3PO_4 Type: S
2. ___ $C_{12}H_{22}O_{11}$ + 12 O_2 → 12 CO_2 + 11 H_2O Type: C
3. 3 MnO_2 + 4 Al → 2 Al_2O_3 + 3 Mn Type: SR
4. 2 C_2H_6 + 7 O_2 → 6 H_2O + 4 CO_2 Type: C
5. 2 NaI + ___ Cl_2 → 2 NaCl + ___ I_2 Type: SR
6. 2 $KClO_3$ → 2 KCl + 3 O_2 Type: D
7. 3 H_2 + ___ N_2 → 2 NH_3 Type: S
8. 6 O_2 + ___ $C_6H_{12}O_6$ → 6 H_2O + 6 CO_2 Type: C
9. ___ Br_2 + 2 H_2O + ___ SO_2 → 2 HBr + ___ H_2SO_4 Type: S
10. 3 KOH + ___ H_3PO_4 → ___ K_3PO_4 + 3 H_2O Type: DR
11. ___ P_4 + 5 O_2 → 2 P_2O_5 Type: S
12. ___ $Al_2(SO_4)_3$ + 3 $Ca(OH)_2$ → 2 $Al(OH)_3$ + 3 $CaSO_4$ Type: DR
13. 2 $NaClO_3$ → 2 NaCl + 3 O_2 Type: D
14. ___ S_8 + 8 O_2 → 8 SO_2 Type: S
15. 2 C_6H_6 + 15 O_2 → 12 CO_2 + 6 H_2O Type: C
16. 2 C_2H_2 + 5 O_2 → 4 CO_2 + 2 H_2O Type: C
17. ___ C_3H_8 + 5 O_2 → 3 CO_2 + 4 H_2O Type: C
18. 2 AlI_3 + 3 $HgCl_2$ → 2 $AlCl_3$ + 3 HgI_2 Type: DR
19. 3 $AgNO_3$ + ___ K_3PO_4 → ___ Ag_3PO_4 + 3 KNO_3 Type: DR
20. 6 F_2 + 2 Al_2O_3 → 4 AlF_3 + 3 O_2 Type: SR

21. 2 C_2H_6 + 7 O_2 → 4 CO_2 + 6 H_2O Type: C

22. 4 NH_3 + 5 O_2 → 4 NO + 6 H_2O Type: C

23. 2 C_5H_{12} + 11 O_2 → 10 CO + 12 H_2O Type: C

24. 2 C_8H_{18} + 17 O_2 → 16 CO + 18 H_2O Type: C

Write the formulas for the following word equations and balance them.

1. Barium nitrate + sulfuric acid → barium sulfate + nitric acid

$Ba(NO_3)_2 + H_2SO_4 \longrightarrow BaSO_4 + 2HNO_3$

2. aluminum sulfate + sodium hydroxide → aluminum hydroxide + sodium sulfate

$Al_2(SO_4)_3 + 6NaOH \longrightarrow 2Al(OH)_3 + 3Na_2SO_4$

3. lithium phosphate → lithium + phosphorus (P_4) + oxygen

$4Li_3PO_4 \longrightarrow 12Li + P_4 + 8O_2$

4. cobalt (III) chloride + potassium hydroxide → potassium chloride + cobalt (III) hydroxide

$CoCl_3 + 3KOH \longrightarrow 3KCl + Co(OH)_3$

5. manganese + hydrochloric acid → manganese (II) chloride + hydrogen

$Mn + 2HCl \longrightarrow MnCl_2 + H_2$

6. cesium iodide + bromine → cesium bromide + iodine

$2CsI + Br_2 \longrightarrow 2CsBr + I_2$

7. strontium + chlorine + oxygen → strontium chlorate

$Sr + Cl_2 + 3O_2 \longrightarrow Sr(ClO_3)_2$

8. paraffin ($C_{25}H_{52}$) + oxygen → carbon dioxide + water

$C_{25}H_{52} + 38O_2 \longrightarrow 25CO_2 + 26H_2O$

9. nickel (II) chlorate → nickel (II) chloride + oxygen

$Ni(ClO_3)_2 \longrightarrow NiCl_2 + 3O_2$

10. phosphorus (P_4) + oxygen → diphosphorus pentoxide

$P_4 + 5O_2 \longrightarrow 2\,P_2O_5$

11. ammonium dichromate → chromium (III) oxide + nitrogen + water

$(NH_4)_2Cr_2O_7 \longrightarrow Cr_2O_3 + N_2 + 4\,H_2O$

12. aluminum + copper (II) nitrate → aluminum nitrate + copper

$2\,Al + 3\,Cu(NO_3)_2 \longrightarrow 2\,Al(NO_3)_3 + 3\,Cu$

13. barium chloride + sodium hydroxide → sodium chloride + barium hydroxide

$BaCl_2 + 2\,NaOH \longrightarrow 2\,NaCl + Ba(OH)_2$

14. aluminum + hydrochloric acid → aluminum chloride + hydrogen

$2\,Al + 6\,HCl \longrightarrow 2\,AlCl_3 + 3\,H_2$

15. potassium hydroxide + antimony (III) chloride → potassium chloride + antimony (III) oxide + water

$6\,KOH + 2\,SbCl_3 \longrightarrow 6\,KCl + Sb_2O_3 + 3\,H_2O$

16. carbon tetrahydride + oxygen → carbon dioxide + water

$CH_4 + 2O_2 \longrightarrow CO_2 + 2\,H_2O$

17. hydrogen + carbon monoxide + oxygen → carbonic acid

$H_2 + CO + O_2 \longrightarrow H_2CO_3$

18. barium chlorate → barium chloride + oxygen

$Ba(ClO_3)_2 \longrightarrow BaCl_2 + 3\,O_2$

19. sodium nitrate → sodium nitrite + oxygen

$2\,NaNO_3 \longrightarrow 2\,NaNO_2 + O_2$

20. sulfur trioxide + water → sulfuric acid

$SO_3 + H_2O \longrightarrow H_2SO_4$

Complete and balance each of the following reactions

1. $2\ Al + 3\ SnCl_2 \rightarrow 2\ AlCl_3 + 3\ Sn$

2. $Ca + 2\ H_2O \rightarrow Ca(OH)_2 + H_2$

3. $Cl_2 + 2\ NaBr \rightarrow 2\ NaCl + Br_2$

4. $Pb\ (II) + 2\ HCl \rightarrow PbCl_2 + H_2$

5. $Pb(NO_3)_2 + K_2CrO_4 \rightarrow PbCrO_4 + 2\ KNO_3$

6. $3\ ZnCO_3 + 2\ H_3PO_4 \rightarrow Zn_3(PO_4)_2 + 3\ H_2CO_3$

7. $Ca(OH)_2 + 2\ HC_2H_3O_2 \rightarrow Ca(C_2H_3O_2)_2 + 2\ H_2O$

8. $FeCl_3 + 3\ NaOH \rightarrow 3\ NaCl + Fe(OH)_3$

9. $FeSO_4 + (NH_4)_2S \rightarrow (NH_4)_2SO_4 + FeS$

10. $2\ KClO_3 \rightarrow 2\ KCl + 3\ O_2$

11. $2\ Al + 3\ H_2SO_4 \rightarrow Al_2(SO_4)_3 + 3\ H_2$

12. $2\ Mg + O_2 \rightarrow 2\ MgO$

13. ___ $CaCl_2 \rightarrow Ca + Cl_2$

14. ___ $MgBr_2$ + ___ $Cl_2 \rightarrow MgCl_2 + Br_2$

15. ___ $Ba(OH)_2 \rightarrow BaO + H_2O$

16. ___ $Pb(NO_3)_2$ + ___ $H_2S \rightarrow PbS + 2\,HNO_3$

17. ___ $SrBr_2$ + ___ $(NH_4)_2CO_3 \rightarrow 2\,NH_4Br + SrCO_3$

18. 2 $AgNO_3$ + ___ $(NH_4)_2CrO_4 \rightarrow 2\,NH_4NO_3 + Ag_2CrO_4$

19. ___ $MgCO_3 \rightarrow MgO + CO_2$

20. ___ Mg + ___ $N_2 \rightarrow Mg_3N_2$

Write and balance the equation corresponding to each description

1. Sodium hydroxide reacts with carbon dioxide gas to produce sodium carbonate and water.

$2\,NaOH + CO_2 \longrightarrow Na_2CO_3 + H_2O$

2. Magnesium burning in air produces magnesium oxide.

$2Mg + O_2 \longrightarrow 2MgO$

3. Iron reacting with sulfur produces iron (II) sulfide.

$8Fe + S_8 \longrightarrow 8FeS$

4. Iron oxidizes in the presence of oxygen to form iron (II) oxide.

$2Fe + O_2 \longrightarrow 2FeO$

5. Hydrogen gas reacts with elemental sulfur to form hydrosulfuric acid.

$8H_2 + S_8 \longrightarrow 8H_2S$

6. Dihydrogen monosulfide reacts with oxygen to form elemental sulfur and water.

$8H_2S + 4O_2 \longrightarrow S_8 + 8H_2O$

7. Zinc sulfide combined with sulfuric acid reacts to form zinc sulfate and dihydrogen monosulfide.

$ZnS + H_2SO_4 \longrightarrow ZnSO_4 + H_2S$

8. Ammonium chloride and silver nitrate combine to form silver chloride and ammonium nitrate.

$NH_4Cl + AgNO_3 \longrightarrow AgCl + NH_4NO_3$

9. Zinc chloride reacts with dihydrogen monosulfide gas to yield zinc sulfide and hydrochloric acid.

$ZnCl_2 + H_2S \longrightarrow ZnS + 2HCl$

10. Lead (IV) nitrate reacts with sodium sulfate to yield lead (IV) sulfate and sodium nitrate.

$Pb(NO_3)_4 + 2Na_2SO_4 \longrightarrow Pb(SO_4)_2 + 4NaNO_3$

11. Aluminum hydroxide reacts with nitric acid to yield soluble aluminum nitrate and liquid water.

$Al(OH)_3 + 3HNO_3 \longrightarrow Al(NO_3)_3 + 3H_2O$

12. Water added to calcium oxide produces calcium hydroxide.

$H_2O + CaO \longrightarrow Ca(OH)_2$