watch for diatomics

Standard: 4-
Reactions Mix 1

Each one is either Redox or Solubility

voltage → Redox -- A + BC → AC + B
states → Solubility -- AB + CD → AD + CB
Composition -- A + B → AB — Redox
Decomposition -- AB → A + B — Redox
states → Neutralization – Acid + base → Salt + HOH — Solubility
Combustion -- $C_xH_y + O_2 \rightarrow H_2O + CO_2$ — Redox

HOH(l)

*For Decomposition reactions decompose to elements.

Complete and balance	Reaction Type
1. 2 H_2 + ____ $O_2 \rightarrow$ 2 H_2O	Redox (composition)
2. ____ Acetic acid + ____ NaOH → $HC_2H_3O_4 + NaOH \rightarrow HOH_{(l)} + NaC_2H_3O_{2(aq)}$ (states)	Solubility neutralization
3. ____ $H_2Cr_2O_7$ + ____ $K_2CO_3 \rightarrow K_2Cr_2O_{7(aq)} + H_2CO_{3(aq)}$ (states →)	Solubility N.R
4. ____ Zn + ____ S → ZnS	Redox composition
5. ____ Al + 3 $AgNO_3 \rightarrow 3Ag + Al(NO_3)_3$ $Al^0 \rightarrow Al^{+3} + 3e^-$ +1.66V $3Ag^{+1} + 3e^- \rightarrow 3Ag^0$ 0.8V	Redox Voltage: +2.46V
6. 2 $NH_3 \rightarrow N_2 + 3H_2$	Redox Decomposition
7. ____ H_2CO_3 + ____ $MgCl_2 \rightarrow 2HCl_{(aq)} + MgCO_{3(s)}$ (states →)	Solubility
8. 2 K + 2 $H_2O_2 \rightarrow K_2O + 2H_2$ $2K^0 \rightarrow 2K^{+1} + 2e^-$ +2.93 $4H^+ + 4e^- \rightarrow 2H_2^0$ 0V	Redox Voltage: +2.93V
9. 2 Fe + ____ $O_2 \rightarrow 2FeO$ OR $4Fe + 3O_2 \rightarrow 2Fe_2O_3$	Redox composition
10. 2 NaCl → 2Na + Cl_2	Redox decomposition
11. 2 Ba + ____ $Sn(NO_3)_4 \rightarrow Sn + 2Ba(NO_3)_2$ $2Ba^0 \rightarrow 2Ba^{+2} + 4e^-$ +2.90V $Sn^{+4} + 4e^- \rightarrow Sn^0$ +0.13V	Redox Voltage: +3.17V
12. 2 $NI_3 \rightarrow N_2 + 3I_2$	Redox decomposition
13. ____ Potassium cyanide + ____ Sulfuric acid → $KCN + H_2SO_4 \rightarrow K_2SO_4 + HCN_{(g)}$ (states →) K^{+1} CN^{-1}	Solubility N.R.
14. 2 NaCl + ____ $F_2 \rightarrow 2NaF + Cl_2$ $2Cl^- \rightarrow Cl_2 + 2e^-$ -1.36V $2F_2^0 \rightarrow 2F^{-1}$ +2.87V	Redox Voltage: +1.51V

peroxide is O_2^{-2}

15. 3 H_2O_2 + 4 Al → H_2 + 2Al_2O_3	Redox
16. _____ Acetic acid + _____ Sodium bicarbonate →	Solubility
17. _____ Iron + _____ Nitric acid →	Redox
18. _____ Sulfur + _____ Copper →	Redox
19. _____ CH_4 →	Redox
20. _____ Lead (IV) sulfate + _____ Ca →	Redox

not on E° chart → $O_2 + 2e^- \rightarrow O^{-2}$

$HC_2H_3O_2 + NaHCO_3 \rightarrow NaC_2H_3O_2(aq) + H_2CO_3$

$Fe \rightarrow Fe^{+2} + 2e^-$ +0.44

$Fe + 2HNO_3 \rightarrow H_2 + Fe(NO_3)_2$ $2H^+ + 2e^- \rightarrow H_2$ 0

Other possible equation exist.

$S + Cu \rightarrow CuS$ or $S + 2Cu \rightarrow Cu_2S$

$CH_4 \rightarrow C + 2H_2$

$Pb(SO_4)_2 + 2Ca \rightarrow 2CaSO_4 + Pb$

$2Ca^0 \rightarrow Ca^{+2} + 4e^-$ +2.87

$4e^- + Pb^{+4} \rightarrow Pb^0$ (no voltage → no reaction)

11b. H_2CO_3 will break down

$H_2CO_3 \rightarrow H_2O(l) + CO_2(g)$

overall

$HC_2H_3O_2 + NaHCO_3 \rightarrow NaC_2H_3O_2 + H_2O(l) + CO_2(g)$ (H_2CO_3)

Almost Every reaction is either redox or solubility

Standards: #4-

Reactions Mix 2

(SR)

Redox -- A + BC → AC + B — Voltage

Solubility -- AB + CD → AD + CB — states (s) (aq)

Redox — Composition -- A + B → AB

Decomposition -- AB → A + B

solubility — Neutralization – Acid + base → Salt + HOH — HOH (ℓ) or (aq)

Redox — Combustion -- $C_xH_y + O_2 \rightarrow H_2O + CO_2$

change charge

no change in charge

elemental diatomic H_2 O_2 Br_2 F_2 I_2 N_2 Cl_2

*For Decomposition reactions decompose to elements.

Complete and balance	Reaction Type
1. $\_2\_ Na + \_\_\_\_ Cl_2 \rightarrow 2NaCl$ (Na^+Cl^{-1})	Redox composition
2. $\_2\_ NaF + \_\_\_\_ I_2 \rightarrow 2NaI + F_2$ $2F^{-1} \rightarrow F_2^0 + 2e^-$ (−2.87 V) | $I_2^0 + 2e^- \rightarrow 2I^{-1}$ (+0.53)	Redox Voltage: $E^0 = -2.34V$
3. $\_2\_ K_3PO_4 + \_3\_ Pb(NO_3)_2 \rightarrow 6KNO_{3(aq)} + Pb_3(PO_4)_{2(s)}$ ($K^{+1}PO_4^{-3}$; $Pb^{+2}NO_3^{-1}$)	Solubility
4. $\_\_\_\_ HCl + \_\_\_\_ NH_4OH \rightarrow HOH(\ell) + NH_4Cl_{(aq)}$	solubility — states neutralization
5. ____Phosphoric acid + ____Sodium → $2H_3PO_4 + 6Na \rightarrow 2Na_3PO_4 + 3H_2$ $6H^{+1} + 6e^- \rightarrow 3H_2^0$; $6Na^0 \rightarrow 6Na^{+1} + 6e^-$ (+2.71)	Redox Voltage: $E^0 = +2.71V$
6. ____Hydrobromic acid + ____ Aluminum hydroxide $3HBr + Al(OH)_3 \rightarrow 3HOH(\ell) + AlBr_{3(aq)}$	Solubility — states
7. $\_2\_ Mg + \_\_\_\_ O_2 \rightarrow 2MgO$	Redox composition
8. ____ Sulfuric acid + ____Barium Nitrate → $H_2SO_4 + Ba(NO_3)_2 \rightarrow 2HNO_{3(aq)} + BaSO_{4(s)}$	Solubility
9. $\_2\_ O_3 \rightarrow 3O_2$ (not redox)	decomposition
10. $\_\_\_\_ K_3N + 3Li \rightarrow 3K + Li_3N$ $3K^{+1} + 3e^- \rightarrow 3K^0$ (−2.93) ; $3Li^0 \rightarrow 3Li^{+1} + 3e^-$ (+3.05)	Redox Voltage: $E^0 = +0.12$

11. _____ Gold (III) Chloride + _____ Potassium cyanide → $AuCl_3 + 3KCN \rightarrow Au(CN)_{3(s)} + 3KCl_{(aq)}$	solubility + states
12. _____ Gold + Silic acid → $2Au + 3H_2SiO_3 \rightarrow 3H_2 + Au_2(SiO_3)_3$ $Au^0 \rightarrow Au^{+3} + 3e^-$ -1.50V / $6H^+ + 6e^- \rightarrow 3H_2^0$ 0	Redox $E^0 = -1.50V$
13. _____ Lithium + _____ Aluminum Sulfate → $6Li + Al_2(SO_4)_3 \rightarrow 3Li_2SO_4 + 2Al$ $6Li^0 \rightarrow 6Li^{+1} + 6e^-$ +3.05 $2Al^{+3} + 6e^- \rightarrow 2Al^0$ -1.66	Redox $E^0 = 1.39V$
14. _____ $CaCl_2$ + _____ Na_2CO_3 → $CaCl_2 + Na_2CO_3 \rightarrow CaCO_{3(s)} + 2NaCl_{(aq)}$	solubility + states
15. _____ $CaCl_2$ + _____ F_2 → $CaF_2 + Cl_2$ $2Cl^- + Cl_2^0 \rightarrow 2Cl^-$ (-1.36V) $F_2^0 + 2e^- \rightarrow 2F^-$ (+2.87V)	Redox $E^0 = +1.51V$
16. Silver Nitrate + Iron (III) Chloride → $3AgNO_3 + FeCl_3 \rightarrow 3AgCl_{(s)} + Fe(NO_3)_{3(aq)}$	solubility + states
17. Ammonium Nitrate + PbI_4 → $NH_4NO_3 + PbI_4 \rightarrow NH_4I_{(aq)} + Pb(NO_3)_{4(aq)}$	solubility N.R.
18. 2 Al + 3 Br_2 → $2AlBr_3$	Redox composition
19. 3 Zn + _____ N_2 → Zn_3N_2	Redox composition

NAME

CHEMICAL REACTIONS TEST REVIEW

INSTRUCTIONS:
Translate chemical name to symbols, indicate type of reaction, predict products (if necessary), and balance the equation.

Al^{+3} $C_2H_3O_2^{-1}$ Na

Redox 1. (#4-3)Aluminum acetate + Sodium metal→
$Al(C_2H_3O_2)_3 + 3Na \rightarrow 3NaC_2H_3O_2 + Al$

Sol 2. (#4-2) Cobalt(II) sulfide + Nickel(II) chloride→
$CoS + NiCl_2 \rightarrow CoCl_{2(\ )} + NiS_{(\ )}$

Sol 3. (#4-2)Ammonium silicate + potassium phosphate→
$3(NH_4)_2SiO_3 + 2K_3PO_4 \rightarrow 2(NH_4)_3PO_{4(aq)} + 3K_2SiO_{3(aq)}$

Redox Composition 4. (#4-3) sodium metal + Chlorine gas→
$2Na + Cl_2 \rightarrow 2NaCl$

Redox Decomp. 5. (#4-3) Lead (II) nitrate → lead(II) oxide + nitrogen dioxide + oxygen gas
$2Pb(NO_3)_2 \rightarrow 2PbO + 4NO_2 + O_2$

Redox 6. (#4 - 3)Magnesium metal + sulfuric acid →
$Mg + H_2SO_4 \rightarrow MgSO_4 + H_2$

7. (#1-2) Ethane (C_2H_6) + Oxygen gas → Carbon dioxide + water

Redox Combustion (Combustion reaction, always result in carbon dioxide and water)
$2C_2H_6 + 7O_2 \rightarrow 4CO_2 + 6H_2O$

Sol 8. (#4- 2)Chromium(II) Chloride + gold(III) sulfide →
$3CrCl_2 + Au_2S_3 \rightarrow 3CrS_{(\ )} + 2AuCl_{3(\ )}$

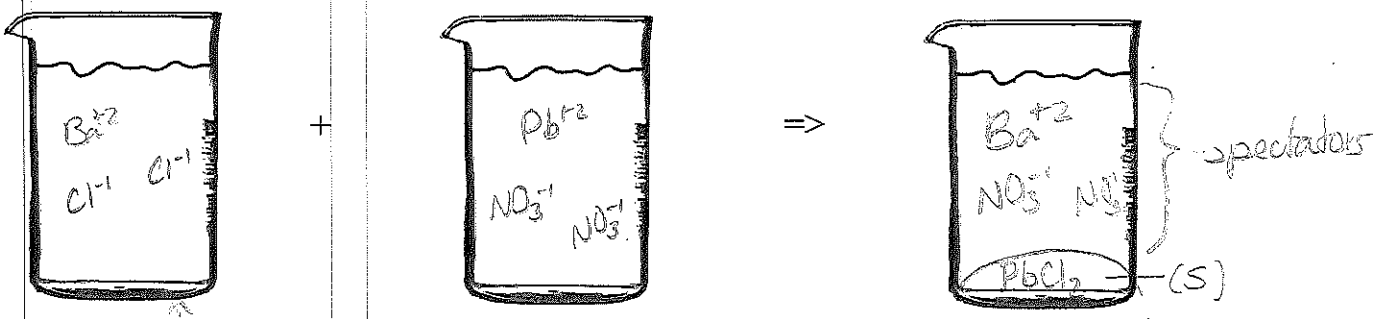
Sol 9. (#4-2) A container has the aqueous solutions poured into it and a reactions takes place causing a solid to be formed. ($BaCl_{2(aq)} + Pb(NO_3)_2$)
$BaCl_2 + Pb(NO_3)_2 \rightarrow Ba(NO_3)_{2(aq)} + PbCl_{2(s)}$

a. (#4- 2) What type of chemical reaction is this? (previous page)

solubility

b. (#4- 2) Write out a reaction for this process.
   a. Molecular equation: $BaCl_2 + Pb(NO_3)_2 \rightarrow Ba(NO_3)_2(aq) + PbCl_2(s)$
   b. Ionic equation: $Ba^{+2} + 2Cl^{-1} + Pb^{+2} + 2NO_3^{-1} \rightarrow Ba^{+2} + 2NO_3^{-1} + PbCl_2(s)$
   c. Net-ionic equation: $2Cl^{-1} + Pb^{+2} \rightarrow PbCl_2(s)$

c. (#4- 2) Draw a picture of each substance before and after.



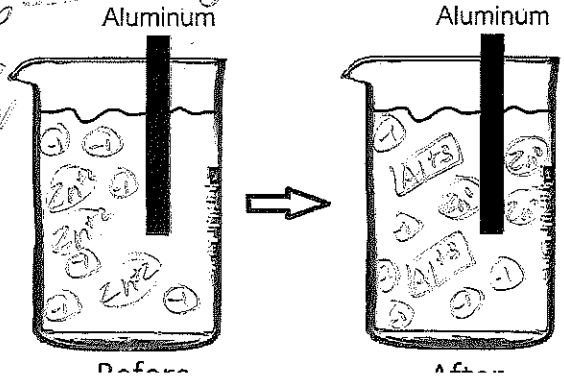
$BaCl_2 \rightarrow Ba^{+2} + 2Cl^{-1}$ $Pb(NO_3)_2 \rightarrow Pb^{+2} + 2NO_3^{-1}$ products (label)

10. A solid chunk of aluminum is placed in zinc nitrate.
   a. (#4-3) What type of reaction is this? Redox
   b. (#4-) Write out a reaction for this process.
      a. $2Al + 3Zn(NO_3)_2 \rightarrow 3Zn + 2Al(NO_3)_3$
      (#4-3)
      a. Molecular equation:
      b. Ionic equation: $2Al^0 + 3Zn^{+2} + 6NO_3^{-1} \rightarrow 3Zn^0 + 2Al^{+3} + 6NO_3^{-1}$
      c. Net-ionic equation: $2Al^0 + 3Zn^{+2} \rightarrow 3Zn^0 + 2Al^{+3}$
   c. (#4- 3)Determine the voltage of this process? (is it spontaneous, how do you know?) + Voltage is spontaneous

Ox
Red

$2Al^0 \rightarrow 2Al^{+3} + 6e^- \quad +1.66$
$6e^- + 3Zn^{+2} \rightarrow 3Zn^0 \quad -0.76$
$+0.90V$

   d. (#4- 3)Model this process before and afte



Key
$NO_3^{-1} = -1$
(spectator)