Mallaig Department of Chemistry
9/13/06

Name: _____
Date: _____

Chemistry 20: Unit 0 – Review
Writing and Balancing Worksheet

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1. For each of the following reactions, determine what the products of each reaction will be. When you have predicted the products, balance the equation and use a table of solubility products to determine the states of matter. Assume all reactions take place in water.

a) 1 $Ca(OH)_2$ + 2 HF → 2 H_2O + CaF_2 (CaF_2 precipitates) or (aq)

b) 1 $Pb(NO_3)_2$ + 1 K_2CrO_4 → 2 KNO_3 + $PbCrO_4$ ($PbCrO_4$ precipitates) /aq

c) 2 $NaC_2H_3O_2$ + 1 H_2SO_4 → Na_2SO_4 + 2 CH_3COOH (no precipitate)

d) 3 $Cu(OH)_2$ + 2 H_3PO_4 → 6 H_2O + $Cu_3(PO_4)_2$ (s) / (aq).
copper (II) phosphate precipitates

e) 2 $AgNO_3$ + 1 Na_2CO_3 → Ag_2CO_3 + 2 $NaNO_3$ (Ag_2CO_3 precipitates)

f) 1 Zn + ~~1~~ H_2CO_3 → $ZnCO_3$ + H_2 ($ZnCO_3$ precipitates)

~~g) $Pb(OH)_2$ + Hg_2S → no reaction; neither reagent is soluble in water~~
Omit.

$PbS_{(s)} + 2HgOH_{(s)}$.

2. For each of the following problems, write complete chemical equations to describe the chemical process taking place. Important note: There are a few physical processes on this sheet – remember, you can't write an equation for a physical process!

a) When lithium hydroxide pellets are added to a solution of sulfuric acid, lithium sulfate and water are formed.

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$2\ LiOH_{(s)} + H_2SO_{4(aq)} \rightarrow Li_2SO_{4(aq)} + 2\ H_2O_{(l)}$

b) When dirty water is boiled for purification purposes, the temperature is brought up to 100^0 C for 15 minutes.

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No equation is needed, as boiling is a physical process.

c) If a copper coil is placed into a solution of silver nitrate, silver crystals form on the surface of the copper. Additionally, highly soluble copper (I) nitrate is generated.

1/2

$Cu_{(s)} + AgNO_{3(aq)} \rightarrow Ag_{(s)} + CuNO_{3(aq)}$

d) When crystalline $C_6H_{12}O_6$ is burned in oxygen, carbon dioxide and water vapor are formed.

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$C_6H_{12}O_{6(s)} + 6\ O_{2(g)} \rightarrow 6\ CO_{2(g)} + 6\ H_2O_{(g)}$

e) When a chunk of palladium metal is ground into a very fine powder and heated to drive off any atmospheric moisture, the resulting powder is an excellent catalyst for chemical reactions.

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Both grinding and heating are physical processes. Even if the atmospheric moisture is mentioned, boiling is still a physical process. No equation is needed.

3. *Balance the following reactions and indicate which of the six types of chemical reaction are being represented:*

a) $2\ NaBr + 1\ Ca(OH)_2 \rightarrow 1\ CaBr_2 + 2\ NaOH$

Type of reaction: **double displacement**

b) $2\ NH_3 + 1\ H_2SO_4 \rightarrow 1\ (NH_4)_2SO_4$

Type of reaction: **synthesis**

c) $4\ C_5H_9O + 27\ O_2 \rightarrow 20\ CO_2 + 18\ H_2O$

Type of reaction: **combustion**

d) $3\ Pb + 2\ H_3PO_4 \rightarrow 3\ H_2 + 1\ Pb_3(PO_4)_2$

Type of reaction: **single displacement**

e) $1\ Li_3N + 3\ NH_4NO_3 \rightarrow 3\ LiNO_3 + 1\ (NH_4)_3N$

Type of reaction: **double displacement**

f) $3\ HBr + 1\ Al(OH)_3 \rightarrow 3\ H_2O + 1\ AlBr_3$

4. Write the word equations below as chemical equations and balance:

1) Zinc and lead (II) nitrate react to form zinc nitrate and lead.

$$Zn + Pb(NO_3)_2 \rightarrow Zn(NO_3)_2 + Pb$$

2) Aluminum bromide and chlorine gas react to form aluminum chloride and *bromine gas.*

$$2\ AlBr_3 + 3\ Cl_2 \rightarrow 2\ AlCl_3 + 3\ Br_2$$

3) Sodium phosphate and calcium chloride react to form calcium phosphate and sodium chloride.

$$2\ Na_3PO_4 + 3\ CaCl_2 \rightarrow 6\ NaCl + Ca_3(PO_4)_2$$

4) Potassium metal and chlorine gas combine to form potassium chloride.

$$2\ K + Cl_2 \rightarrow 2\ KCl$$

5) Aluminum and hydrochloric acid react to form aluminum chloride and *hydrogen gas.*

$$2\ Al + 6\ HCl \rightarrow 3\ H_2 + 2\ AlCl_3$$

6) Calcium hydroxide and phosphoric acid react to form calcium phosphate and water.

$$3\ Ca(OH)_2 + 2\ H_3PO_4 \rightarrow Ca_3(PO_4)_2 + 6\ H_2O$$

7) Copper and sulfuric acid react to form copper (II) sulfate and water and *sulfur dioxide.*

$$Cu + 2\ H_2SO_4 \rightarrow CuSO_4 + 2\ H_2O + SO_2$$

8) Hydrogen gas and nitrogen monoxide react to form water and nitrogen gas.

$$2\ H_2 + 2\ NO \rightarrow 2\ H_2O + N_2$$

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Name Key
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Chemistry 20 Naming Acids Extra Credit Worksheet

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Part A – Write the formula and state for each acid.

nitric acid $HNO_3(aq)$

hydrocyanic acid $HCN(aq)$

chloric acid $HClO_3(aq)$

acetic acid $CH_3COOH(aq)$

hydrobromic acid $HBr(aq)$

sulfurous acid $H_2SO_3(aq)$

☆ chlorous acid $HClO_2(aq)$

boric acid $H_3BO_3(aq)$

hydrochloric acid $HCl(aq)$

phosphoric acid $H_3PO_4(aq)$

nitrous acid $HNO_2(aq)$

hydrofluoric acid $HF(aq)$

☆ perchloric acid $HClO_4(aq)$

hydroiodic acid $HI(aq)$

☆ phosphorous acid $H_3PO_3(aq)$

carbonic acid $H_2CO_3(aq)$

sulfuric acid $H_2SO_4(aq)$

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Part B – Write the name of each acid.

$HClO_4$ (aq) perchloric acid.

H_3PO_4 (aq) phosphoric acid. ✓

HCl (aq) hydrochloric acid

H_3BO_3 (aq) boric acid.

H_2SO_4 (aq) sulfuric acid.

HNO_2 (aq) nitrous acid.

HI (aq) hydroiodic acid.

CH_3COOH (aq) acetic acid

HF (aq) hydrofluric acid

H_3PO_3 (aq) phosphorous acid

HCN (aq) hydrocyanic acid

$HClO_3$ (aq) chloric acid

H_2CO_3 (aq) carbonic acid

H_2SO_3 (aq) sulfurous acid.

$HClO_2$ (aq) chlorous acid

HNO_3 (aq) nitric acid

HBr (aq) hydrobromic acid.

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