Gen Chem I (CHM 111) Fall 16 Dr. Hahn MW 8 am Quiz II Form Green 10/10 M Exam # _____

Name Key (BA = bad attempt) Print Name (NW = no work)

1. $BaCl_2 + 2\,AgNO_3 \rightarrow 2\,AgCl + Ba(NO_3)_2$

a. If 1.25 grams of the barium chloride reacts by the above reaction, what is the theoretical yield in grams of the silver chloride ? {FW($BaCl_2$) = 208.23 g/mol FW(AgCl) = 143.31 g/mol } (15 pts)

$1.25\text{ g } BaCl_2 \times \frac{1\text{ mol } BaCl_2}{208.23\text{ g } BaCl_2} \times \frac{2\text{ mol AgCl}}{1\text{ mol } BaCl_2} \times \frac{143.31\text{ g AgCl}}{1\text{ mol AgCl}} = 1.72\text{ g AgCl}$

(3pt) (3pt) (3pt) (3pt) (3pt)

RXN goes forward BA - 7 pts

b. Will the reaction go as shown ? Consult the solubility chart & explain. (5 pts)

AgCl is insoluble (exception to soluble Cl)

$Ba(NO_3)_2$ is soluble (no exceptions to soluble)

BA - 2½

c. If I have 2.55 moles of the barium nitrate , how many atoms of oxygen do I have ($N_A = 6.022 \times 10^{-23}$) ? (5 pts)

(1pt) (1pt)

$2.55\text{ mol } Ba(NO_3)_2 \times \frac{6\text{ mol O}}{1\text{ mol } Ba(NO_3)_2} \times \frac{6.022 \times 10^{23}\text{ atoms O}}{1\text{ mol O}} = 9.21 \times 10^{24}\text{ atoms O}$ (1pt)

BA -2½ (1pt)

2. Write the balanced ionic equation for the following. Note: to balance RXN you change coefficients NOT subscripts. (10 pts)

(+1) (-2) (+1) (-1)

$2\,LiOH + H_2SO_4 \rightarrow Li_2SO_4 + 2\,H{-}OH$

BA -5

3. What is the oxidation state of the following ? Either explain or show work. (15 pts, 5 pts per blank)

Sr zero - element

C in CO_2 +4

O = -2

C + 2(-2) = zero

C = +4

P in PO_4^{-3} +5

O = -2

P + 4(-2) = -3

P - 8 = -3

P = -3 + 8

P = +5

NW -2½ each

BA -2½ each

4. Extra Credit (10 pts) Given the combined gas law $\frac{P_2V_2}{P_1V_1} = \frac{T_2}{T_1}$

I have a gas N_2 at 772.1 torr, at 298 K in a closed area of volume 1.2 Liters. If the volume changes to 1.6 Liters and the temperature measures 278 K, what is the pressure in atmospheres ? (760 torr = 1 atm)

$P_1 = 772.1 \text{ torr} \times \frac{1 \text{ atm}}{760 \text{ torr}} = 1.016 \text{ atm}$

$T_1 = 298K$

$V_1 = 1.2 \ell$

$V_2 = 1.6 \ell$

$T_2 = 278K$

$P_2 = ?$

math -1pt

BA-5

$$\frac{(P_2)(1.6\ell)}{(1.016 \text{atm})(1.2\ell)} = \frac{(278K)}{(298K)}$$

$$P_2 = \frac{(278K)(1.016 \text{atm})(1.2\ell)}{(298K)(1.6\ell)}$$

$P_2 = 0.71 \text{ atm}$

Gen Chem I (CHM 111) Fall ~~16 Dr. Hahn~~ MW 8 am Quiz II Form White ~~10/10 M Exam #~~

Name Key (BA = bad attempt) Print Name (NW = no work)

1. $Na_2SO_4 + CaCl_2 \rightarrow 2\,NaCl + CaSO_4$ (BA = -1)

a. If 5.21 grams of sodium sulfate reacts by the above reaction, what is the theoretical yield in grams of the calcium sulfate ? { $FW(Na_2SO_4) = 142.07$ g/mol $FW(CaSO_4) = 136.15$ g/mol } (15 pts)

$$5.21\ g\ Na_2SO_4 \times \frac{1\ mol\ Na_2SO_4}{142.07\ g\ Na_2SO_4} \times \frac{1\ mol\ CaSO_4}{1\ mol\ Na_2SO_4} \times \frac{136.15\ g\ CaSO_4}{1\ mol\ CaSO_4} = 4.99\ g\ CaSO_4$$

(3 pt) (3 pt) (3 pt) (3 pt) (3 pt)

b. Will the reaction go as shown ? Consult the solubility chart & explain. (5 pts) (BA -2 ½)

NaCl is soluble (not exception to soluble ce)

$CaSO_4$ is insoluble (exception to soluble sulfates)

c. If I have 4.35 moles of the calcium sulfate , how many atoms of oxygen do I have ($N_A = 6.022 \times 10^{23}$) ? (5 pts)

$$4.35\ mol\ CaSO_4 \times \frac{4\ mol\ O\ per\ CaSO_4}{1\ mol\ CaSO_4} \times \frac{6.022 \times 10^{+23}\ atoms}{1\ mol} = 1.05 \times 10^{25}\ atoms\ O$$

(1 pt) (1 pt) (BA -2 ½) (1 pt) (1 pt)

2. Write the balanced ionic equation for the following. Note: to balance RXN you change coefficients NOT subscripts. (10 pts) (BA -5)

$Pb(NO_3)_2 + 2\,KCl \rightarrow PbCl_2 + 2\,KNO_3$

(+2) (-1) (+1) (-1)

3. What is the oxidation state of the ~~following~~ ? ~~Either explain or show~~ work. (15 pts, 5 pts per blank) (BA -2 ½) (NW -2 ½)

H_2 zero - element

S in SO_2 +4

O = -2

$S + 2(-2) = zero$

S = +4

C in CO_3^{-2} +4

O = -2

$C + 3(-2) = -2$

C - 6 = -2

C = -2 + 6 = +4

4. Extra Credit (10 pts) Given the ideal gas law $PV = n R T$

If I have 5.6 moles of a gas at 24.1 °C at 1.01 atm, what volume will the gas occupy ? (K = °C + 273.15)

$n = 5.6\ mol$

$T = 24.1\ ^\circ C + 273.15 = 297.25\ K$

$P = 1.01\ atm$ (with -1)

$V = ?$ (BA -5)

$$(1.01\ atm)\,V = (5.6\ mol)\left(0.08206\ \frac{l\ atm}{mol\ K}\right)(297.25\ K)$$

$$V = \frac{(5.6\ mol)\left(0.08206\ \frac{l\ atm}{mol\ K}\right)(297.25\ K)}{(1.01\ atm)}$$

$V = 135.24\ l$ 2 sig fig

$V = 1.4 \times 10^2\ l$

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c. If I have 2.55 moles of the barium nitrate , how many atoms of oxygen do I have ($N_A = 6.022 \times 10^{-23}$) ? (5 pts)

2. Write the balanced ionic equation for the following. Note: to balance RXN you change coefficients NOT subscripts. (10 pts)

$2\,Li\,OH + H_2\,SO_4 \rightarrow$ _____ + _____

3. What is the oxidation state of the following ? Either explain or show work. (15 pts, 5 pts per blank)

Sr _____

C in CO_2 _____

P in PO_4^{-3} _____

4. Extra Credit (10 pts) Given the combined gas law $\frac{P_2V_2}{P_1V_1} = \frac{T_2}{T_1}$

I have a gas N_2 at 772.1 torr, at 298 K in a closed area of volume 1.2 Liters. If the volume changes to 1.6 Liters and the temperature measures 278 K, what is the pressure in atmospheres ? (760 torr = 1 atm)

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b. Will the reaction go as shown ? Consult the solubility chart & explain. (5 pts)

c. If I have 4.35 moles of the calcium sulfate , how many atoms of oxygen do I have ($N_A = 6.022 \times 10^{23}$) ? (5 pts)

2. Write the balanced ionic equation for the following. Note: to balance RXN you change coefficients NOT subscripts. (10 pts)

$Pb(NO_3)_2 + 2\,KCl \rightarrow$ _____ + _____

3. What is the oxidation state of the following ? Either explain or show work. (15 pts, 5 pts per blank)

H_2 _____

S in SO_2 _____

C in CO_3^{-2} _____

4. Extra Credit (10 pts) Given the ideal gas law $PV = n R T$

If I have 5.6 moles of a gas at 24.1 °C at 1.01 atm, what volume will the gas occupy ? (K = °C + 273.15)