

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



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(BaCl₂) = 208.23 g/mol FW(AgCl) = 143.31 g/mol} (15 pts)

$$1.25g \text{ BaCl}_2 \times \frac{1 \text{ mol BaCl}_2}{208.23g \text{ BaCl}_2} \times \frac{2 \text{ mol AgCl}}{1 \text{ mol BaCl}_2} \times \frac{143.31g \text{ AgCl}}{1 \text{ mol AgCl}} = 1.72g \text{ AgCl}$$

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

Rxn goes forward (BA - 7 pt) (3pt)

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

AgCl is insoluble (exception to soluble Cl)

(BA - 2 1/2)

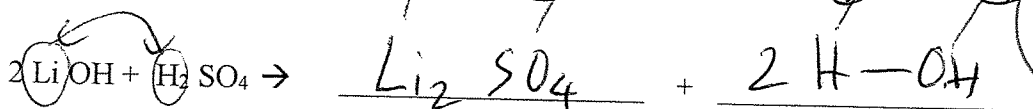
Ba(NO₃)₂ is soluble (no exceptions to soluble)

c. If I have 2.55 moles of the barium nitrate, how many atoms of oxygen do I have (N_A = 6.022 x 10⁻²³)? (5 pts)

$$2.55 \text{ mol Ba(NO}_3)_2 \times \frac{6 \text{ mol O}}{1 \text{ mol Ba(NO}_3)_2} \times \frac{6.022 \times 10^{23} \text{ atoms O}}{1 \text{ mol O}} = 9.21 \times 10^{24} \text{ atoms O}$$

(1pt) (1pt) (1pt) (1pt)

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



(+1) (-2) (+1) (-2) (BA - 5) (BA - 2 1/2) (1pt)

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

Sr zero-element

O = -2

C = +4

C + 2(-2) = zero

C in CO₂ +4

O = -2

P = -3 + 8

NW -2 1/2 rank

P in PO₄⁻³ +5

P + 4(-2) = -3

P = +5

(BA - 2 1/2) rank

P - 8 = -3

4. Extra Credit (10 pts) Given the combined gas law $\frac{P_2 V_2}{P_1 V_1} = \frac{T_2}{T_1}$

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)

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

$$T_1 = 298 \text{ K}$$

math - (1 pt)

$$V_1 = 1.2 \text{ l}$$

BA - 5

$$V_2 = 1.6 \text{ l}$$

$$T_2 = 278 \text{ K}$$

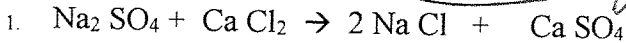
$$P_2 = ?$$

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

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

$$P_2 = 0.71 \text{ atm}$$

Name Key BA = bad attempt Print Name NW = now work



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)

$$5.21 \text{ g Na}_2\text{SO}_4 \times \frac{1 \text{ mol Na}_2\text{SO}_4}{142.07 \text{ g Na}_2\text{SO}_4} \times \frac{1 \text{ mol CaSO}_4}{1 \text{ mol Na}_2\text{SO}_4} \times \frac{136.15 \text{ g CaSO}_4}{1 \text{ mol CaSO}_4} = 4.99 \text{ g CaSO}_4$$

3 pt 3 pt 3 pt 3 pt 3 pt

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

NaCl is soluble (not exception to soluble Cl) BA - 2 1/2

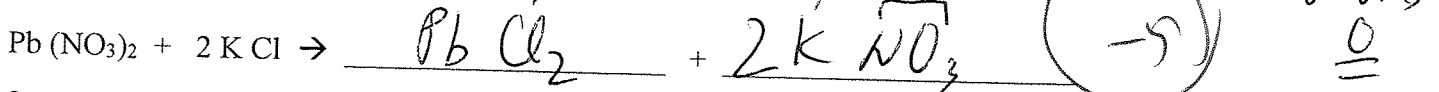
CaSO_4 is insoluble (exception to soluble sulfates)

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)

$$4.35 \text{ mol CaSO}_4 \times \frac{4 \text{ mol O per CaSO}_4}{1 \text{ mol CaSO}_4} \times \frac{6.022 \times 10^{23} \text{ atoms}}{1 \text{ mol O}} = 1.05 \times 10^{25} \text{ atoms}$$

1 pt 1 pt BA - 2 1/2 1 pt 1 pt 1 pt

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



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

H_2 zero - element BA - 2 1/2 NW - 2 1/2

S in SO_2 +4 $\text{O} = -2$ $\text{S} + 2(-2) = \text{zero}$ $\text{S} = +4$

C in CO_3^{2-} +4 $\text{O} = -2$ $\text{C} + 3(-2) = -2$ $\text{C} - 6 = -2$ $\text{C} = -2 + 6 = +4$

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

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

$$n = 5.6 \text{ mol}$$

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

$$P = 1.01 \text{ atm}$$

math - 1

$$V = ?$$

BA - 5

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

$$V = \frac{(5.6 \text{ mol}) (0.08206 \frac{\text{L atm}}{\text{mol K}}) (297.25 \text{ K})}{(1.01 \text{ atm})}$$

$$V = 135,24 \text{ L} \quad 2 \text{ sig fig}$$

$$V = 1.4 \times 10^2 \text{ L}$$

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Sr _____

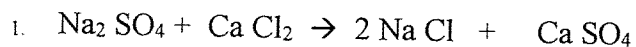
C in CO_2 _____

P in PO_4^{3-} _____

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Name _____ Print Name _____



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

H₂ _____

S in SO₂ _____

C in CO₃⁻² _____

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

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