

### AP Chem Quiz Ch 3 & 4, Version A

- $1 \text{ Al(OH)}_3(\text{s}) + 3 \text{ HClO}_4(\text{aq}) \rightarrow \text{Al(ClO}_4)_3(\text{aq}) + \text{H}_2\text{O}(\text{l})$
- $2 \text{ AgNO}_3(\text{aq}) + 1 \text{ Na}_2\text{SO}_4(\text{aq}) \rightarrow 1 \text{ Ag}_2\text{SO}_4(\text{s}) + 2 \text{ NaNO}_3(\text{aq})$   
 $2 \text{ Ag}^+(\text{aq}) + \text{SO}_4^{2-}(\text{aq}) \rightarrow \text{Ag}_2\text{SO}_4(\text{s})$
- $\% \text{ O} = \frac{4 * 16.00}{39.10 + 54.938 + 64.00} = \frac{64.00}{158.04} = 40.50\%$
- $\frac{4.850 \text{ g butane}}{58.123 \text{ g}} = 0.08413 \text{ mol butane}$   
 $\frac{15.92 \text{ g O}_2}{32.00 \text{ g}} = 0.4975 \text{ mol O}_2$   
O<sub>2</sub> is limiting reactant  
 $\frac{0.4975 \text{ mol O}_2 * 8 \text{ mole CO}_2 * 6.022 \times 10^{23}}{13 \text{ mol O}_2 * 1 \text{ mol}} = 1.844 \times 10^{23} \text{ atoms CO}_2$
- O<sub>2</sub> is the limiting reactant.  
 $\frac{0.4975 \text{ mol O}_2 * 2 \text{ mol butane} * 58.123 \text{ g}}{13 \text{ mole O}_2 * 1 \text{ mol}} = 4.449 \text{ g butane}$   
 $4.890 - 4.449 = 0.441 \text{ g excess butane}$
- $\frac{0.8044 \text{ g H}_2\text{O} * 1 \text{ mol H}_2\text{O} * 2 * 1.0079 \text{ g}}{18.02 \text{ g} * 1 * 1 \text{ mol H}} = 0.08998 \text{ g H}$   
 $\frac{1.789 \text{ g} * 1 \text{ mol} * 1 * 12.011 \text{ g}}{44.01 \text{ g} * 1 * 1 \text{ mol}} = 0.4882 \text{ g C}$   
C<sub>5</sub>H<sub>11</sub>O<sub>3</sub>
- $\frac{.350 \text{ L} * 1.20 \text{ mol CaCl}_2}{1 \text{ L}} = 1.420 \text{ mol CaCl}_2$   
 $\frac{1.420 \text{ mol CaCl}_2 * 1 \text{ L}}{1.70 \text{ mol}} = 0.247 \text{ L sol'n add to beaker and dilute with 103 ml D.I.}$
- Many answers. Strong electrolytes completely dissociate.

### AP Chem Quiz Ch 3 & 4, Version B

- $\text{Sr(NO}_3)_2(\text{aq}) + \text{Li}_2\text{SO}_4(\text{aq}) \rightarrow 2\text{LiNO}_3(\text{aq}) + \text{SrSO}_4(\text{s})$   
 $\text{Sr}^{2+}(\text{aq}) + \text{SO}_4^{2-}(\text{aq}) \rightarrow \text{SrSO}_4(\text{s})$
- $3\text{PbBr}_2(\text{s}) + 2(\text{NH}_4)_3\text{PO}_4(\text{aq}) \rightarrow \text{Pb}_3(\text{PO}_4)_2(\text{s}) + 6\text{NH}_4\text{Br}(\text{aq})$   
 $3\text{PbBr}_2(\text{s}) + 2\text{PO}_4^{3-}(\text{aq}) \rightarrow \text{Pb}_3(\text{PO}_4)_2(\text{s}) + 6\text{Br}^-(\text{aq})$
- $\% \text{ O} = \frac{4 * 16.00}{2 * 22.99 + 52.00 + 4 * 16.00} = \frac{64.00}{161.98} = 39.51\%$
- $\frac{4.890 \text{ g of propane}}{44.096 \text{ g}} = 0.1109 \text{ mol of propane}$

$$\frac{20.05 \text{ g of O}_2}{32 \text{ g}} = 0.6266 \text{ mol of O}_2$$

Therefore propane is the limiting reactant

$$\frac{0.1109 \text{ mol propane} * 4 \text{ mole H}_2\text{O} * 6.022 \times 10^{23}}{1 \text{ mol propane} * 1 \text{ mol H}_2\text{O}} = 2.671 \times 10^{23} \text{ atoms of H}_2\text{O}$$

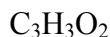
5. Propane is the limiting reactant.

$$\begin{array}{r} 20.05 \text{ g O}_2 \\ - 17.71 \text{ g reacted O}_2 \\ \hline 2.31 \text{ g O}_2 \text{ excess} \end{array}$$

6.  $2.030 \text{ g PG} - 0.2151 - 0.9612 = 0.8537 \text{ g O} = 0.05336 \text{ mol O} = 1$

$$\frac{1.923 \text{ g H}_2\text{O} \times 1 \text{ mol of H}_2\text{O} \times 2 \times 1.0079 \text{ g}}{18.02 \text{ g of H}_2\text{O}} = 0.2151 \text{ g of H} = \frac{0.2134 \text{ mol of H}}{0.05336 \text{ mol O}} = 3.999$$

$$\frac{3.522 \text{ g CO}_2 \times 1 \text{ mol of CO}_2 \times 1 \times 12.011 \text{ g}}{44.01 \text{ g of CO}_2} = 0.9612 \text{ g of C} = \frac{0.08003 \text{ mol of C}}{0.05336 \text{ mol O}} = 1.505$$



7.  $\frac{0.250 \text{ L} \times 0.200 \text{ mol}}{1 \text{ L}} = \frac{0.0500 \text{ mol} \times 1 \text{ L}}{2.60 \text{ mol}} = 0.0192 \text{ L sol'n}$  add to beaker and dilute with 231 ml D.I.

8. Many answers. Strong electrolytes completely dissociate.

### AP Chem Answer Key, Quiz: Ch 3 & 4, Version E

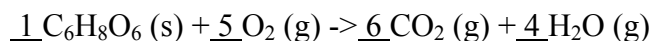
1.

a)

$$\begin{aligned} \% \text{ comp} &= (\text{grams O}) / (\text{grams C}_6\text{H}_8\text{O}_6) \\ &= (6 \times 16.00) / (6 \times 16.00 + 6 \times 12.011 + 8 \times 1.0079) \\ &= (96.00 / 176.1292) \times 100 \\ &= 54.51 \% \end{aligned}$$

**Ans** = 54.51 % O

b)



c)

$$\begin{aligned} &= (20.00 \text{ g asc acid} / 1) \times (1 \text{ mol asc acid} / 176.13 \text{ g}) \\ &= (0.1136 \text{ mol asc acid} / 1) \times (6 \text{ mol O}_2 / 1) \\ &= 0.6813 \text{ mol O}_2 \text{ required} \end{aligned}$$

$$\begin{aligned} &= (3.00 \text{ g O}_2 / 1) \times (1 \text{ mol} / 32.00 \text{ g}) \\ &= 0.0938 \text{ mol O}_2 \end{aligned}$$

**Ans** = Oxygen is the limiting reactant

d)

$$= (0.0938 \text{ mol O}_2 / 1) \times (1 \text{ mol asc acid} / 5 \text{ mol O}_2)$$

$$= 0.0156 \text{ mol asc required}$$

$$(0.1136 \text{ mol asc acid}) - (0.0156 \text{ mol asc acid}) = 0.0977 \text{ mol acid}$$

$$= (0.0977 \text{ mol asc acid}) \times (176.13 \text{ g} / 1 \text{ mol})$$

$$= 16.7 \text{ g}$$

**Ans** = 16.7g asc acid

e)

$$(0.0938 \text{ mol O}_2 / 1) \times (4 \text{ mol H}_2\text{O} / 5 \text{ mol O}_2) \times (18.02 \text{ g H}_2\text{O} / 1 \text{ mol H}_2\text{O}) \times 0.900$$

$$= 1.22$$

**Ans** = 1.22g H<sub>2</sub>O

2.

a)

$$M_1V_1 = M_2V_2$$

$$(0.100\text{M})(0.4000\text{L}) = (2.50\text{M})(V_2)$$

$$V_2 = 0.0160\text{L}$$

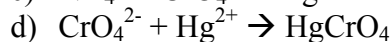
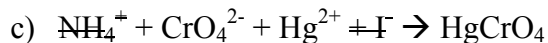
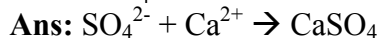
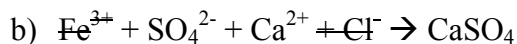
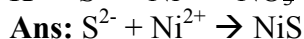
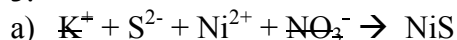
1) Add 16.0ml of 2.50M solution to a flask.

2) Dilute w/ distilled water to 400.0ml

3) Mix.

b) No. Mg(OH)<sub>2</sub> is negligibly soluble. No ions = non-electrolyte = no conductivity.

3.



### AP Chem Answer Key, Quiz: Ch 3 & 4, Version F

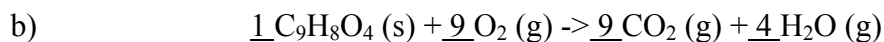
1.

a) % O = (grams O) / (grams C<sub>9</sub>H<sub>8</sub>O<sub>4</sub>)

$$= (6 \times 16.00) / (6 \times 16.00 + 9 \times 12.011 + 8 \times 1.0079)$$

$$= (64.00 / 180.1622) \times 100\%$$

**Ans** = 35.52 % O



c) = (20.00g asc acid / 1) X (1 mol asc acid / 180.16 g)

$$= (0.1110 \text{ mol asc acid} / 1) \times (9 \text{ mol O}_2 / 1 \text{ mol asc acid})$$

$$= 0.999 \text{ mol O}_2 \text{ required}$$

$$= (3.00\text{g O}_2 / 1) \times (1 \text{ mol O}_2 / 32.00 \text{ g O}_2)$$

$$= 0.0937 \text{ mol O}_2$$

**Ans** = oxygen

d) 
$$= (0.0937 \text{ mol O}_2 / 1) \times (1 \text{ mol asc acid} / 9 \text{ mol O}_2)$$

$$= 0.0104 \text{ mol asc required}$$

$$(0.1110 \text{ mol asc acid}) - (0.0104 \text{ mol asc acid}) = 0.01006 \text{ mol acid}$$

$$= (0.1006 \text{ mol asc acid excess}) \times (180.16\text{g} / 1 \text{ mol})$$

$$= 18.12 \text{ g}$$

**Ans** = 18.12 g asc acid

e) 
$$(0.0937 \text{ mol O}_2 / 1) \times (9 \text{ mol CO}_2 / 9 \text{ mol O}_2) \times (44.011 \text{ g CO}_2 / 1 \text{ mol CO}_2) \times 0.60$$

$$= 2.48 \text{ g}$$

**Ans** = 2.48 g H<sub>2</sub>O

2.

a)

$$M_1V_1 = M_2V_2$$

$$(0.200\text{M})(0.3000\text{L}) = (2.00\text{M})(V_2)$$

$$V_2 = 0.0300\text{L}$$

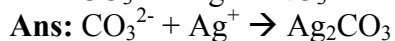
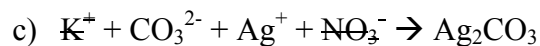
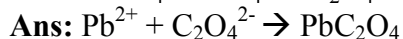
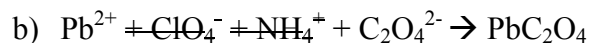
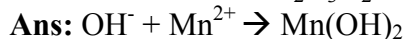
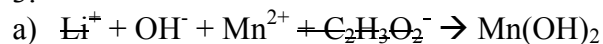
1) Add 30.0ml of 2.00M solution to a flask.

2) Dilute to 400.0mL w/ distilled water.

3) Mix.

b) Slightly. H<sub>3</sub>PO<sub>4</sub> is a weak acid = weak electrolyte since partially dissociated.

3.



Special thanks to Jennifer Zhou (Class of 08), Johnny Li ('07), David Guan ('07), Jessica Warner ('07), and Sowmya Arya ('07) for typing this. If you find any errors, please let me know.