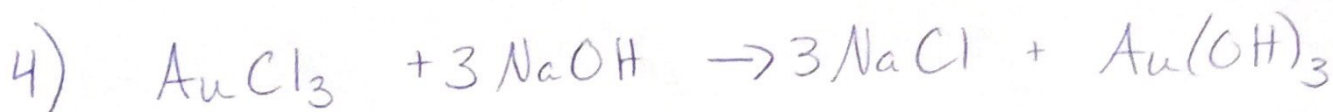
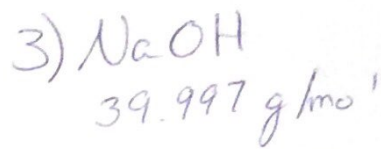
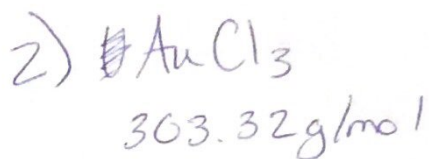
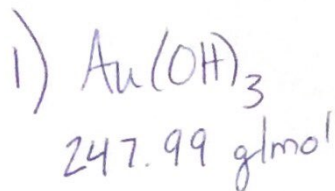


Gold Case Study Answer Key

Au = 196.97
Cl = 35.45



5)
$$\frac{280 \text{ g AuCl}_3}{303.32 \text{ g AuCl}_3} \times \frac{1 \text{ mol AuCl}_3}{1 \text{ mol AuCl}_3} \times \frac{1 \text{ mol Au}(\text{OH})_3}{1 \text{ mol Au}(\text{OH})_3} \times 247.99 \text{ g Au}(\text{OH})_3 = 229 \text{ g Au}(\text{OH})_3$$

$$\frac{12 \text{ g NaOH}}{39.997 \text{ g NaOH}} \times \frac{1 \text{ mol NaOH}}{3 \text{ mol NaOH}} \times \frac{1 \text{ mol Au}(\text{OH})_3}{1 \text{ mol Au}(\text{OH})_3} \times 247.99 \text{ g Au}(\text{OH})_3 = 24.8 \text{ g Au}(\text{OH})_3$$

NaOH is the limiting reactant because it makes less $\text{Au}(\text{OH})_3$. You (John) could only make $24.8 \text{ g Au}(\text{OH})_3$.

6)
$$\% \text{ yield} = \frac{\text{act.}}{\text{theo.}} \times 100$$

$$= \frac{24 \leftarrow \text{from story}}{24.8} \times 100 = \boxed{96.8\%}$$

$$7) \frac{2800 \text{ g AuCl}_3}{303.32 \text{ g AuCl}_3} \times \frac{1 \text{ mol AuCl}_3}{1 \text{ mol AuCl}_3} \times \frac{1 \text{ mol Au(OH)}_3}{1 \text{ mol Au(OH)}_3} \times 247.99 \text{ g} = 2289 \text{ g Au(OH)}_3$$

$$\frac{120 \text{ g NaOH}}{39.997 \text{ g NaOH}} \times \frac{1 \text{ mol NaOH}}{3 \text{ mol NaOH}} \times \frac{1 \text{ mol NaOH}}{1 \text{ mol Au(OH)}_3} \times 247.99 \text{ g} = 248 \text{ g Au(OH)}_3$$

NaOH = limiting reactant

248 g Au(OH)₃ can be made

8) Excess = AuCl₃

$$\frac{12 \text{ g NaOH}}{39.997 \text{ g NaOH}} \times \frac{1 \text{ mol NaOH}}{3 \text{ mol NaOH}} \times \frac{1 \text{ mol AuCl}_3}{1 \text{ mol AuCl}_3} \times 303.32 \text{ g AuCl}_3$$

$$= 30.3 \text{ g AuCl}_3$$

what he used
↓

how much is needed
↗

$$280 \text{ g} - 30.3 = \boxed{249.7 \text{ g AuCl}_3 \text{ extra!!!!}}$$

9) Excess = AuCl₃

120 g NaOH ⇒ 303 g AuCl₃ needed

$$2800 \text{ g (used)} - 303 \text{ g (needed)} = \boxed{2497 \text{ g AuCl}_3 \text{ extra!}}$$

10) 5 batches a week

x 5 weeks

25 batches of 2nd reaction
+ 1 batch of 1st reaction



$$\begin{array}{r} 25 \times 249.7 \text{ g AuCl}_3 \\ + 1 \times 249.7 \text{ g AuCl}_3 \\ \hline \boxed{62674.7 \text{ g AuCl}_3} \end{array}$$

11) Down the drain!

$$12) a) \% = \frac{\text{Au}}{\text{AuCl}_3} \times 100 = \frac{196.97}{303.32} \times 100 = 64.9 \% \text{ Au}$$

$$b) 62674.7 \text{ g AuCl}_3 \cdot 0.649 = 40,676 \text{ g Au}$$

$$c) 40,676 \text{ g Au} \times \$43.61/\text{g} = \$1,773,875.14$$

$$13) \$1,773,875.14 \times 0.05 = \boxed{\$88,693.76} \text{ Lost!!}$$

(5%)

$$14) \frac{200 \text{ g Au(OH)}_3}{247.99 \text{ g Au(OH)}_3} \cdot \frac{1 \text{ mol Au(OH)}_3}{1 \text{ mol Au(OH)}_3} \cdot \frac{1 \text{ mol AuCl}_3}{1 \text{ mol Au(OH)}_3} \cdot \frac{303.32 \text{ g}}{1 \text{ mol AuCl}_3} = \boxed{244.6 \text{ g AuCl}_3}$$

15) FIRED!!!