

## Challenge Problem

An original sample is a mixture of KCl and 22.9% KBr. When 0.1024 grams of the sample is dissolved in water and reacted with excess silver nitrate, 0.1889 grams of solid (a mixture of silver chloride and silver bromide) is produced. What is the composition of the product mixture in grams for each substance?

# Problem Solving Template

Analyze

Question: (what are you trying to find out?)

How many g of each  $\text{AgBr}$  &  $\text{AgCl}$  are in the product?

1A

Known: (what information does the problem give you?)

reactants - 0.1024g mix  $\text{KCl}$  & 22.9%  $\text{KBr}$  w/ Excess  $\text{AgNO}_3$

products - 0.1889g mix  $\text{AgCl}$  &  $\text{AgBr}$

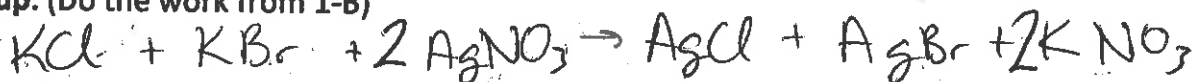
What do you need to do to solve the problem? (break it down into parts)

1B

- Molar masses - Balanced Eqn.
- g  $\text{KBr}$   $\rightarrow$  g  $\text{AgBr}$   $\rightarrow$  g  $\text{AgCl}$
- check w/ %  $\text{KCl}$   $\rightarrow$  g  $\text{KCl}$   $\rightarrow$  g  $\text{AgCl}$  ~~#~~

Set up: (Do the work from 1-B)

2A



$$\text{KBr} = 119.0023 \text{ g/mol} \quad \text{AgBr} = 187.7722 \text{ g/mol}$$

$$(0.229)(0.1024 \text{ g}) = 0.0235 \text{ g KBr}$$

$$0.0235 \text{ g KBr} \left( \frac{1 \text{ mol KBr}}{119.0023 \text{ g}} \right) \left( \frac{1 \text{ mol AgBr}}{1 \text{ mol KBr}} \right) (187.7722 \text{ g/mol}) = 0.0371 \text{ g AgBr}$$

$$0.1889 \text{ g mix} - 0.0371 \text{ g AgBr} = 0.1518 \text{ g AgCl}$$

∴ product mix contains  $\begin{matrix} 0.0371 \text{ g AgBr} \\ 0.1518 \text{ g AgCl} \end{matrix}$

$$\sqrt{100 - 22.9 = 77.1\% \text{ KCl}} \quad (0.771)(0.1024 \text{ g}) = 0.07895 \text{ g KCl}$$

$$0.07895 \text{ g KCl} \left( \frac{1 \text{ mol KCl}}{74.55 \text{ g}} \right) \left( \frac{1 \text{ mol AgCl}}{1 \text{ mol KCl}} \right) (143.32 \text{ g/mol}) = 0.152 \text{ g AgCl}$$

2B

Answer the question: (Use the info from above to solve the problem)



3

Does your answer make sense?



Calculate

Evaluate