

Complex K_{sp} problem - determine mass of ppte formed.

400 mL of $0.0001\text{ M Ba(NO}_3)_2$ is mixed with

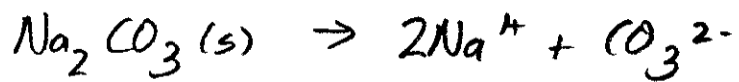
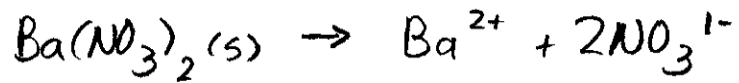
500 mL of $0.0003\text{ M Na}_2\text{CO}_3$. What mass of ppte

forms in mg?

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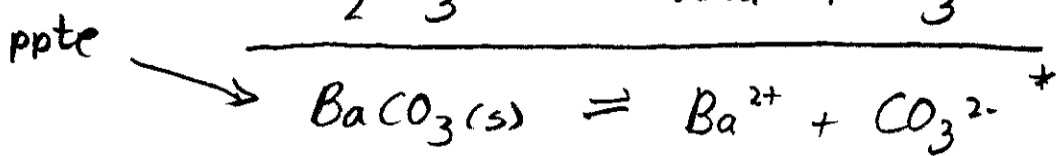
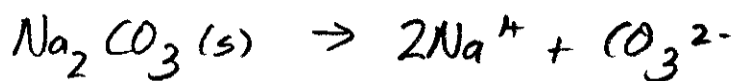
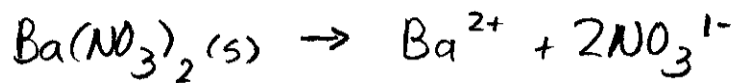
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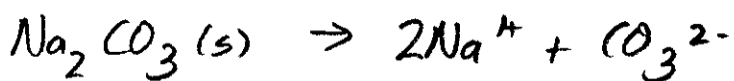
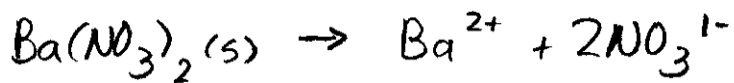
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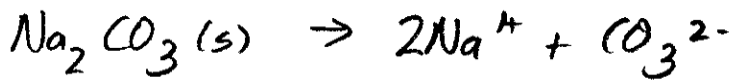
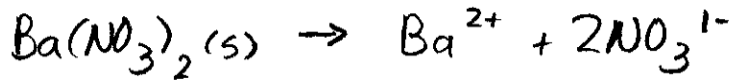
ppte →

	$\text{BaCO}_3(s)$	Ba^{2+}	CO_3^{2-}
Initial []			
Initial amount			
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400 mL + 500 mL = 900 mL
 Total Volume: 0.9 L

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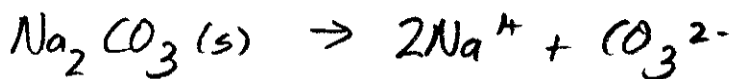
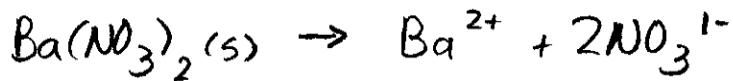
ppte → $\text{BaCO}_3(s) \rightleftharpoons \text{Ba}^{2+} + \text{CO}_3^{2-}$

Initial []	N.A.	/	/
Initial amount	0	$n = CV$ $n = 0.0001\text{M} \times 0.4\text{L}$ $n = 4 \times 10^{-5}\text{mol}$	$n = CV$ $n = 0.0003\text{M} \times 0.5\text{L}$ $n = 1.5 \times 10^{-4}\text{mol}$
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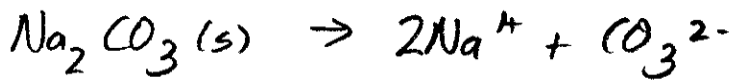
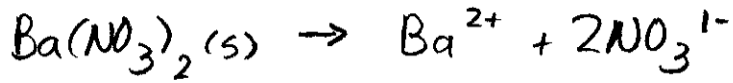
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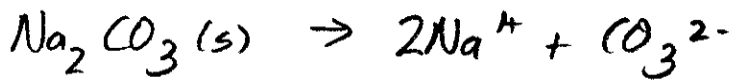
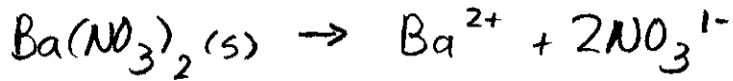
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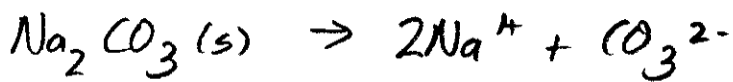
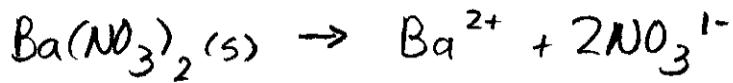
$$K_{sp} = [Ba^{2+}][CO_3^{2-}]$$

$$4.9 \times 10^{-9} = \left(\frac{4 \times 10^{-5} - x}{0.9} \right) \left(\frac{1.5 \times 10^{-4} - x}{0.9} \right)$$

(from table)

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"quadratic"
 \Rightarrow

~~extraneous~~

$$x = 1.78 \times 10^{-4} \text{ mol}$$

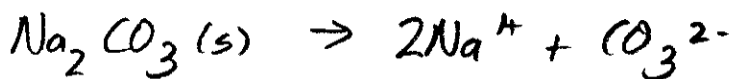
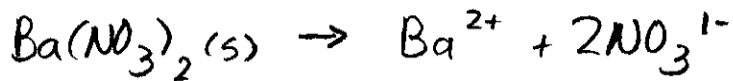
(too big)

or

$$x = 1.137 \times 10^{-5} \text{ mol}$$

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 $x = 1.78 \times 10^{-4}\text{mol}$
 (too big)
 or
 $x = 1.137 \times 10^{-5}\text{mol}$

$$1.137 \times 10^{-5}\text{mol BaCO}_3 \times \frac{197.34\text{g BaCO}_3}{1\text{mol BaCO}_3} \times \frac{1000\text{mg}}{1\text{g}} = 2.244\text{mg BaCO}_3$$