Chemistry 20 - Unit 4 - Introduction to Stoichiometry
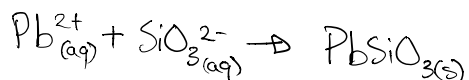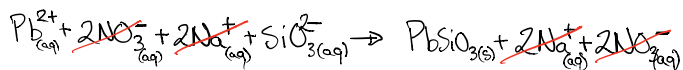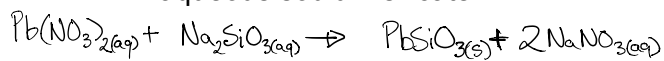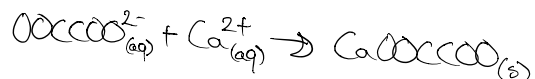
Name: _____

1) An acceptable method for the treatment of soluble lead waste is to precipitate the lead as a low solubility lead(II) silicate.
   a) Write the net ionic equation for the reaction of aqueous lead(II) nitrate and aqueous sodium silicate.

$$Pb(NO_3)_{2(aq)} + Na_2SiO_{3(aq)} \rightarrow PbSiO_{3(s)} + 2NaNO_{3(aq)}$$

$$Pb^{2+}_{(aq)} + 2NO^-_{3(aq)} + 2Na^+_{(aq)} + SiO^{2-}_{3(aq)} \rightarrow PbSiO_{3(s)} + 2Na^+_{(aq)} + 2NO^-_{3(aq)}$$

$$Pb^{2+}_{(aq)} + SiO^{2-}_{3(aq)} \rightarrow PbSiO_{3(s)}$$

   b) What can we assume about the ambient conditions and the container that likely could be used?

Probably normal SATP.
Container does not react

   c) Identify the spectator ions in this reaction.

$$Na^+_{(aq)} \text{ and } NO^-_{3(aq)}$$

2) In a hard water analysis, sodium oxalate solution reacts with calcium hydrogen carbonate present in the hard water to precipitate a calcium compound. Write the net ionic equation for this reaction.

$$Na_2OOCCOO_{(aq)} + Ca(HCO_3)_{2(aq)} \rightarrow CaOOCCOO_{(s)} + 2NaHCO_{3(aq)}$$

$$2Na^+_{(aq)} + OOCCOO^{2-}_{(aq)} + Ca^{2+}_{(aq)} + 2HCO_{3(aq)} \rightarrow CaOOCCOO_{(s)} + 2Na^+_{(aq)} + 2HCO_{3(aq)}$$

$$OOCCOO^{2-}_{(aq)} + Ca^{2+}_{(aq)} \rightarrow CaOOCCOO_{(s)}$$

3) Write a net ionic equation for the reaction of vinegar (acetic acid solution) with a scale deposit in a kettle (assume solid calcium hydroxide).

$$2CH_3COOH_{(aq)} + Ca(OH)_{2(s)} \rightarrow Ca(CH_3COO)_{2(aq)} + 2HOH_{(l)}$$

$$2CH_3COOH_{(aq)} + Ca(OH)_{2(s)} \rightarrow Ca^{2+}_{(aq)} + 2CH_3COO^-_{(aq)} + 2H_2O_{(l)}$$
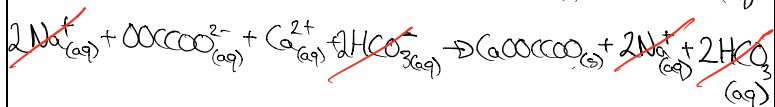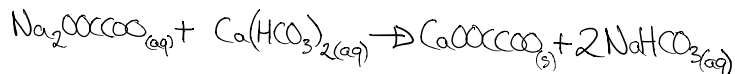
weak acids can't dissociate quantitatively.

This is a nuetralization reaction.

4) Bromine is a disinfectant commonly used in swimming pools. One industrial method of producing bromine is to react sea water, containing sodium bromide, with chlorine gas. Write the net ionic equation for this reaction.

$$2NaBr_{(aq)} + Cl_{2(g)} \rightarrow 2NaCl_{(aq)} + Br_{2(g)}$$

$$2Na^+_{(aq)} + 2Br^-_{(aq)} + Cl_{2(g)} \rightarrow 2Na^+_{(aq)} + 2Cl^-_{(aq)} + Br_{2(g)}$$

$$2Br^-_{(aq)} + Cl_{2(g)} \rightarrow 2Cl^-_{(aq)} + Br_{2(g)}$$

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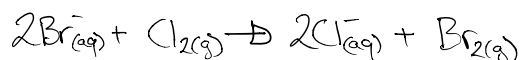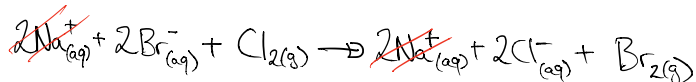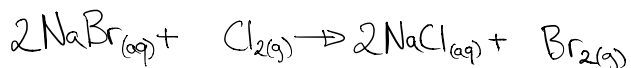
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