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Phase diagram from barium-arsenate precipitation in the absence and presence of polyelectrolyte

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The phases produced from precipitation of aqueous sodium hydrogen arsenate with barium chloride solution were studied both in the absence and presence of poly(diallyldimethyl ammonium chloride). Barium to arsenate molar ratios of 1:2, 1:1, 3:2, 2:1, 5:2, and 3:1 and pH from 2.0-13.5 in steps of 0.5 pH units were used. White precipitates were obtained for pH 5.5 and higher for every molar ratio in both the absence and presence of polyelectrolyte. Pure $BaHAsO_4 \cdot H_2O$, $Ba_5Cl(AsO_4)_3$, and $NaBaAsO_4 \cdot 9H_2O$ phases and mixed phases of $BaHAsO_4 \cdot H_2O/NaBaAsO_4 \cdot 9H_2O$, $BaHAsO_4 \cdot H_2O/Ba_5Cl(AsO_4)_3$ and $Ba_5Cl(AsO_4)_3/NaBaAsO_4 \cdot 9H_2O$ were identified by powder x-ray diffraction. Energy dispersive x-ray fluorescence confirmed the presence of Ba, As, Cl, and Na consistent with the phase assignments. Fourier transform infrared spectroscopy showed the arsenate bands, and where indicated, water bands.

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