

Chemistry 192
Quiz Number 1
Spring 2018
Solution

$$R = 8.3144 \text{ J mol}^{-1} \text{ K}^{-1}$$

$$R = 0.0821 \text{ L atm mol}^{-1} \text{ K}^{-1}$$

$$R = 0.08314 \text{ L bar mol}^{-1} \text{ K}^{-1}$$

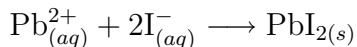
$$N_A = 6.022 \times 10^{23} \text{ molecules mol}^{-1}$$

$$T = t + 273.15$$

Name:

Given that lead nitrate $[\text{Pb}(\text{NO}_3)_2]$ and sodium iodide $[\text{NaI}]$ are both highly soluble in water whereas lead iodide $[\text{PbI}_2]$ is highly insoluble, calculate the mass of lead iodide that forms when 0.025 L of a 3.28 M lead nitrate solution are mixed with 0.75 L of a 2.27 M sodium iodide solution. Additionally, calculate the final concentration of iodide ions in the mixture after the lead iodide precipitates.

Answer:



$$n_{\text{Pb}^{2+}} = (3.28 \text{ mol L}^{-1})(0.025 \text{ L}) = 0.082 \text{ mol}$$

$$n_{\text{I}^{-}} = (2.27 \text{ mol L}^{-1})(0.75 \text{ L}) = 1.7 \text{ mol}$$

The limiting reagent is the lead ions, so that

$$n_{\text{PbI}_2} = 0.082 \text{ mol} \quad m_{\text{PbI}_2} = (0.082 \text{ mol}) (207.2 \text{ g mol}^{-1} + 2(126.9) \text{ g mol}^{-1}) = 38. \text{ g}$$

After the precipitate forms

$$n_{\text{I}^{-}} = 1.7 \text{ mol} - 2(0.082 \text{ mol}) = 1.6 \text{ mol}$$

$$[\text{I}^{-}] = \frac{1.6 \text{ mol}}{0.75 \text{ L} + 0.025 \text{ L}} = 2.0 \text{ M}$$

Name:

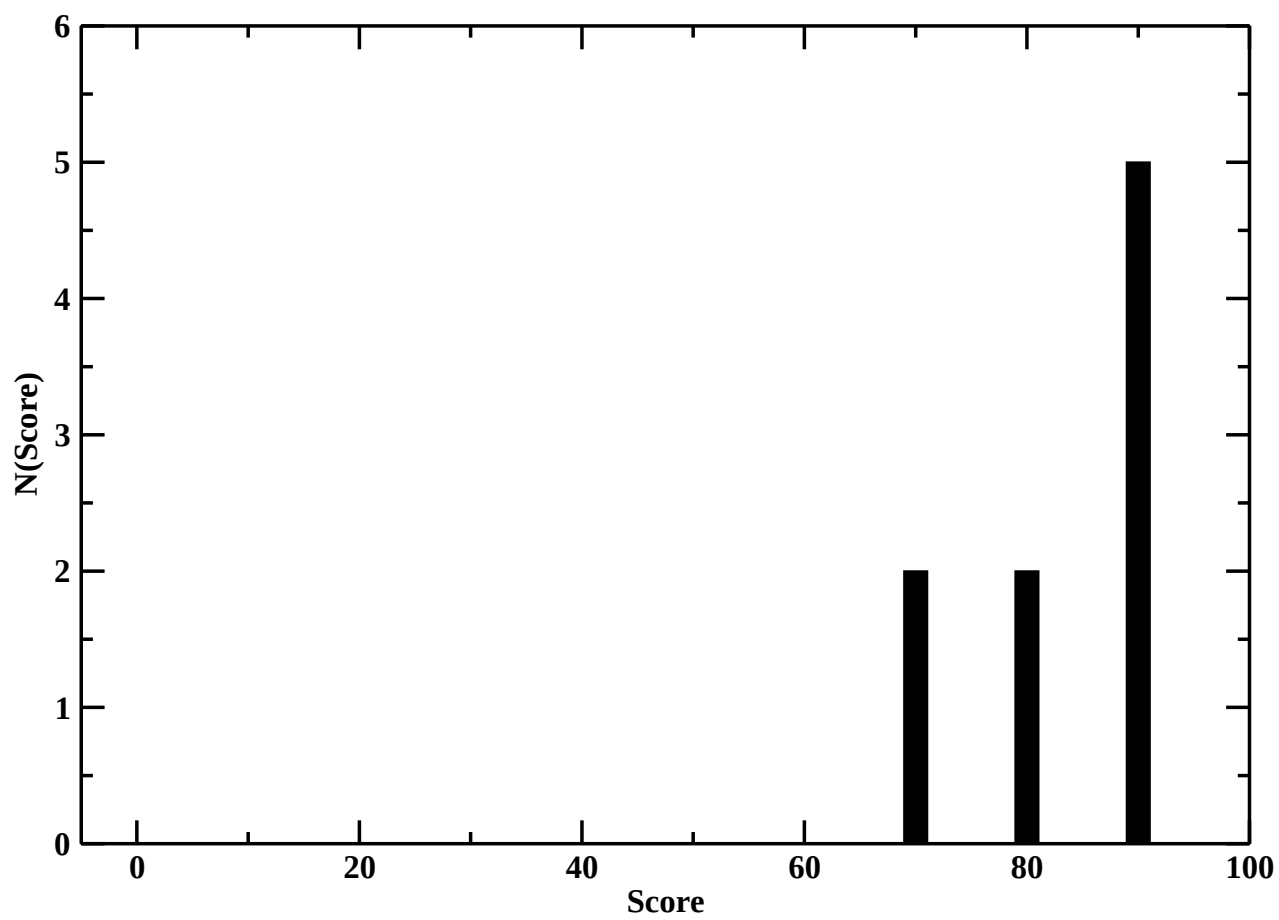


Figure 1: **High** = 100, **Median** = 97, **Mean** = 90