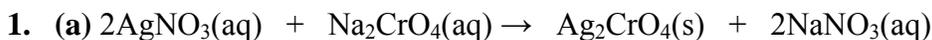


Limiting Reactant in Solution and Gas Stoichiometry Answer Key

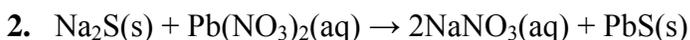


$$0.0500 \text{ L AgNO}_3 \times 0.100 \frac{\text{mol}}{\text{L}} \text{AgNO}_3 \times \frac{1 \text{ mol Ag}_2\text{CrO}_4}{2 \text{ mol AgNO}_3} = 0.00250 \text{ mol Ag}_2\text{CrO}_4(\text{s})$$

$$0.0250 \text{ L Na}_2\text{CrO}_4 \times 0.150 \frac{\text{mol}}{\text{L}} \text{Na}_2\text{CrO}_4 \times \frac{1 \text{ mol Ag}_2\text{CrO}_4}{1 \text{ mol Na}_2\text{CrO}_4} = 0.00375 \text{ mol Ag}_2\text{CrO}_4(\text{s})$$

Silver nitrate is limiting.

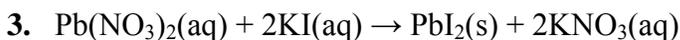
$$(b) 0.00250 \text{ mol Ag}_2\text{CrO}_4 \times 331.74 \frac{\text{g}}{\text{mol}} \text{Ag}_2\text{CrO}_4 = 0.829 \text{ g Ag}_2\text{CrO}_4(\text{s})$$



$$8.76 \text{ g Na}_2\text{S} \times \frac{\text{mol}}{78.05 \text{ g}} \text{Na}_2\text{S} \times \frac{1 \text{ mol PbS}}{1 \text{ mol Na}_2\text{S}} = 0.112 \text{ mol PbS}(\text{s})$$

$$0.350 \text{ L Pb}(\text{NO}_3)_2 \times 0.250 \frac{\text{mol}}{\text{L}} \text{Pb}(\text{NO}_3)_2 \times \frac{1 \text{ mol PbS}}{1 \text{ mol Pb}(\text{NO}_3)_2} = 0.0875 \text{ mol PbS}(\text{s})$$

Lead(II) nitrate is limiting.



$$0.0250 \text{ L Pb}(\text{NO}_3)_2 \times 0.400 \frac{\text{mol}}{\text{L}} \text{Pb}(\text{NO}_3)_2 \times \frac{1 \text{ mol PbI}_2}{1 \text{ mol Pb}(\text{NO}_3)_2} = 0.0100 \text{ mol PbI}_2(\text{s})$$

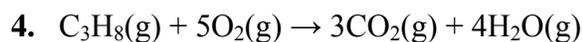
$$0.300 \text{ L KI} \times 0.220 \frac{\text{mol}}{\text{L}} \text{KI} \times \frac{1 \text{ mol PbI}_2}{2 \text{ mol KI}} = 0.033 \text{ mol PbI}_2(\text{s})$$

Lead(II) nitrate is limiting.

$$0.0100 \text{ mol PbI}_2 \times 461.00 \frac{\text{g}}{\text{mol}} \text{PbI}_2 = 4.61 \text{ g PbI}_2(\text{s})$$

The maximum mass of lead(II) iodide that can form is 4.61 g.

Limiting Reactant in Solution and Gas Stoichiometry Answer Key (continued)



$$PV = nRT$$

$$n = \frac{PV}{RT}$$

$$n_{\text{C}_3\text{H}_8} = \frac{(101.325 \text{ kPa})(3.7 \text{ L})}{\left(8.314 \frac{\text{kPa}\cdot\text{L}}{\text{mol}\cdot\text{K}}\right)(273.15 \text{ K})}$$

$$n_{\text{C}_3\text{H}_8} = 0.17 \text{ mol}$$

$$0.17 \text{ mol C}_3\text{H}_8 \times \frac{3 \text{ mol CO}_2}{1 \text{ mol C}_3\text{H}_8} = 0.51 \text{ mol CO}_2(\text{g})$$

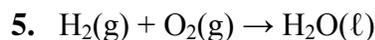
$$n = \frac{PV}{RT}$$

$$n_{\text{O}_2} = \frac{(101.325 \text{ kPa})(11.2 \text{ L})}{\left(8.314 \frac{\text{kPa}\cdot\text{L}}{\text{mol}\cdot\text{K}}\right)(273.15 \text{ K})}$$

$$n_{\text{O}_2} = 0.500 \text{ mol}$$

$$0.500 \text{ mol O}_2 \times \frac{1 \text{ mol C}_3\text{H}_8}{5 \text{ mol O}_2} = 0.100 \text{ mol C}_3\text{H}_8(\text{g})$$

Oxygen is the limiting reactant.



$$n = \frac{PV}{RT}$$

$$n_{\text{H}_2\text{O}} = \frac{(102.5 \text{ kPa})(2.00 \text{ L})}{\left(8.314 \frac{\text{kPa}\cdot\text{L}}{\text{mol}\cdot\text{K}}\right)(295.15 \text{ K})}$$

$$n_{\text{H}_2\text{O}} = 0.0835 \text{ mol}$$

$$0.0835 \text{ mol H}_2\text{O} \times 18.02 \frac{\text{g}}{\text{mol}} = 1.50 \text{ g H}_2\text{O}$$

The quantity of liquid water expected is 1.50 g.