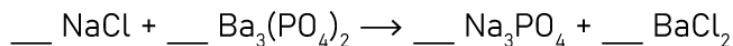


Name : \_\_\_\_\_ Date : \_\_\_\_\_

# Limiting Reactant Worksheet

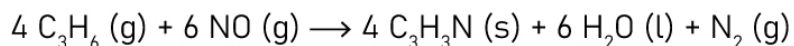
- 1 Balance the following reaction:



- a Suppose 100 grams of sodium chloride reacts with 200 g of barium phosphate. What is the limiting reactant?

- b How many grams of excess reactant are left?

- 2 Acrylonitrile ( $\text{C}_3\text{H}_3\text{N}$ ) is the starting material for the production of a kind of synthetic fiber acrylic. It can be made from propylene ( $\text{C}_3\text{H}_6$ ) by reacting with nitric oxide (NO) as follows:

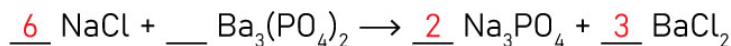


What mass of  $\text{C}_3\text{H}_3\text{N}$  can be made when 21.6 g of propylene react with 21.6 g of nitric oxide?

# Limiting Reactant Worksheet

## Answers

1 Balance the following reaction:



a Suppose 100 grams of sodium chloride reacts with 200 g of barium phosphate. What is the limiting reactant?

$$100 \text{ g NaCl} \times \frac{1 \text{ mol NaCl}}{58.443 \text{ g NaCl}} \times \frac{3 \text{ mol BaCl}_2}{6 \text{ mol NaCl}} \times \frac{208.236 \text{ g BaCl}_2}{1 \text{ mol BaCl}_2} = 178.1 \text{ g BaCl}_2$$

$$200 \text{ g Ba}_3(\text{PO}_4)_2 \times \frac{1 \text{ mol Ba}_3(\text{PO}_4)_2}{601.938 \text{ g Ba}_3(\text{PO}_4)_2} \times \frac{3 \text{ mol BaCl}_2}{1 \text{ mol Ba}_3(\text{PO}_4)_2} \times \frac{208.236 \text{ g BaCl}_2}{1 \text{ mol BaCl}_2} = 207.5 \text{ g BaCl}_2$$

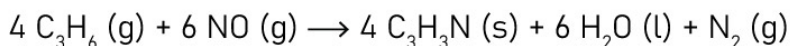
NaCl is the limiting reactant.

b How many grams of excess reactant are left?

$$100 \text{ g NaCl} \times \frac{1 \text{ mol NaCl}}{58.443 \text{ g NaCl}} \times \frac{1 \text{ mol Ba}_3(\text{PO}_4)_2}{6 \text{ mol NaCl}} \times \frac{601.938 \text{ g Ba}_3(\text{PO}_4)_2}{1 \text{ mol Ba}_3(\text{PO}_4)_2} = 171.7 \text{ g Ba}_3(\text{PO}_4)_2 \text{ used}$$

$$200 \text{ g Ba}_3(\text{PO}_4)_2 - 171.7 \text{ g Ba}_3(\text{PO}_4)_2 = 28.3 \text{ g Ba}_3(\text{PO}_4)_2 \text{ remain}$$

2 Acrylonitrile ( $\text{C}_3\text{H}_3\text{N}$ ) is the starting material for the production of a kind of synthetic fiber acrylic. It can be made from propylene ( $\text{C}_3\text{H}_6$ ) by reacting with nitric oxide (NO) as follows:



What mass of  $\text{C}_3\text{H}_3\text{N}$  can be made when 21.6 g of propylene react with 21.6 g of nitric oxide?

$$21.6 \text{ g C}_3\text{H}_6 \times \frac{1 \text{ mol C}_3\text{H}_6}{42.09 \text{ g C}_3\text{H}_6} \times \frac{4 \text{ mol C}_3\text{H}_3\text{N}}{4 \text{ mol C}_3\text{H}_6} \times \frac{53.07 \text{ g C}_3\text{H}_3\text{N}}{1 \text{ mol C}_3\text{H}_3\text{N}} = 27.2 \text{ g C}_3\text{H}_3\text{N}$$

$$21.6 \text{ g NO} \times \frac{1 \text{ mol NO}}{30.01 \text{ g NO}} \times \frac{4 \text{ mol C}_3\text{H}_3\text{N}}{6 \text{ mol NO}} \times \frac{53.07 \text{ g C}_3\text{H}_3\text{N}}{1 \text{ mol C}_3\text{H}_3\text{N}} = 25.5 \text{ g C}_3\text{H}_3\text{N}$$

The answer is the one with the smallest amount of the product. Hence, 25.5 g of  $\text{C}_3\text{H}_3\text{N}$  is produced.