Determining Mole Ratios Worksheet

Here is a balanced chemical reaction.

$$3Cu + 8HNO_3 \rightarrow 3Cu(NO_3)_2 + 2NO + 4H_2O$$

With regards to it, answer the following questions.

a) How many moles of HNO_3 are used to produce 1 mole of H_2O?

b) How many moles of NO are produced by 1.5 moles of Cu?

c) How many moles of $Cu(NO_3)_2$ are produced by 4.50 moles of HNO_3?

d) How many moles of $Cu(NO_3)_2$ are produced alongside 0.2 moles of NO?

e) How many moles of Cu were needed to produce 9 g of water?

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Answers

Here is a balanced chemical reaction.

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With regards to it, answer the following questions.

a) How many moles of HNO_3 are used to produce 1 mole of H_2O?

8 moles of HNO_3 produce 4 moles of H_2O

Number of moles of HNO_3 needed to produce 1 mole of H_2O = (8/4) x 1 moles = 2 moles

b) How many moles of NO are produced by 1.5 moles of Cu?

3 moles of Cu produce 2 moles of NO

Number of moles of NO produced by 1.5 moles of Cu = (2/3) x 1.5 moles = 1 mole

c) How many moles of $Cu(NO_3)_2$ are produced by 4.50 moles of HNO_3?

3 moles of $Cu(NO_3)_2$ are produced by 8 moles of HNO_3

4.5 moles of HNO_3 produce = (8/3) x 4.5 moles = 12 moles

d) How many moles of $Cu(NO_3)_2$ are produced alongside 0.2 moles of NO?

3 moles of $Cu(NO_3)_2$ are produced alongside 2 moles of NO

Number of moles of $Cu(NO_3)_2$ produced alongside 0.2 moles of NO = (3/2) x 0.2 = 0.3 moles

e) How many moles of Cu were needed to produce 9 g of water?

Molar mass of water = 18 g/mol

1 mole of H_2O weighs 18 g

In this reaction, 4 moles, i.e., 72 g of water, are produced by 3 moles of Cu

So 9 g of water are produced by 0.375 moles of Cu