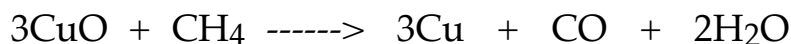# Problems for Using Moles in Equations

In the reaction between copper(II) oxide and methane there are several products: copper, carbon monoxide, and water.

$$3CuO + CH_4 \longrightarrow 3Cu + CO + 2H_2O$$

The above reaction can be read as the following: 3 moles of CuO will react with 1 mole of CH_4 to produce 3 moles of Cu, 1 mole of CO, and 2 moles of H_2O.

Based on the above reaction answer the following questions:

1) What is the ratio between the moles of copper(II) oxide used and the moles of methane (CH_4) used?
2) What is the ratio between the moles of methane used and the moles of carbon monoxide (CO) produced?
3) What is the ratio between the moles of CuO used and the moles of Cu produced?
4) If you started with 3.0 **moles** of CuO, how many **moles** of Cu would you produce?
5) If 12.0 **moles** of H_2O were produced, how many **moles** of CH_4 would you have needed?
6) If you produced 0.250 **moles** of CO, how many **moles** of Cu would you have also produced?
7) If you started with 10.4 **moles** of CuO, how many **moles** of Cu would be produced?
8) If you started with 10.4 **moles** of CuO , how many **moles** of H_2O would be produced?
9) If 18.0 **grams** of water were produced, how many **moles** of Cu were also produced?
10) How many **moles** of CH_4 were used if 32.0 **grams** of CH_4 were used?
11) If 32.0 **grams** of CH_4 were used, how many **moles** of CuO were also used?
12) If 84.0 **grams** of CO were produced, how many **moles** of Cu were also produced?
13) If 2.00 **moles** of CH_4 were used, how many **grams** of H_2O would be produced? (Hint: Frist find moles of H_2O produced.)
14) If 1.00 **mole** of CuO was used, how many **grams** of Cu would be produced?
15) If 1.00 **mole** of CuO was used, how many **grams** of CO would be produced?
16) If 3.45 **grams** of CH_4 were used, how many **grams** of H_2O would be produced?
17) If 12.5 grams of Cu were produed, how many **grams** of CuO must have been used?

Answers to problems:
1) 3 to 1. Three moles of CuO are used for each mole of CH_4
2) 1 to 1. For each mole of CH_4 used one mole of CO is produced.
3) 3 to 3 which is the same as 1 to 1. For each mole of CuO used one mole of Cu will be produced.
4) 3.0 moles of Cu
5) 6.00 moles of CH_4
6) 0.750 moles of Cu
7) 10.4 moles of Cu
8) 6.93 moles of H_2O
9) 1.50 mole of Cu
10) 2.00 moles of CH_4 used
11) 6.00 moles of CuO

12) 9.00 moles of Cu produced
13) 72.1 grams of water produced
14) 63.6 grams of Cu
15) 9.33 grams of CO produced
16) 7.75 grams of H_2O produced
17) 15.6 grams of CuO used