

A series of ConcepTest questions to test the concept of limiting reactants.

Suppose you are going to make sandwiches that contain specifically 2 slices of bread and 1 slice of ham. If you have a total of 23 slices of ham and 50 slices of bread, how many sandwiches can you make?

1. 50 sandwiches
2. 25 sandwiches
3. 23 sandwiches
4. none of the above

Correct Answer: 3. 23 sandwiches

Comment to Instructor: 50 slices of bread would require 25 slices of ham and you have only 23 slices of ham, so the ham is the limiting factor. Students probably don't have a problem with this unless they did not read the question carefully. This is just a lead-in to the next set of questions. Go on to the next question.

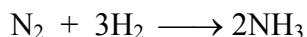
Suppose you are going to make sandwiches that contain specifically 2 pieces of bread, 1 slice of ham and 3 slices of pickles. If you have a total of 31 pieces of bread, 17 slices of ham and 42 slices of pickles, how many sandwiches can you make?

1. 14 sandwiches
2. 15 sandwiches
3. 17 sandwiches
4. none of the above

Correct Answer: 1. 14 sandwiches

Comment to Instructor: The pickles are the limiting factor. 42 slices can make only 14 sandwiches. Choice 2 indicates they are focusing the first item they come to, the bread. They probably realize they can make only 15 sandwiches based on the bread, and that 17 slices of ham would be sufficient, but they don't know what to do with the pickles. Or, they can't multiply 15 by 3 correctly and ended up with something like 35 slices of pickles for 15 sandwiches, so they erroneously think pickles are in excess. Choice 3 indicates they can't divide 31 by 2 or who knows? Perhaps they think 17 is the smallest number and so the ham is the limiting factor.

Consider the reaction stated below:



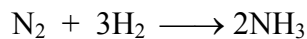
Suppose you have 4 moles of N_2 and 6 moles of H_2 , which is the limiting reactant?

1. N_2
2. H_2
3. NH_3
4. none of the above

Correct Answer: 2. H_2

Comment to Instructor: Choice 1 indicates students may be thinking that 4 is a smaller number than 6 so N_2 would be the limiting reactant. Go on to the next question.

Consider the reaction stated below:



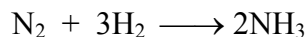
Suppose you have 4 moles of N_2 and 6 moles of H_2 , how much NH_3 would be expected to be produced?

1. 8 moles NH_3
2. 4 moles NH_3
3. 12 moles NH_3
4. 6 moles NH_3

Correct Answer: 2. 4 moles NH_3

Comment to Instructor: Having decided in the previous question that H_2 is the limiting reactant, 6 moles of H_2 should produce 4 moles NH_3 . Choice 1 indicates students for some reason are considering N_2 as the limiting reactant.

Consider the reaction stated below:



Suppose you have 4.0 g of N_2 and 6.0 g of H_2 , how much NH_3 would be expected to be produced?

1. 4.0 g NH_3
2. 4.9 g NH_3
3. 8.0 g NH_3
4. 34 g NH_3

Correct Answer: 2. 4.9 g NH_3

Comment to Instructor: You may wish to save them time and give them this information: MM of N_2 is 28 g/mol; MM of H_2 is 2.0 g/mol; MM of NH_3 is 17 g/mole. The limiting reactant is N_2 this time.
