

Stoichiometry Teachers' Guide:

This lesson will take about 50 minutes. The first segments of this video present a situation about how baking a cake is related to stoichiometry. The video will be followed by explaining the meaning of limiting reactant and how the amount of product produced depends on the limiting reactant.

Learning Outcomes/Objectives:

At the end of the lesson, a student should be able to:

1. Understand the chemical equations
2. Identify the limiting reagent
3. Determine the amount of product produced from certain amount of reactant.

Prerequisites :

Before watching this video, a student should have prior knowledge on:

1. Writing correct chemical formulas of compound,
2. Write balanced chemical equations,
3. Conversion of mole to mass and volume of gas and vice versa and relationship between no. of mole and molarity.

Suggested activities :

1. Carry out a simple experiment on the reaction of marble chips and hydrochloric acid to observe that the volume of carbon dioxide gas collected depends on the number of mole of hydrochloric acid which is the limiting reactant.
2. Problem solving activities.

Note:

Other than carrying out experiment, teacher can also use demonstration method (if the apparatus and materials are not available).

Activity 1:

Students discuss among themselves to answer the question: What is stoichiometry according to their understanding?

Activity 2:

After watching the video, teacher will assign students to work in small groups. Students have to discuss how much ingredients are needed to bake four cakes. Teacher provides the ingredients to bake 1 cake as stated in the earlier video:

200 g flour + 250 g butter + 200 g sugar + 4 eggs

The teacher will choose some students to present their ideas to the class.

Activity 3:

After looking at the animation of the chemical equation, teacher will assign students to work in small groups.

Teacher poses the question and students will have to discuss.

“If mole is converted to mass and volume, how do you transform or describe the equation?”

At the end of the activity teacher asks a student to present the answer

Activity 4

Carry out an activity to determine how many moles of NH_3 can be produced. Each group is provided with a pack of coloured marbles and sticks:

- I. A pair of blue marbles – Nitrogen molecule
- II. Six pairs of white marbles – Hydrogen molecules
- III. Sticks

Each group is asked to form the NH_3 from the marbles given.

At the end of the activity, teacher asks the students to give answers to the following questions:

1. Which substance acts as the limiting reagent?
2. How many moles of NH_3 produced?

Activity 5

Working in groups of 3, carry out an activity to determine how many cars can be produced.

Each group is provided with a pack of flash cards containing pictures of:

- 2 car bodies
- 10 wheels

2 steering wheels
10 doors

Students form the cars by using 10 wheels, 2 steering wheels and 10 doors and identify the limiting reagent.

At the end of the activity teacher asks a student to give answers

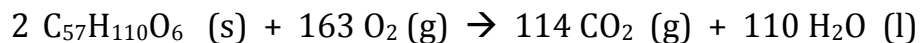
1. How many cars can be formed?
2. Which is the limiting part of the car?

Activity 6

Teacher will have to provide the following hand-out for this activity. Each group has to solve the given problem.

Water from a Camel:

Camels store the fat tristearin ($C_{57}H_{110}O_6$) in the hump. As well as being a source of energy, the fat is a source of water, because when it is used the reaction takes place.



What mass of water can be made from 1.0 kg of fat?

