
UNIT 23 WRITING REPORTS-5

REPORTING EXPERIMENTS

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23.0 OBJECTIVES

In this unit we shall show you how to conduct an experiment and how to report it. After completing the unit you should be able to write reports on the experiments you conduct.

23.1 INTRODUCTION

Laboratory tests or experiments are not limited to any particular field. They can be carried out in a number of fields: from Physics to Medical Technology, and from Bio-sciences to Fire Science. If you are a student of Science, you will have to perform a number of experiments in laboratories. These experiments will demand from you the ability to choose suitable equipment, to arrange various instruments appropriately, to observe and record the readings and reactions, and to arrive at the right conclusions. Finally you will be required to write a report on the various steps you take while conducting an experiment, your findings, and your conclusions.

23.2 VARIOUS STEPS IN CONDUCTING AN EXPERIMENT

- i) Before planning the actual experiment, you should have an understanding of the nature of the problem and any theory associated with it. The theory explains the problem. The theory or explanation has, of course, to be proved; but it helps in formulating a hypothesis. Do not conduct an experiment without having a clear idea of what is to be tested. You should ask yourself: Why am I carrying out this experiment? Will it be of use to me in finding an answer to my problem? Moreover, you should analyse the problem and put it in simple words. You may divide your problem into parts which can more easily be answered separately than together.
- ii) Experimentation is observation carried out in specific conditions. In an experiment, an event is seen to occur under known conditions. So you should eliminate as many outside influences as possible. In this situation, you can carefully observe the inter-relationships between facts.

Remember that observation implies selection. It is important to decide whether you will use selective sampling or cover the entire field.

- iii) You should arrange the apparatus carefully to suit your purpose and follow

the procedure you have in mind for conducting the experiment.

- iv) In your notebook, you should record, carefully and accurately, the details about the purpose of the experiment, how the equipment was set up, the procedure, the results, and the conclusions. It is important to record what is actually seen, including the things not fully understood by you at the time of conducting the experiment. You should avoid carelessness or dishonesty in recording the facts related to the experiment.
- v) You may use illustrations like diagrams, drawings, graphs, maps, or tables. The purpose of an illustration is to clarify, or give a visual explanation of the text. With the help of an illustration, you can present a large number of details in a limited space. Further, suitable illustrations catch the reader's eyes quickly and convey your message effectively.

Different illustrations serve different purposes:

Diagrams or drawings form an essential part of a report on scientific experiments. You will have to use the drawings of the apparatus, e.g., electrical circuit diagrams, in your report.

Graphs present mathematical data and trade statistics pictorially. They are very effective in indicating trends, distribution, and comparisons of two or more items.

Maps are used to show geographical distribution of data.

Tables are used for displaying mathematical data in a compact form.

23.3 REPORTING AN EXPERIMENT

Your report should have the following contents;

- i) Subject
- ii) Apparatus and other materials used
- iii) Procedure
- iv) Observations
- v) Conclusions
- vi) Drawings, diagrams, or graphs.

You should identify the experiment you are reporting on and indicate the apparatus and other materials you used.

If the purpose of the experiment is not obvious to your reader, you should explain it in the body of the report and give a detailed explanation of how you performed the experiment. Include your observations also.

In the concluding part of your report, you should give the results of your experiment. If an interpretation of the results is going to be useful to the reader, provide such an analysis in your conclusion. You may include your recommendations as well.

When you write your report, state your findings in clear sentences. Avoid the use of jargon as far as possible. Be objective and accurate. In an experiment report, the passive voice is more suitable than the active voice. So use the passive voice and include illustrations like diagrams, drawings, or graphs to make your report clearer.

23.4 EXAMPLES OF REPORTS

Example 1

Here we shall show you how to report an experiment conducted in a Chemistry Laboratory:

Aim:

To prepare hydrogen gas and to study its properties.

Apparatus:

Woulfe bottle; thistle funnel; glass jars with discs as covers; delivery tube bent at three places; two corks, each with a single hole; trough with water; and beehive shelf.

Materials:

Granulated zinc, dilute sulphuric acid, matches.

Theory:

Hydrogen gas is prepared in the laboratory by the action of dilute sulphuric acid on granulated zinc.

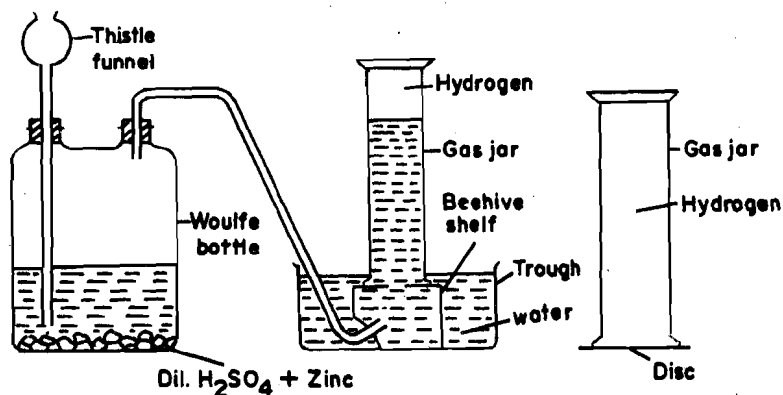


Fig.1. Preparation of hydrogen gas

Procedure:

- i) The apparatus is set up as shown in Fig. 1 .
- ii) 5 grams of granulated zinc are put in the bottle.
- iii) We make sure that the lower end of the thistle funnel is very near the bottom of the Woulfe bottle.
- iv) Dilute sulphuric acid is poured down the thistle funnel to cover zinc.
- v) It is observed that as soon as the acid comes in contact with zinc, a gas is produced.
- vi) The gas is collected in the jar by the displacement of water. The mouth of the gas jar is closed with a glass disc. The jar is removed and put in the same position, that is, upside down, with the disc cover, on the table.

Observations:

- i) The colour of the gas in the gas jar is observed. The gas is colourless.
- ii) The gas is odourless also.
- iii) A lighted splinter is introduced into the gas jar. The gas begins to burn at the mouth of the jar. From this we infer that the gas inside the jar is hydrogen.
- iv) To test whether the gas inside the jar is lighter than air, the gas jar is covered with a glass disc and placed in an upright position on the table. An empty jar is placed with its mouth downward on the gas jar. The glass disc between the two jars is removed. After two minutes a burning splinter is introduced into each jar. The gas in the upper jar starts burning, but the gas in the lower jar does not burn. This indicates that the gas is lighter than air and has moved from the lower jar to the upper jar.

Conclusions:

The gas collected in the jar is colourless, odourless, combustible, and lighter than air. As it has all the properties of Hydrogen, the gas must be Hydrogen.

Example 2

Here is an example of a report on a scientific experiment conducted in a Physics Laboratory.

Aim:

To study the rate of cooling of a given mass of heated water.

Apparatus used:

A flask of 1 litre capacity, a thermometer (0-100°C), a stop-watch, a stand to fix the thermometer.

Procedure:

The apparatus is set up as shown in Fig. 2.

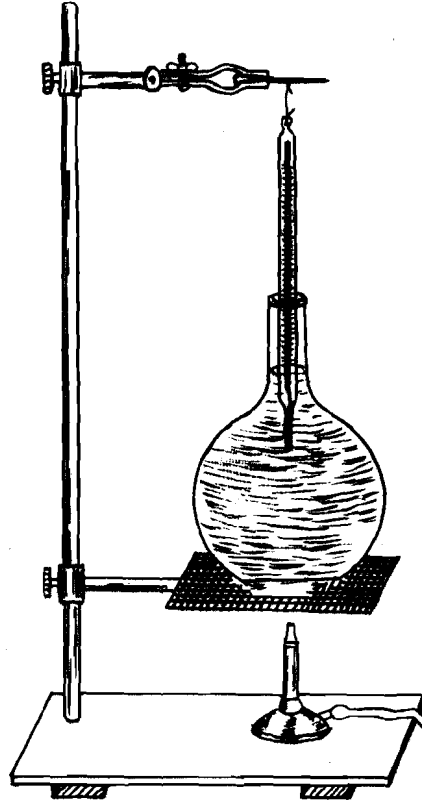


Fig. 2

The flask is filled up to its neck with water and the water is heated to 80°C. Then the water is allowed to cool. The temperature of the water is noted every minute for the first five minutes; later, the temperature of the water is noted after every two minutes for the next ten minutes.

The experiment is repeated by heating the water to 70°C and 90°C and allowing it to cool.

A graph is drawn showing the temperatures at different times and the rate of cooling of the water is determined.

Self-check Exercise 1

Answer the following questions:

- 1) What is the role of observation in conducting an experiment?

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23.5 PUNCTUATION: COMMAS

In this section we shall discuss the use of the comma, the mark (,) used in writing for showing a short pause. There are occasions where a comma must be used and where it would be quite wrong to omit it. There are other occasions where you will be free to use your discretion.

Let us now study the occasions where it is necessary to have a comma.

- i) Commas are used to separate items in a list.

Examples

1. Neeharika is pretty, intelligent, gregarious, and popular.
- 2 I bought potatoes, onions, eggs, bread and butter.

Remember that it would be correct to use a comma before 'and' in a list (as in Example 1 above); unless you want to suggest that there is a special connection between the last two items (as in Example 2).

- ii) Commas are used to mark off the names of people spoken to.

Examples

- 1 'Good morning, Mr. Vyas.'
- 2 'I think, Mrs. Khan, this will suit you.'
- 3 'Shipra, can you do it for me?'

Titles such as 'ladies and gentlemen', 'sir', 'madam', etc. are punctuated in the same way.

Examples

- 1 'Please come in, doctor.'
- 2 'Excuse me, sir, your button is undone.'

- iii) Commas are used to mark off phrases beginning with participles.

Examples

- 1 Frightened by the noise, the mouse ran into its hole.
(*frightened*: past participle)
- 2 He hesitated, looking cautiously around the room before he said he had to go.
(*looking*: present participle)

- iv) Commas are used to separate Direct Speech from the reporting clause.

Examples

- 1 'I was shocked at her behaviour,' he said.
- 2 He said, 'I was shocked at her behaviour'.
- 3 'I was startled,' he said, 'at her behaviour.'

- v) Commas are used to separate subordinate clauses from the main clauses.

Examples

- 1 Although he was not well, he attended the meeting.
- 2 He walked, although he was tired, all the way to the library.

- vi) Commas are used to mark off asides.

Examples

- 1 Children are to be handled carefully, I agree.
- 2 Well, I don't agree with you.

- vii) Commas are used before and after a phrase in apposition.

Example

Study the following sentences:

- The Amazon is in South America.
It is the longest river in the world.

These two sentences can be combined easily because the same river is being referred to in each sentence.

The Amazon, the longest river in the world, is in South America.

In the following situations, the use of commas is optional:

- a) In dates:

18 June 1957 or 18 June, 1957

b) In addresses:

You may use a comma between the number (or name) of the house and the name of the street.

e.g., 310 Ashoka Road *or* 310, Ashoka Road.

Self-check Exercise 2

Insert commas where necessary:

- 1 He opted for Mathematics Physics and Chemistry.
- 2 Chairs benches and stools are used to sit on.
- 3 He walked past the cinema hall the temple and the city library.
- 4 He ran down the garden picked up the ball and threw it over the wall.
- 5 I'm sorry I cannot help you Mr. Pal.
- 6 Children love candies don't they?
- 7 As he was tired Mr. Pal decided to go home early.
- 8 Wherever you go you will see the same thing.
- 9 The shopkeeper said 'Can I help you'?
- 10 'I wish we could go abroad' said Sheila.
- 11 Bombay the capital of Maharashtra is one of the largest cities in the world.
- 12 Mahatma Gandhi was born on 2 October 1869.

23.6 LET US SUM UP

You should follow these steps in conducting an experiment: (1) Plan the experiment. (2) Arrange the apparatus. (3) Observe what happens during the experiment. (4) Record your observations. (5) Write a report.

Your report should include the aim of the experiment, details of the apparatus and other materials used, the procedure adopted, the observations made, and the conclusions arrived at. It may also include drawings, diagrams and graphs related to the experiment and the findings.

23.7 KEY WORDS

'appa' ratus: a set of instruments or other mechanical appliances put together for a purpose

'comma: a punctuation mark (,) to indicate a slight pause or a break between parts of a sentence

con clusion: an opinion based on reasoning

'diagram: a drawing, design, or plan to explain or illustrate something

'drawing: a sketch, plan, etc. made by lines

ex'periment(n.): a test or trial carried out carefully in order to study what happens and thus gain new knowledge

graph: a diagram consisting of a line or lines showing the variation of two quantities, e.g. the temperature at each hour

map: a representation on paper of the earth's surface or a part of it, showing countries, oceans, rivers, mountains, etc.

obser'vation: watching carefully

pro'cedure: the order of doing things

'table: a list of facts, information, etc., usually in columns

23.8 ANSWERS TO SELF-CHECK EXERCISES

Exercise 1

- 1 Observation plays a very important role in conducting an experiment. Unless you observe carefully what happens during the experiment, you cannot understand the inter-relationships between the facts or arrive at conclusions based on the facts.
- 2 In the laboratory notebook, details about the purpose of the experiment, how the apparatus was set up, the procedure, the observations, and the conclusions should be recorded accurately, carefully and objectively.
- 3 The contents are:
 - i) Aim of the experiment
 - ii) Apparatus used
 - iii) Procedure
 - iv) Observations
 - v) Conclusions
 - vi) Illustrations
- 4 You may follow the example given by us.
- 5 The language should be clear and objective. It should be devoid of jargon. Passive voice should be preferred.

Exercise 2

- 1 He opted for Mathematics, Physics, and Chemistry.
- 2 Chairs, benches, and stools are used to sit on.
- 3 He walked past the cinema hall, the temple, and the city library.
- 4 He ran down the garden, picked up the ball, and threw it over the wall.
- 5 I'm sorry I cannot help you, Mr. Pal.
- 6 Children love candies, don't they?
- 7 As he was tired, Mr. Pal decided to go home early.
- 8 Wherever you go, you will see the same thing.
- 9 The shopkeeper said, 'Can I help you?'
- 10 'I wish we could go abroad,' said Sheila.
- 11 Bombay, the capital of Maharashtra, is one of the largest cities in the world.
- 12 Mahatma Gandhi was born on 2 October 1869.
or
Mahatma Gandhi was born on 2 October, 1869.