

Course Title: Physical chemistry
Course Code: CHEM 5101

VARIABLES AND CONSTANTS

Variables and constants

- A quantity whose value changes during a particular discussion is known as a **variable**.
- A quantity which retains the same value throughout is called a **constant**.

Examples:

- ❖ Volume (v) of a given mass of a gas at a certain temperature (T) changes as we change the applied pressure (P). Here P and V are variables and T is a constant.
- ❖ Temperature of a Human body
- Anything that can be measured or counted is called a **Quantity**.

Examples:

e.g; length, volume, mass, time, age, force, population;etc.

DEFINITION



- **Variable – Any factor that can change in a scientific investigation or experiment**

Types of Variables



Independent Variable

(also called the manipulated variable)

- The condition that is **intentionally changed** by the investigator in an experiment
- There can be **only one** independent variable in an experiment

Types of Variables



Dependent Variable

(also called the responding variable)

- The factors or conditions that will **change as a result of the independent variable**
- The factors that you **measure or observe** as data
- There can be **one or more** dependent variables in an experiment

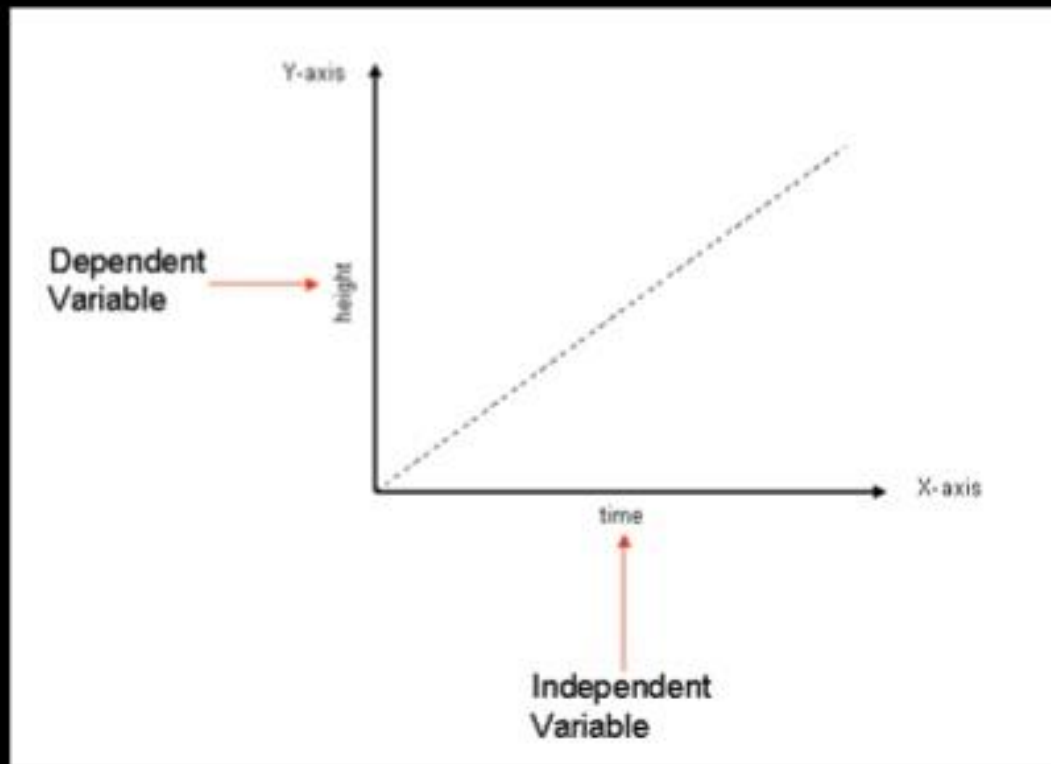
Types of Variables



Controlled Variables

- The factors or conditions that are **kept the same (unchanged)** in an experiment.
- There are **many** controlled variables in an experiment

DATA ANALYSIS



On a simple X-Y coordinate line graph the independent variable is always on the X-axis.

Testable Question #1



- **Does changing the temperature of a ball affect the height the ball will bounce?**

Cold



Hot



Identify Variables #1



Cold



Hot

Manipulated
Variable

- Does changing the **temperature** of a ball affect **the height the ball will bounce?**

Responding
Variable

Identify Variables #1



- **Controlled Variables:**

- * **Same ball**

- * **Dropped from the same height**

- * **Dropped onto the same surface**

- * **etc...**

Testable Question #2



- **Does changing the color of light affect the growth rate of plants?**



Identify Variables #2



Manipulated
Variable

- Does changing **the color of light** affect the **growth rate of plants?**

Responding
Variable



Identify Variables #2



- **Controlled Variables:**

- * **Same type / size of plant**
- * **Same wattage of bulb**
- * **Same amount of water**
- * **Same soil**
- * **Light on for the same amount of time**
- * **etc...**