CHEMISTRY 9th (New Book)

CHAPTER NO 12 EMPIRICAL DATA COLLECTION AND ANALYSIS

Exercise: Multiple Choice Questions

1.	Heat and work	2.	Calorie
3.	Pico	4.	Newton Per meter square
5.	Kg	6.	Number
7.	Cubic Centimeter	8.	8.40×10^{-4}
9.	10^{-9}	10.	338 K

Q#2: Short Question Answer

i. What is the consistency of results?

SI units provide a single global standard, ensuring accuracy, consistency, and universal understanding in scientific communication. This allows measurements from one part of the world to be easily understood and verified elsewhere.

ii. Why SI units are user friendly?

They provide a common language for international scientific collaboration, enabling scientists to compare results, replicate experiments, and benefit from each other's work.

iii. Define systematic error and random error.

Systematic Error: Errors that naturally occur in measurement tools, causing them to not always give correct results.

Random Errors: Occur when repeated measurements of a quantity give different values under the same conditions due to unpredictable causes.

iv. What is reason behind a random error?

Reasons include limitations of instruments, environmental factors, and slight variations in procedure. They cause unpredictable changes during an experiment.

Example 1: Reading volume from a different angle in a measuring cylinder each time.

Example 2: Variations in mass readings on a balance due to surrounding air.

v. Does systematic error affect the accuracy?

Yes, it affects accuracy by causing consistent deviations from the true value.

* Example: A thermometer that always reads 20C higher will give inaccurate readings.

vi. Which other systems of measurements are used apart from SI units?

1) CGS system (Centimetre-gram-second)

2) MKS system (Meter-kilogram-second)

3) Imperial system units.

vii. Define metre.

A metre is the distance travelled by light in a vacuum in 1/299,792,458 of a second. It is the standard unit of length, symbolized by 'm'.

viii. Mention two benefits scientists get by using SI units.

1. Provides a common language for international collaboration, allowing comparison of results and replication of experiments.

2. Allows scientists to work together effectively, ensuring safety, reliability, reproducibility, and progress.

Q#3: Constructed Response Questions

i. Compare the units in SI system with those in MKS system.

- SI System: Includes 7 base units: Meter (m) for length
  1. Kilogram (kg) for mass
  2. Second (s) for time
  3. Ampere (A) for current
  4. Kelvin (K) for temperature
  5. Mole (mol) for amount of substance
  6. Candela (cd) for luminous intensity.
- MKS System: A subset of the SI system focusing on three base units:
  1. Meter (m) for length
  2. Kilogram (kg) for mass
  3. Second (s) for time

ii. What are the basic five SI Units which are used in chemistry?

The **five basic SI units** commonly used in **chemistry** are:

1. **Meter (m)** – for measuring **length** or distance.
2. **Kilogram (kg)** – for measuring **mass**.
3. **Second (s)** – for measuring **time**.
4. **Mole (mol)** – for measuring the **amount of substance**.
5. **Kelvin (K)** – for measuring **temperature**.

iii. Explain the three units for the basic SI Units.

1. **Volume: Cubic Meter (m^3)**
2. **Density: Kilogram per cubic meter (m^3)**
3. **Area: Square meter (m^2)**

iv. Explain why we prefer to use smaller units of mass and volume in chemistry?

* Mass: Molar mass is measured in grams per mole (g/mol). Measuring reactant masses in grams allows for direct calculation of moles.

* Volume: The cubic centimeter (cm^3) is used instead of the cubic meter (m^3) because it is easier to measure, calculate with, and is more precise for the smaller liquid volumes handled in a laboratory.

v. What difficulties we expect to encounter if we use different units of measurement in daily life?

Difficulties include problems with conversion, confusion when comparing quantities, and wasted time. This is why scientists adopted standard SI units to make things easier.