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Where Minds Pollinate

Class 12
Chemistry

Chapter 17
Qualitative Analysis
Handwritten Notes

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Chapter no 17::

QUALITATIVE ANALYSIS::

• Determination of Molecular mass by Molecular Ion::

1- Molecular Ion Peak::

1. It is a peak in mass spectrum that represent the molecular ion.
2. It is present at extreme right corner of spectrum (except isotopic peak).
3. It has highest mass to charge ratio (m/z) value.
$$\text{Molecule} \xrightarrow{e^-} M^+ + 2e^-$$
4. Molecular mass of molecular ion peak is same as the molecule.
5. Relative abundance of Molecular ion peak $\propto$ Stability of ion.

• e.g.: Aromatic comp > conjugated comp > unbranched comp.

2- Base Ion Peak::

- Peak that corresponds to most abundant ion is called base peak.
- It has highest relative abundance (Intensity) i.e. 100%.
- Abundance of other peak is calculated.

with help of base peak.

- It is most abundant and stable ion

3- **Isotopic Peak**:: If isotopes are present with greater mass but less relative abundance than the peaks appear at one, two m/z unit greater than molecular ion peak.

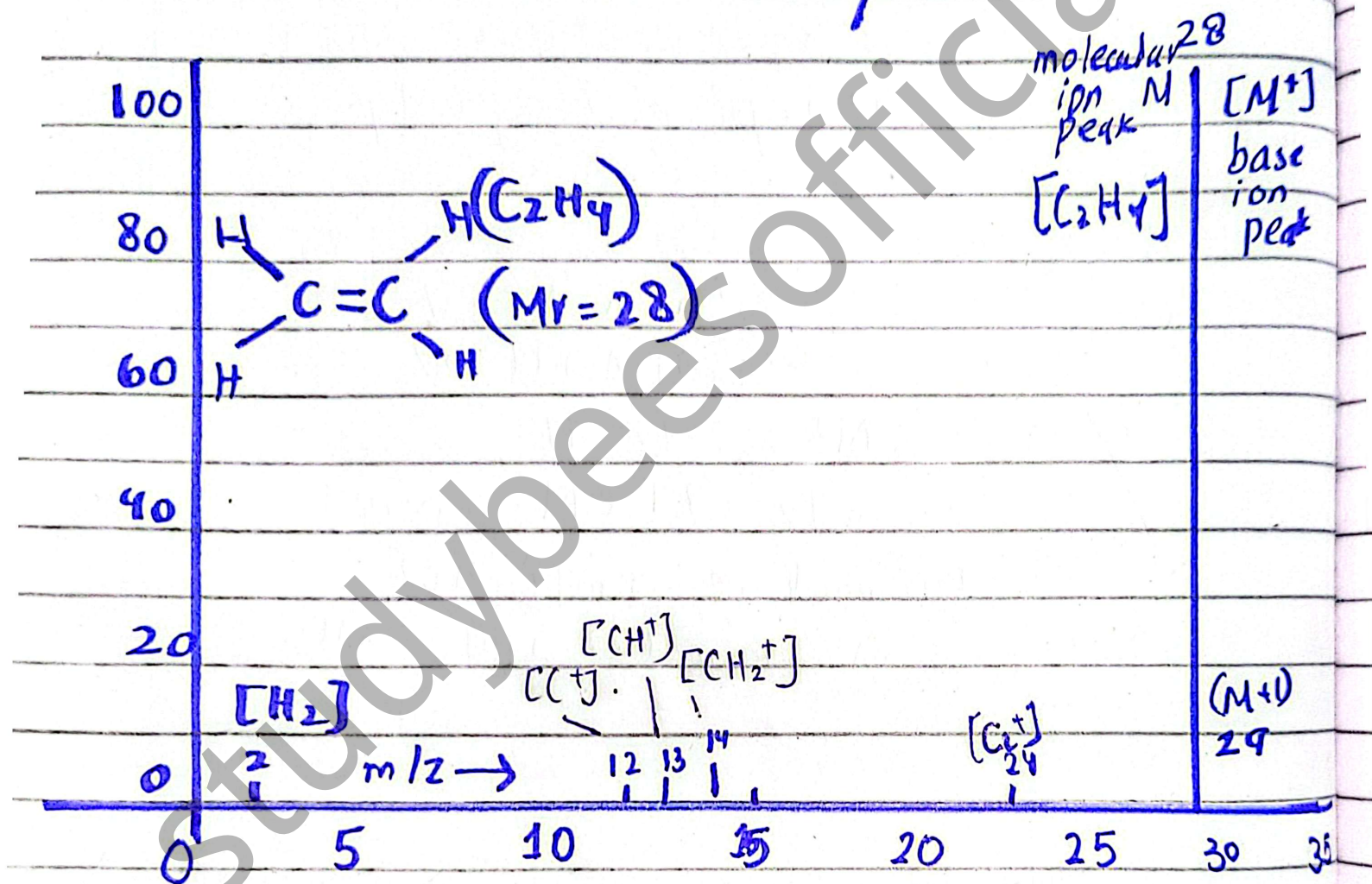
- Carbon C^{12} C^{13} C^{14}
 M^+ M^{+1} M^{+2}

- Chlorine Cl^{35} Cl^{37}
 (M^+) (M^{+2})

4- **Fragment Peaks**::

- Other peaks are formed by all those fragments ion formed during the process of mass spectrometry.

• Determination of molecular mass by molecular ion peak:-

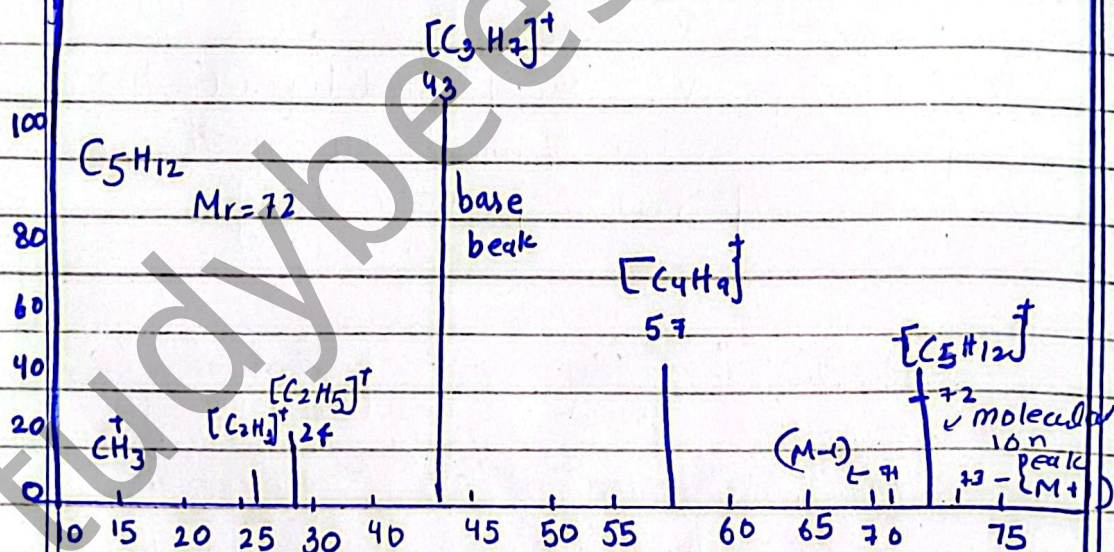
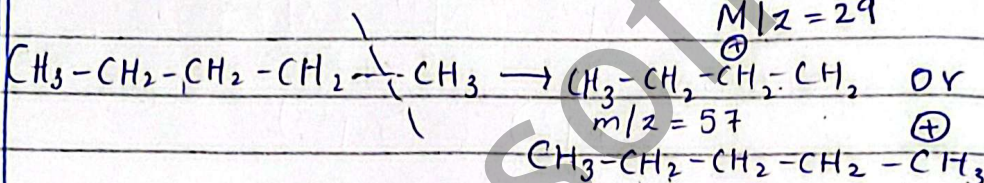
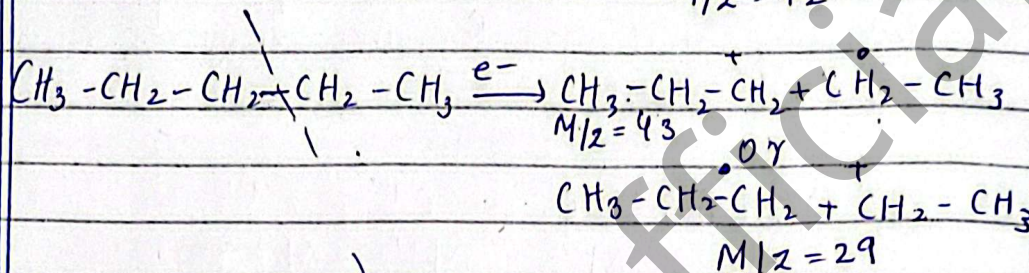
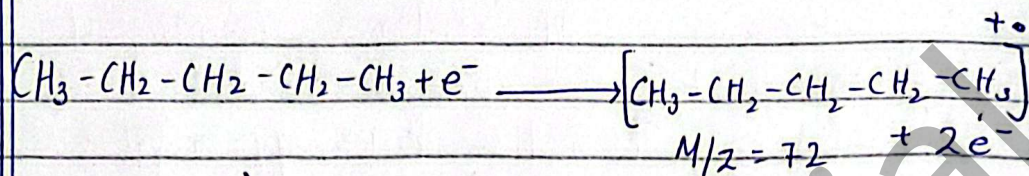


Identification of Molecule

↑ break one molecule into diff / small peaks
by fragmentation Pattern:

- When the electrons from electron gun hit the molecule it undergo fragmentation.
- Breaking a bond depend upon type of function group usually.
- More stable ions are also produce by rearrangement of unstable ions.
- for alcohols peak one less than molecular ion peak ($M-1$) appears due to loss of hydrogen from OH group.

- Similarly in alcohols (M-17) peak is obtained by loss of OH-group.

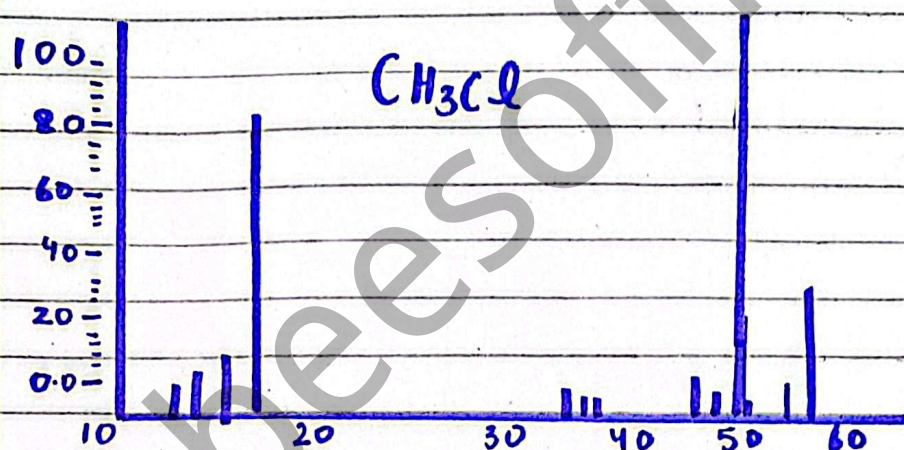


Deduction of C-no in a molecule:-

$$\text{No. of C-atoms} = \frac{100 \times \text{abundance of } M^+ \text{ peak}}{1 \times \text{abund of } M^+ \text{ peak}}$$

Deduction of the Presence of Cl & Br:-

Chlorine: molecular ion peak (M^+) appear at $m/z = 35 \rightarrow$ greater relative abundance (75.77%)
 $1/3$ height at $M+2 \rightarrow$ heavy isotope with a R.A $\rightarrow 24.23\%$



Molecular Ion Peak at $m/z = 50 \rightarrow$ base peak
 $m/z = 52 \rightarrow$ represent heavy isotope $Cl-37$.

Bromine:-

