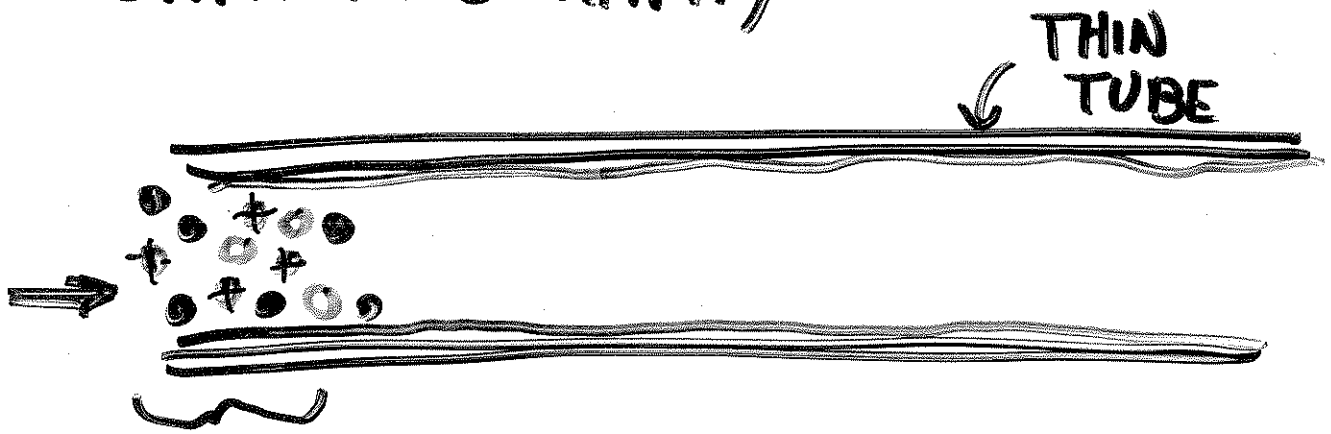
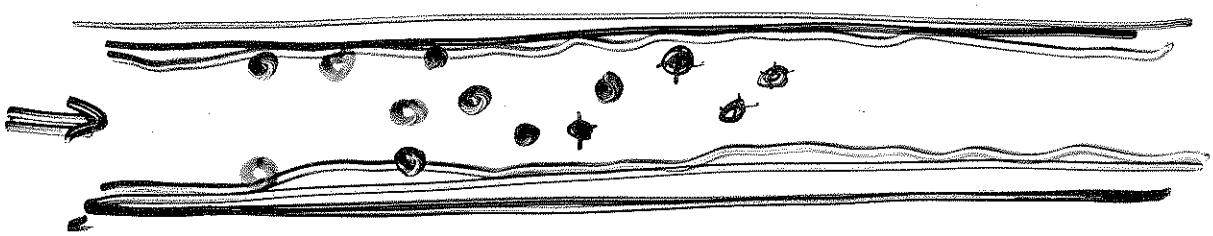
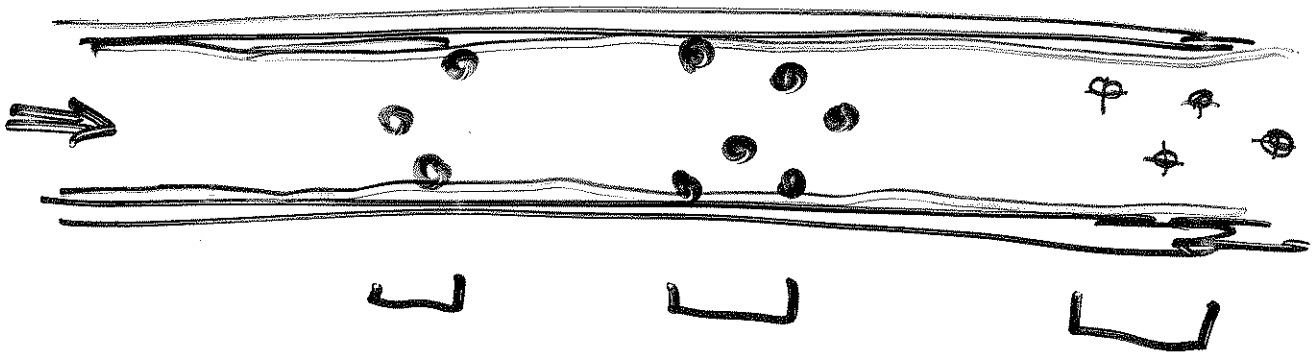
CHROMATOGRAPHY



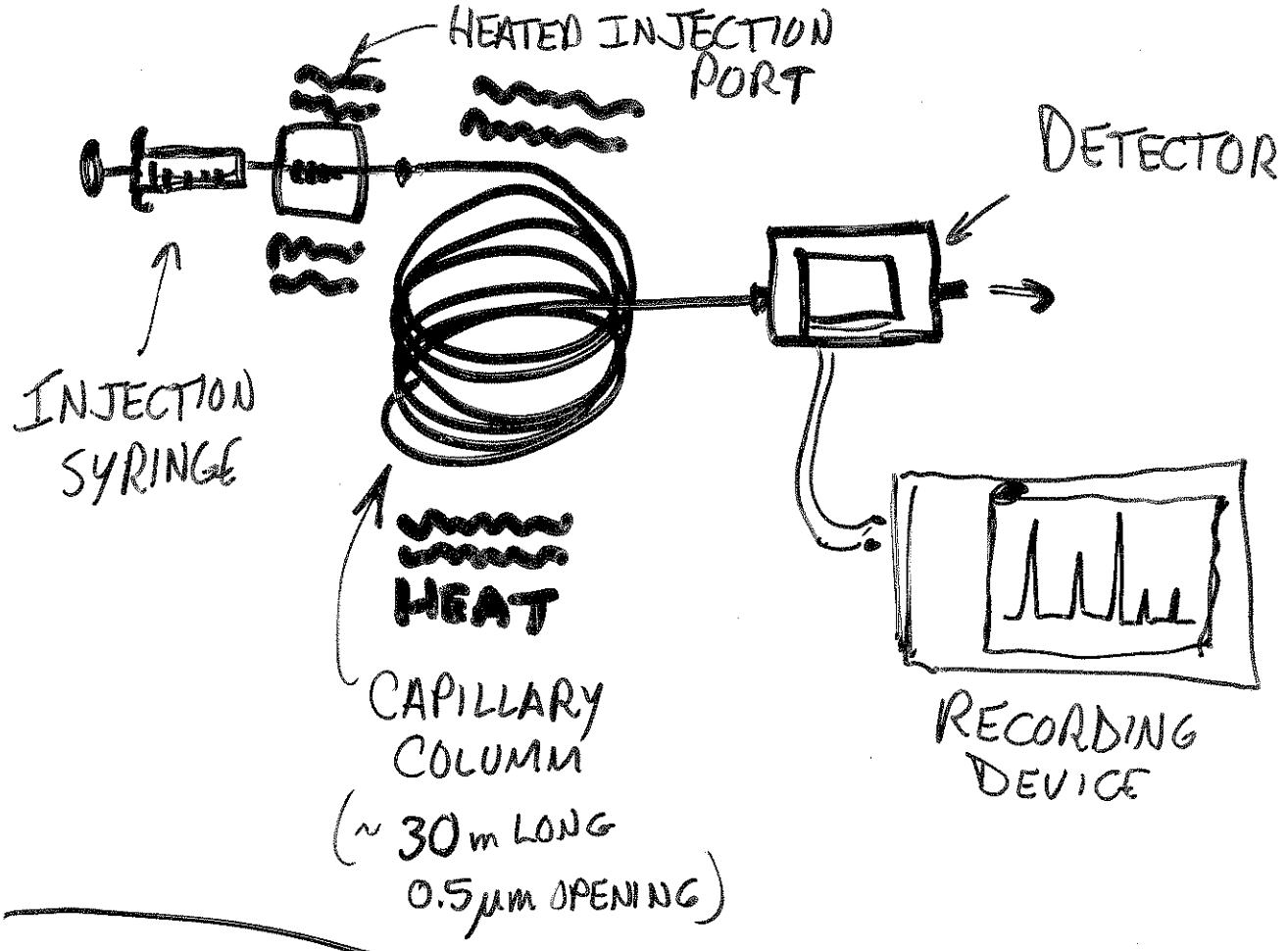
MIX OF 3 COMPOUNDS



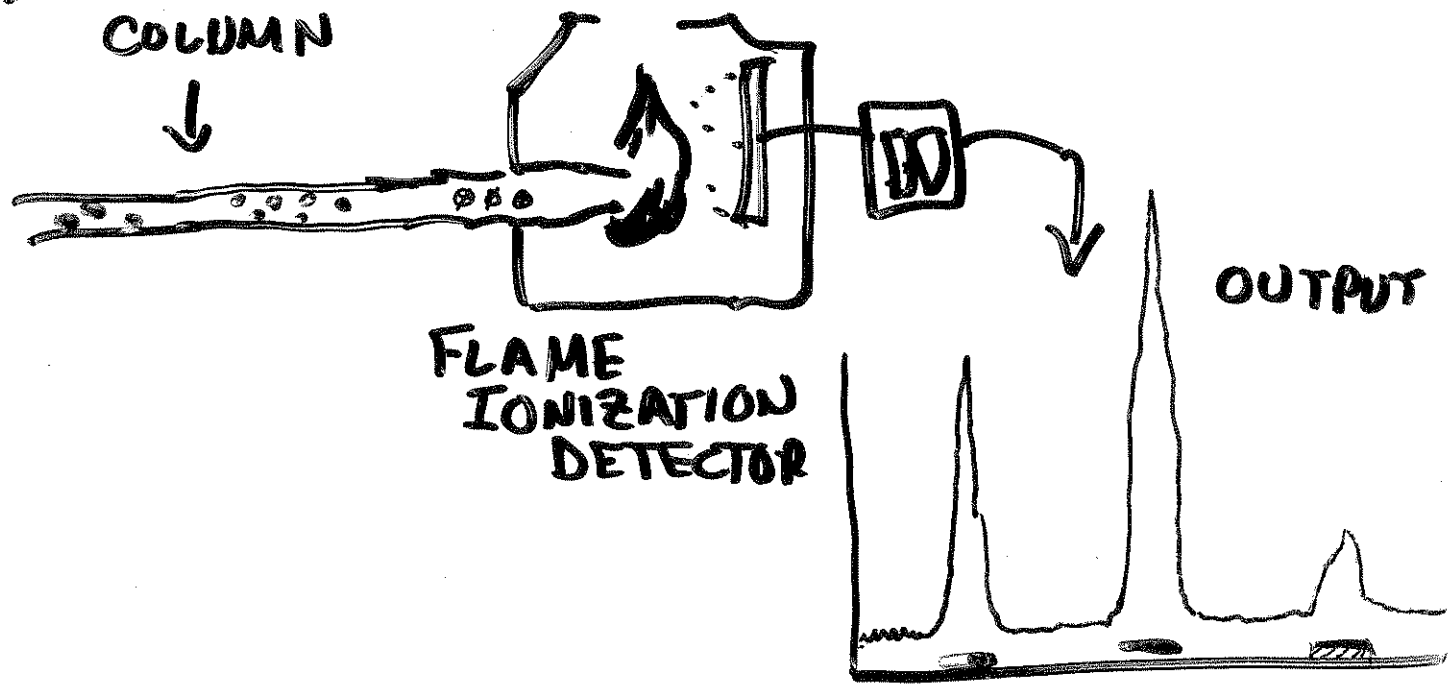


SEPARATION OF THE 3 CMPDS

GC:


HEATED INJECTION PORT
DETECTOR
INJECTION SYRINGE
HEAT
CAPILLARY COLUMN
(~ 30 m LONG
0.5 μm OPENING)
RECORDING DEVICE

Ex


COLUMN
FLAME IONIZATION DETECTOR
OUTPUT

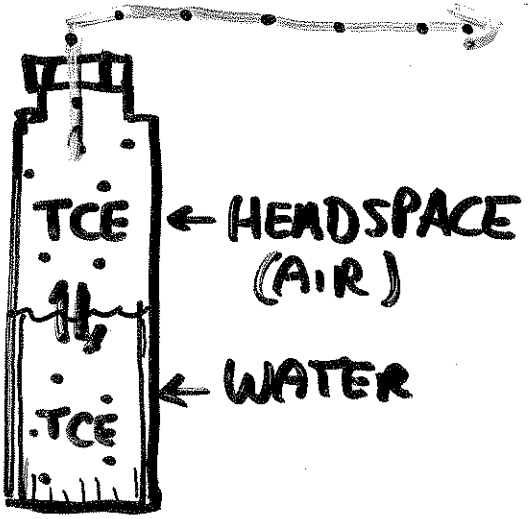
GAS CHROMATOGRAPHY (G.C.)

- Separates & quantifies gases

∴ Used for volatilizable organic compounds

Ex: Volatile Organic Compounds

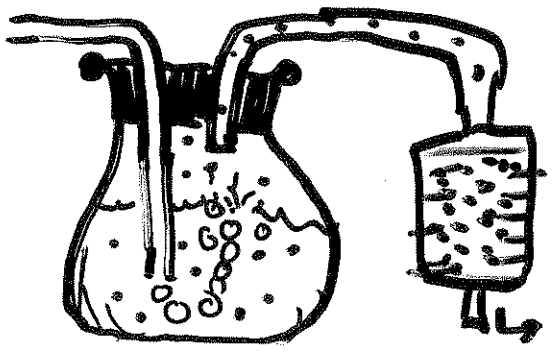
40 mL
"EPA Vial"



OR:

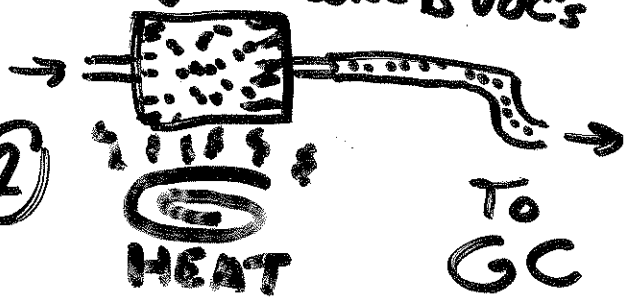
PURGE & TRAP

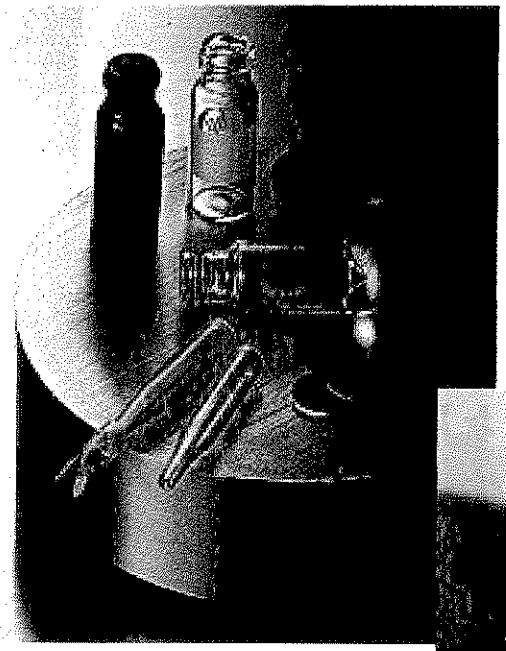
(1)



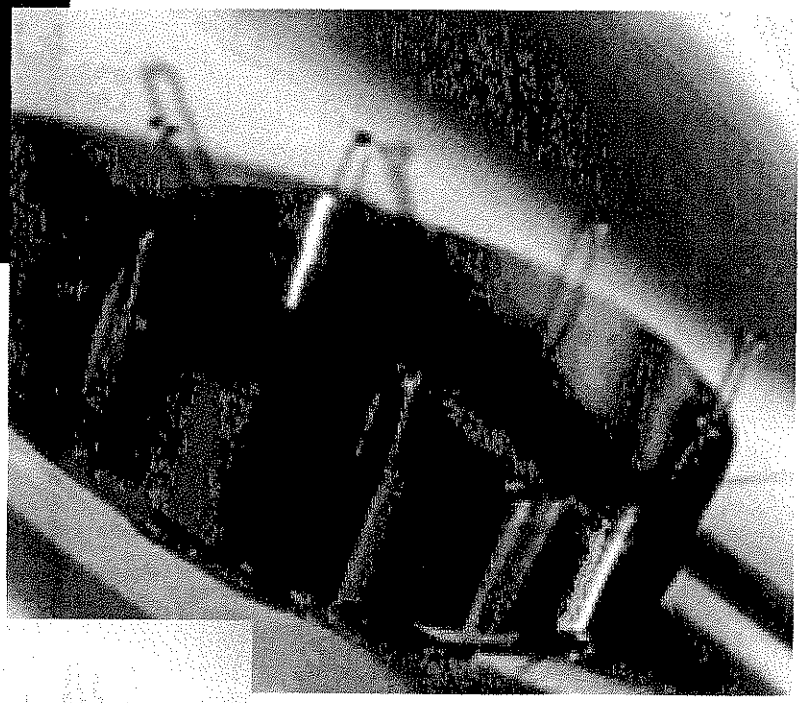
(2)

CARTRIDGE w/ CONC'D VOC's

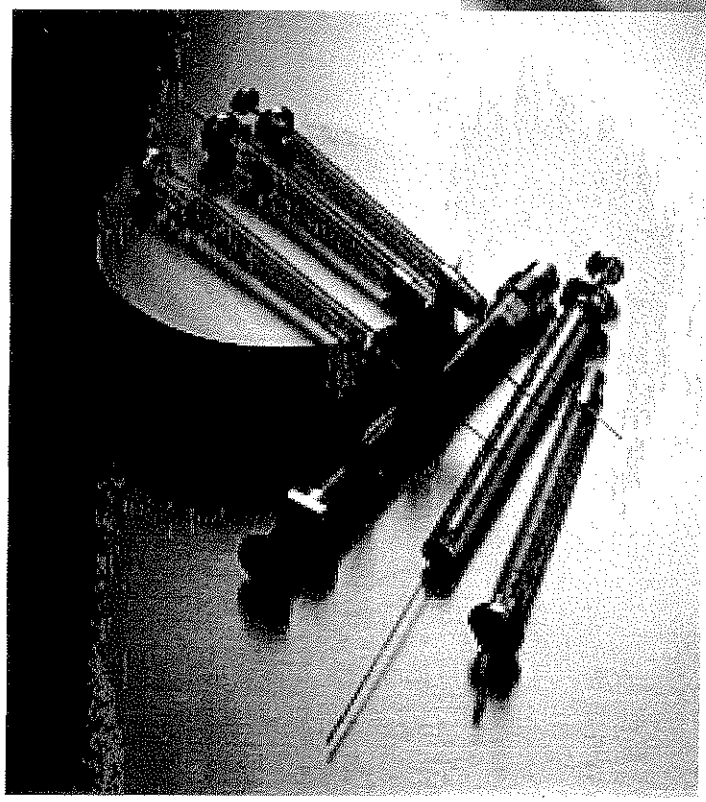




GC Vials, septa, caps



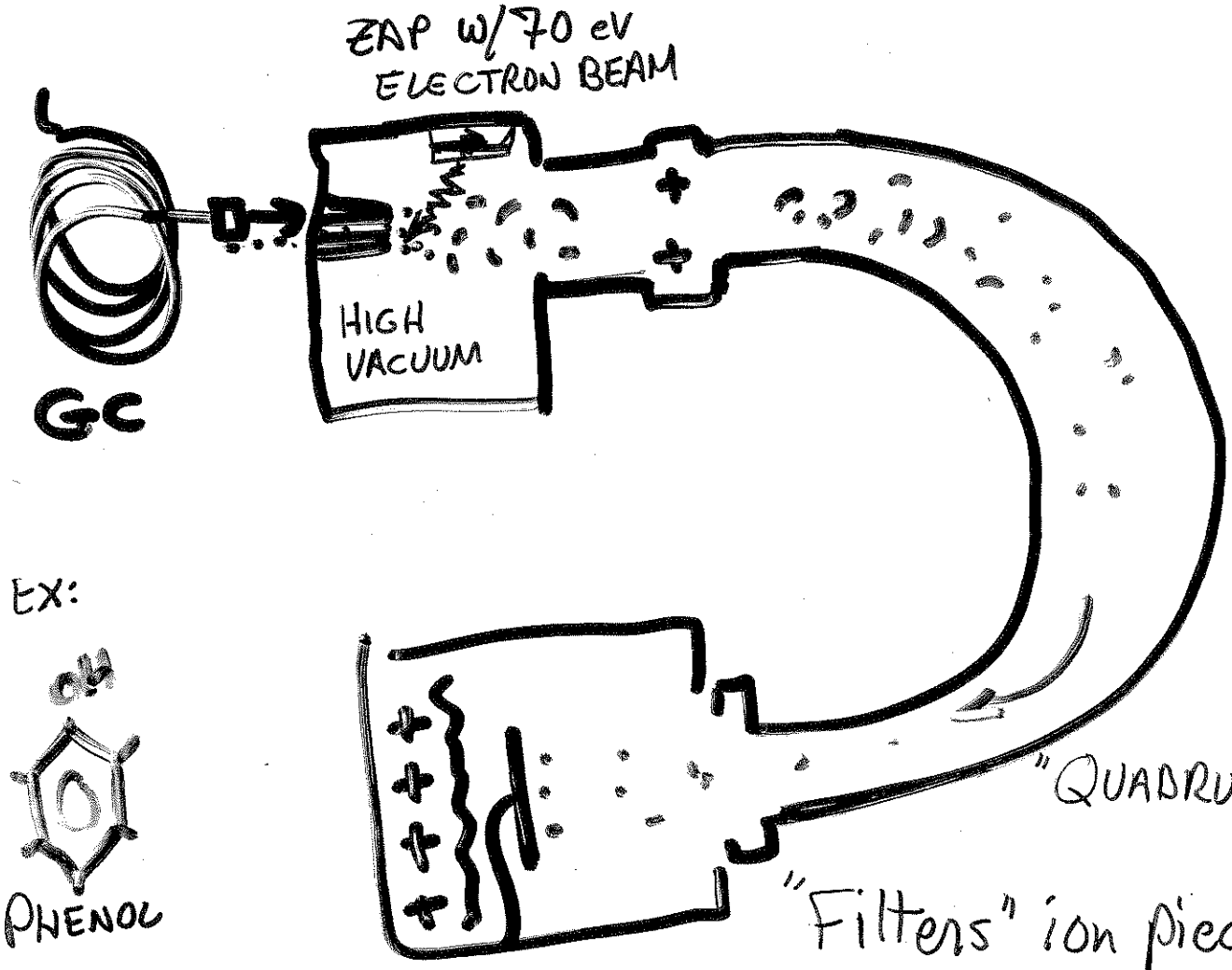
Glass Capillary Column



GC **Injection** GC syringes

GC w/ MASS SPECTROMETRY
GC/MS

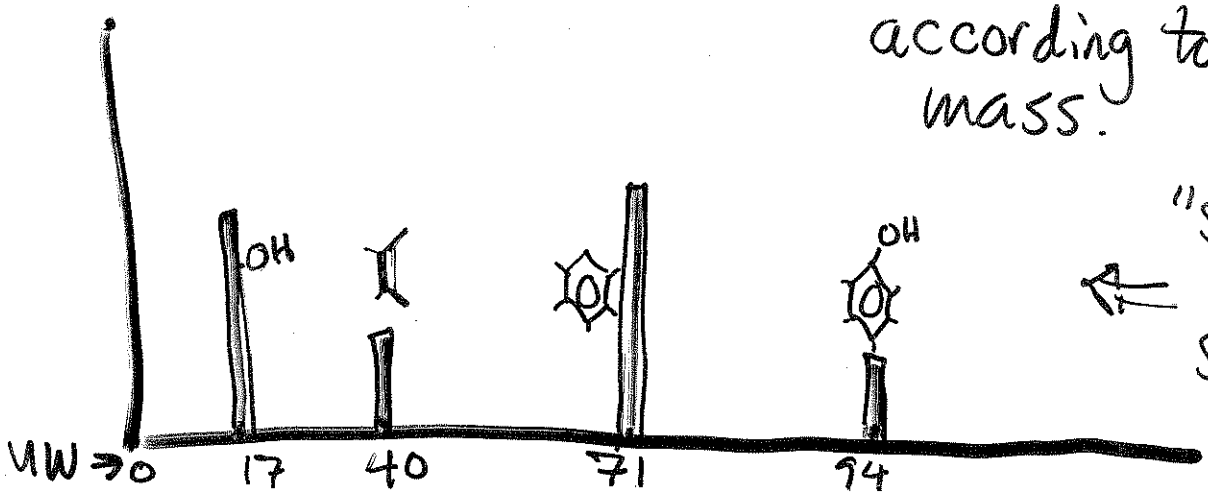
IDEAL FOR SCANNING A SAMPLE WITH MANY UNKNOWN COMPONENTS



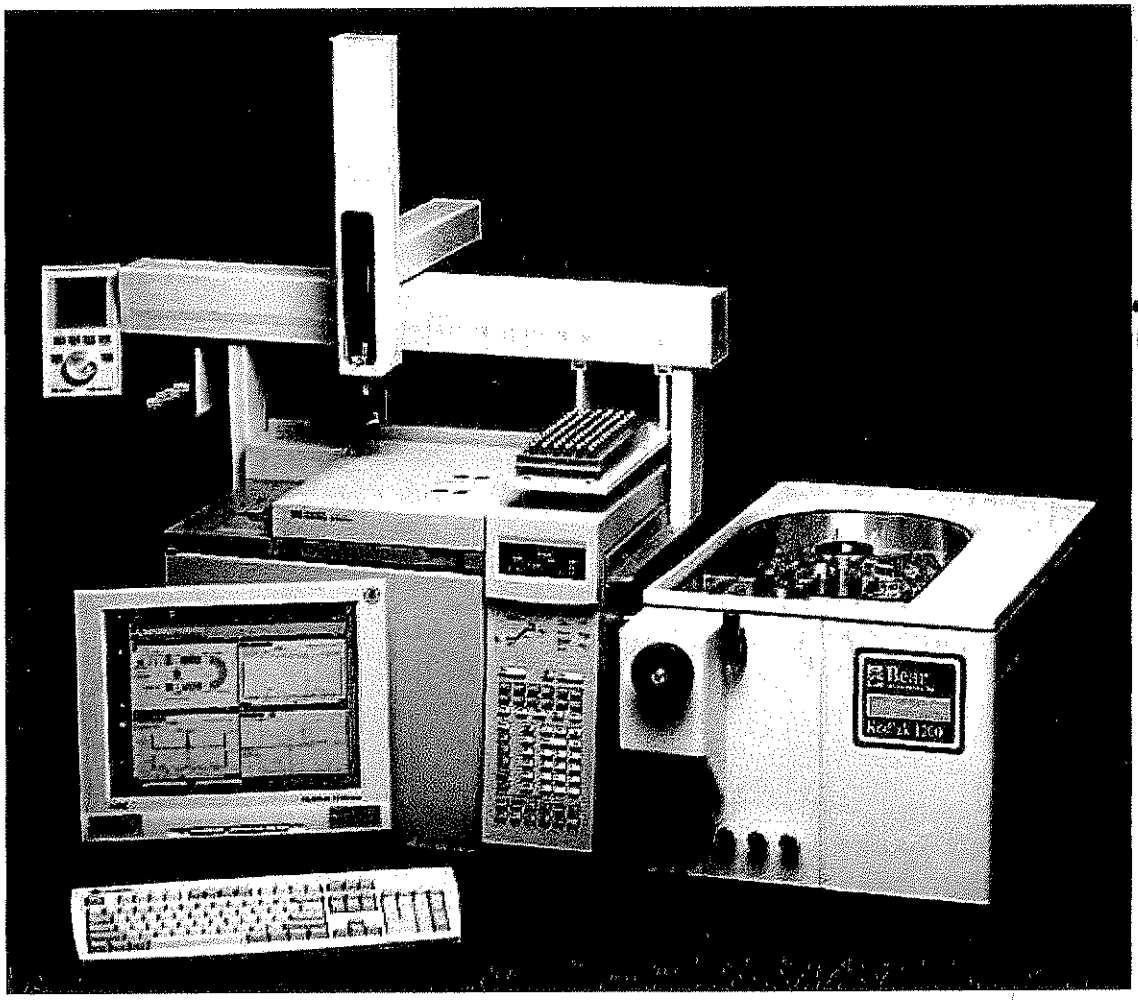
EX:

PHENOL

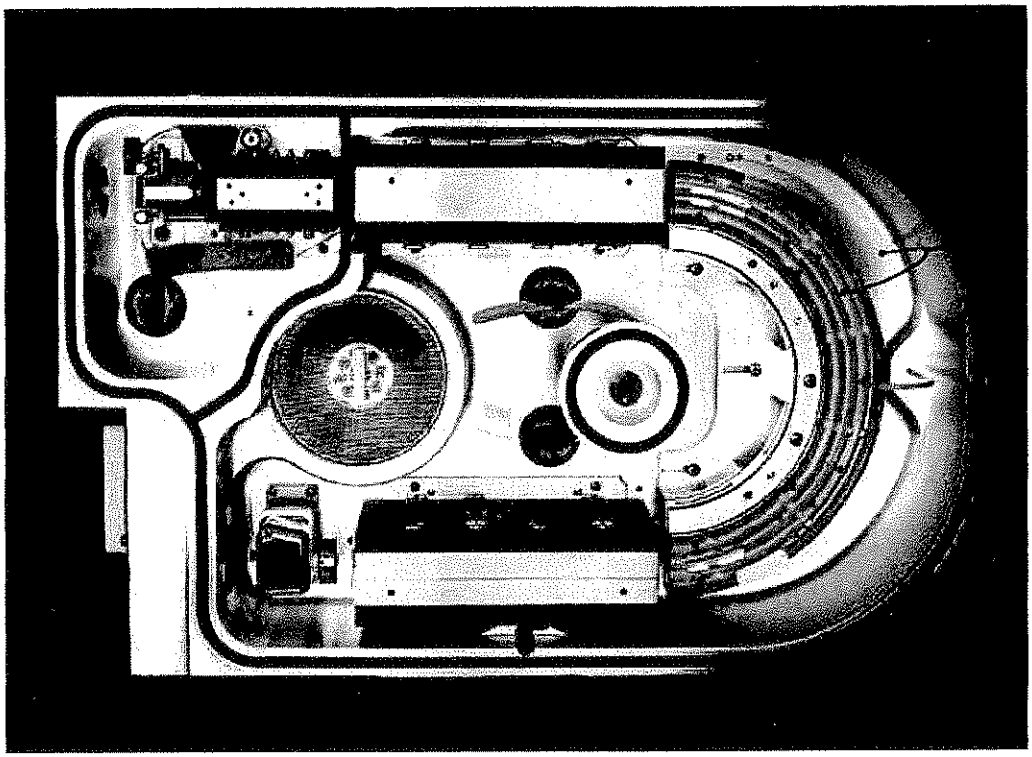
"Filters" ion pieces according to molecular mass.



"SNAPSHOT" MS SPECTRUM

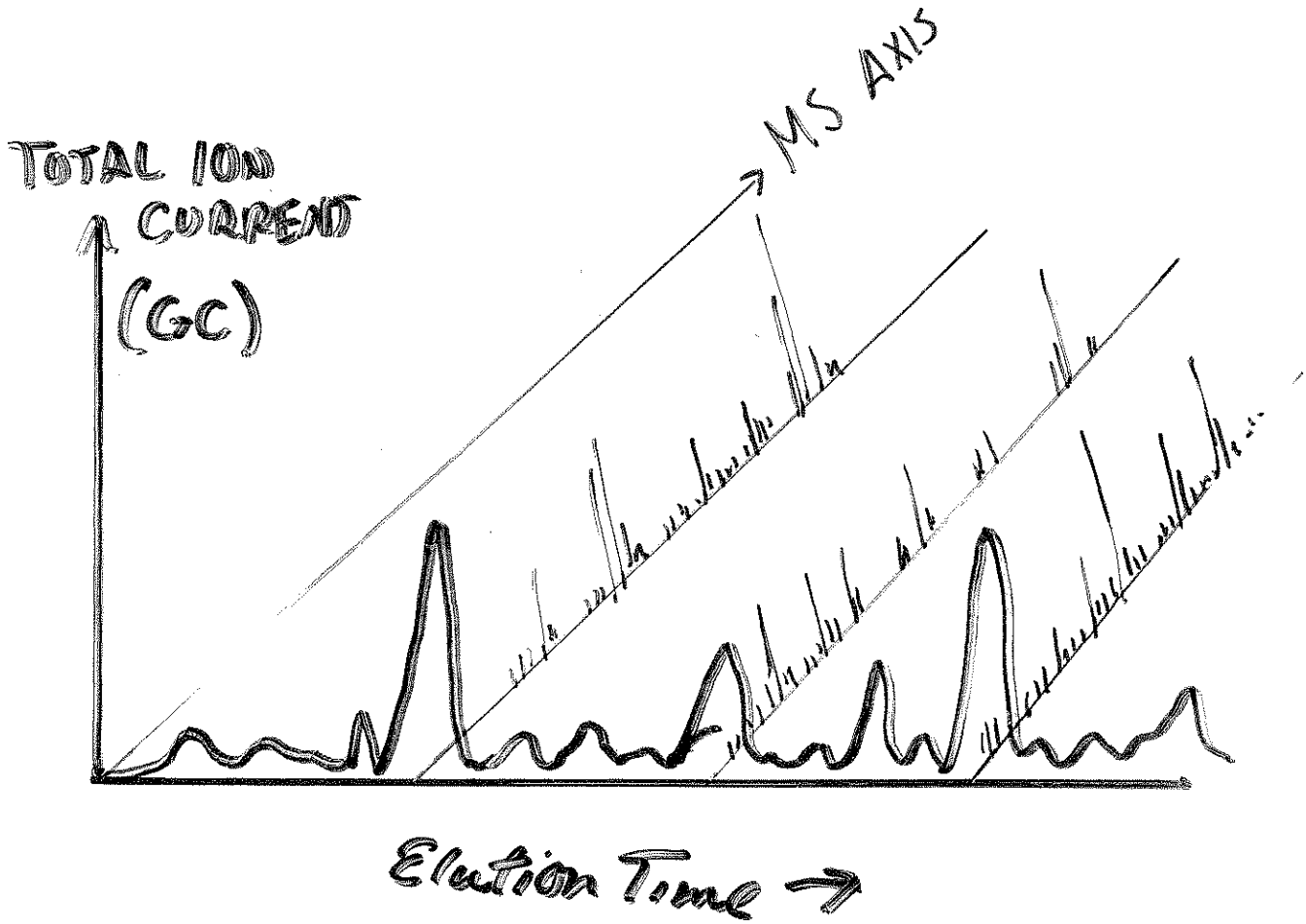


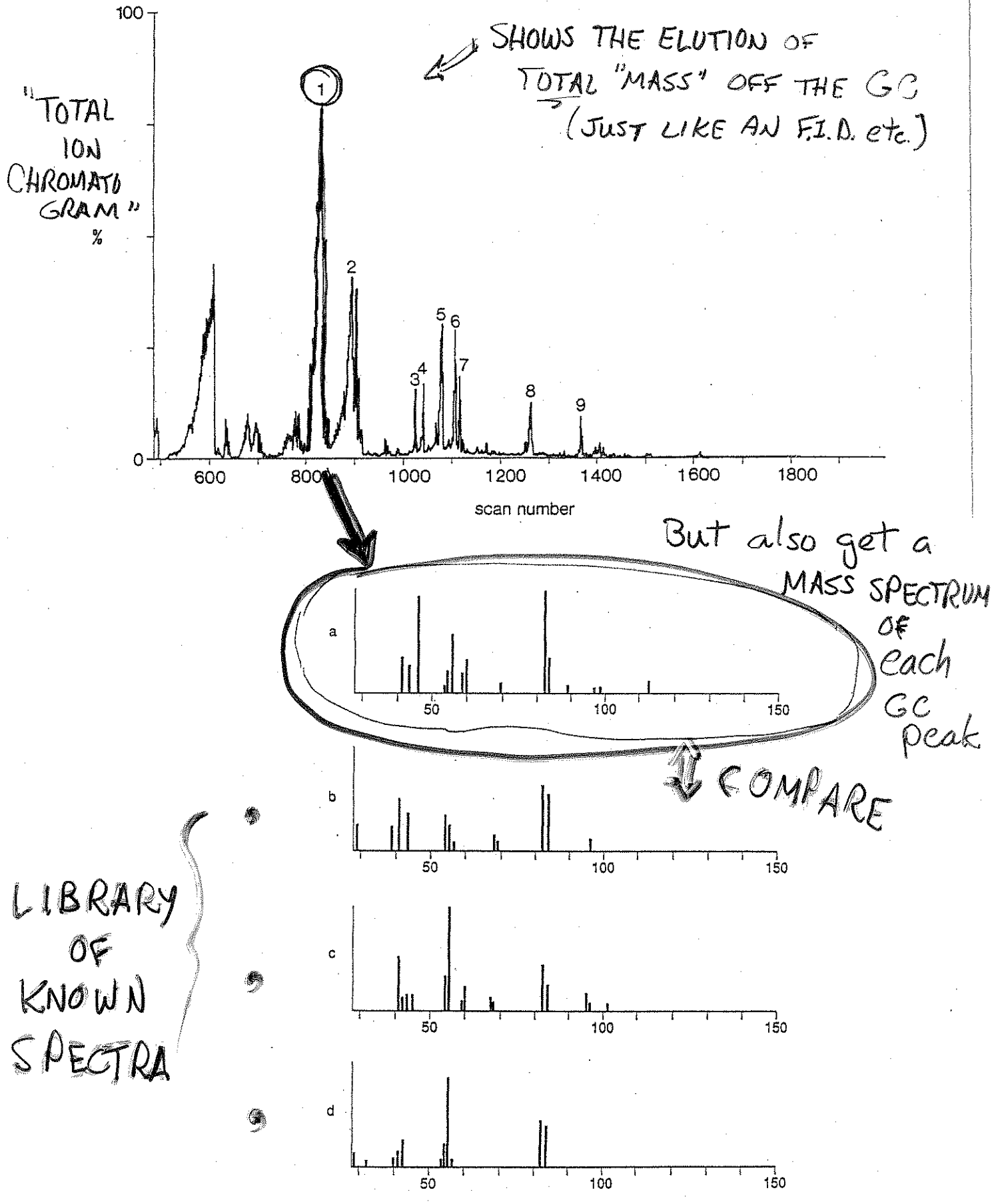
TYPICAL GC/MS SYSTEM



TOP VIEW OF MS PART

GC-MS ANALYSIS: Data




"TOTAL ION CHROMATOGRAM"
%
100
0
1
2
3
4
5
6
7
8
9
600
800
1000
1200
1400
1600
1800
scan number
SHOWS THE ELUTION OF TOTAL "MASS" OFF THE GC (JUST LIKE AN F.I.D. etc.)
But also get a MASS SPECTRUM of each GC peak
a
50
100
150
COMPARE
b
c
d
LIBRARY OF KNOWN SPECTRA

QUALITY ASSURANCE

=

A Stated Set of Quality Goals

+

Quality Control

+

Quality Assessment

Quality Assurance: Assure that data meet defined standards of quality with a stated level of confidence.

Quality Control: How you control the quality of the methods so they meet the needs of the user:

- ✓ adequate in precision and accuracy
- ✓ dependable
- ✓ economical

Quality Assessment: Assuring that the quality control is effective. Includes auditing and evaluation of results.

Statistical

Quality

Assurance

Use of data
from a stable
measurement system

to provide
probabilistic confidence
of achieving

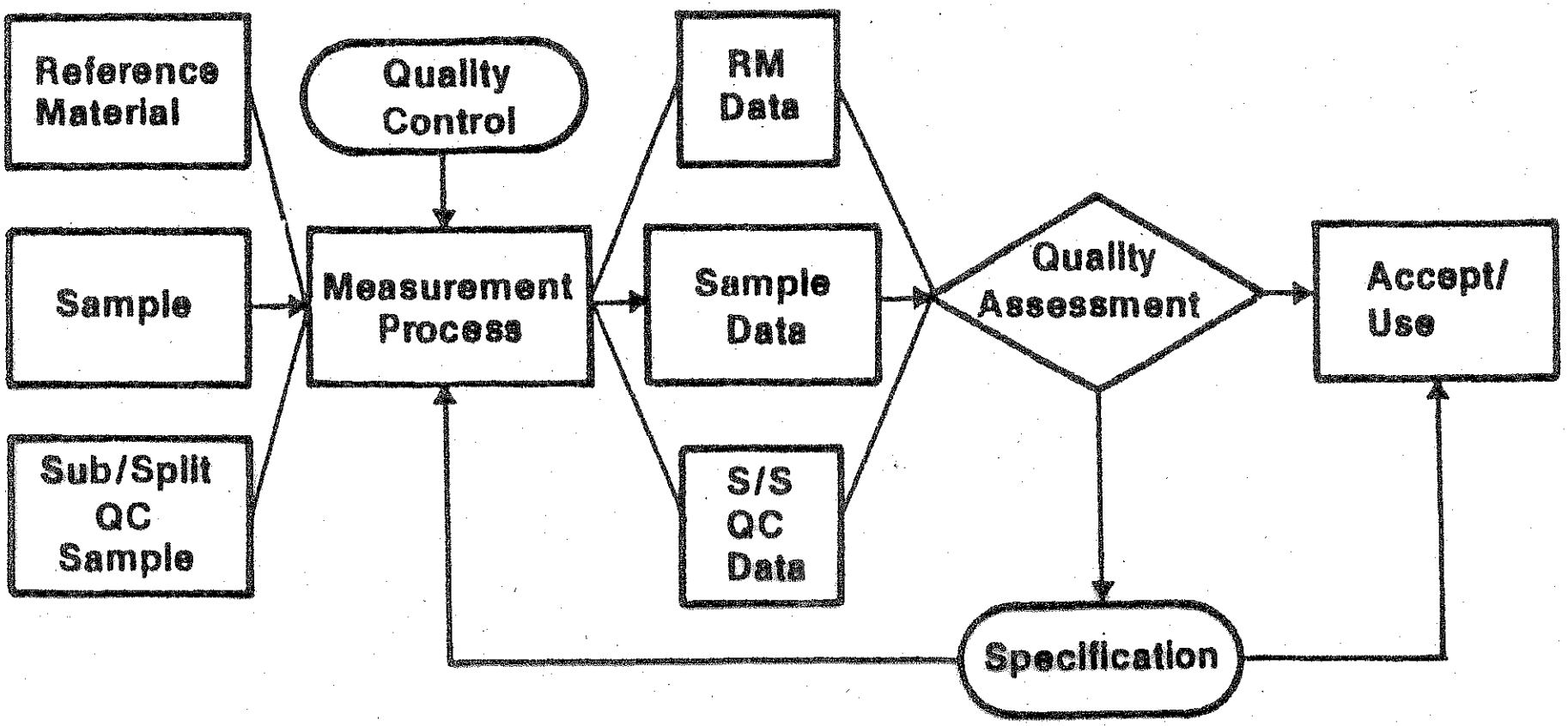
a desired
level
of acceptability.

U.S. EPA guidelines for establishing a "desired level of acceptability":

Completeness:
Did we get all the data we set out to get?

Representativeness:
Do our data accurately and precisely represent what is really going on in the system?

Comparability:
Can we confidently compare one data set with another?



Measurement process quality assurance.

Measurement Quality Objectives

MQOs are specific goals defined by the data users that clearly describe the data quality that is sought for the project phase. The MQOs should be defined according to the following six quality assurance objectives and attributes:

- **Detection Limit**--The lowest concentration of an analyte that a specified analytical procedure can reliably detect
- **Bias**--The difference between an observed value and the "true" value (or known concentration) of the parameter being measured; bias is the first component of accuracy, which is the ability to obtain precisely a nonbiased (true) value
- **Precision**--The level of agreement among multiple measurements of the same characteristic; precision is the second component of accuracy
- **Representativeness**--The degree to which the data collected accurately represent the population of interest (e.g., contaminant concentrations)
- **Comparability**--The similarity of data from different sources included within individual or multiple data sets; the similarity of analytical methods and data from related projects across AOCs
- **Completeness**--The quantity of data that is successfully collected with respect to the amount intended in the experimental design.

Replicates [Precision Check]

- Analytical: Sample divided in the lab
- Field Replicates: Several samples in the field
- Field Split Samples: One field sample split in the field

Blanks: [Check on Contamination]

- Reagent Blank: Pure water in lab taken through process
- Field Blank: Pure water taken into field and "sampled"

Reference Materials: [Check on Bias]

- Carefully standardized materials with known levels of the compounds
- Can be pure samples or environmetal matrices with known contamination levels
- Available from licenced sources and NIST

Spikes

- Matrix spikes: Known amount added to the matrix before analysis
- Surrogate spikes: Something similar to analyte but not actually in the sample; allows tracking of the amount of *recovery* of analyte

Sample Custody

"Chain of custody" is a set of procedures used to provide an accurate *written record* that can be used to trace the possession of a sample from the moment of its collection through its introduction into a data set.

The National Enforcement Investigations Center of EPA defines custody of a sample in the following ways:

- It is in your actual possession, or
- It is in your view, after being in your physical possession, or
- It was in your possession and then you locked or sealed it up to prevent tampering, or
- It is in a secure area.

AEROTECH LABORATORIES, INC

1501 W. Knudsen Drive · Phoenix, Arizona 85027
623-780-4800 · Fax 623-780-7695 · 1-800-651-4802
www.aerotechlabs.com

Lab Number

Customer Number: | Page _____ of _____

Customer

Address

City, State, Zip

Contact | Sampler

Phone | Project Name

FAX | Project Number

P.O. Number | Fax Results Y N

E-mail | email Results Y N

Sample Type Codes

A - Air D - Dust WC - WallChek

B - Bulk W - Water S - Surface Swab

T - Tape Other _____

Sample Information

#	Sample Identification	Date	Type	Analyses Requested	Area/ Volume

Instructions/Special Requirements:

Date	Time	Samples Relinquished By	Samples Received By