YILDIZ TECHNICAL UNIVERSITY
FACULTY OF ART & SCIENCE
DEPARTMENT OF CHEMISTRY

# ANALYTICAL CHEMISTRY LABORATORY NOTEBOOK

**Student**

**Name-Surname:**

**Number:**

**Department:**

**Term/Group Number:**

**Starting Date of Laboratory: …. / ….. / ……..**

**It is an attachment of the Book of Analytical Chemistry Laboratory,**

**can not be sold separately.**

# YILDIZ TECHNICAL UNIVERSITY

# ANALYTICAL CHEMISTRY

# LABORATORY NOTEBOOK

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# LABORATORY NOTEBOOK

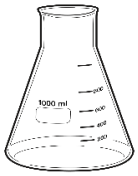
| | | |
|---|---|---|
| **NAME-SURNAME** | **NUMBER** | Photo |
| | | |
| **E-mail** | **Mobile Phone** | |
| | | |
| **LECTURER** | | |
| **TERM** | **ASSISTANT** | |
| | | |

**All students must obey Analytical Chemistry Laboratory General Rules below:**

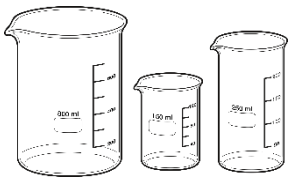
- Attendance is compulsory.
- All students must wear **lab coats, goggles/glasses and gloves** at all times.
- Do not eat food, drink beverages, or chew gum in the laboratory.
- No smoking is permitted in the laboratory.
- Do not enter laboratory without your laboratory manual and notebook.
- Each student must read and summarize the necessary parts from the laboratory manual at home and be ready for the laboratory.
- You will take a written or oral entrance quiz at the beginning of each analysis. Their credits will be added your grade.
- Students should work in the lab silently. Moving around banks, talking loudly and going out without permission are forbidden.
- Broken glass should not be used. Place it in the designated glass disposal container.
- Keep your work space clean and tidy. The working space, desk drawers, cabinets, instruments must be kept neat and clean at all times. Liquid or gas valves must be controlled and turned off at the end of laboratory working at all times.
- Retain all laboratory equipments, materials and chemicals used on the reserved area. When lab work is completed, all materials must be returned to their proper places and used benches, instruments and glassware must be cleaned up.
- Keep analytical balances clean and avoid them dislocate.
- Check the label on all chemical bottles twice before removing any of the contents. Take only as much chemical as you need with clean pipette or spoon (do not use stock solutions directly).
- Pipette bulbs must always use in order to transfer solutions with pipette, especially for acids and bases.
- Most of the chemicals in the laboratory are toxic and highly corrosive. Avoid contact between these liquids and the skin.
- Perform all work involving hazardous or volatile materials in a fume hood.
- Concentrated acid and base solutions should not pour a sink.
- The mouth of the glassware containing the solution to be heated should never be pointed toward anyone.
- Volatile liquids and solids that are toxic or irritating should be handled under fume hoods.
- All injuries and accidents must be reported to the instructor.


Harmful
Explosive
Corrosive
Dangerous for the environment
Flammable
Toxic
Oxidizing
Radioactive
Biohazard
Poison
Oxidizing
General danger
Explosive
Flammable
Electrical hazard

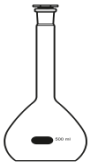

5 steps to
HAZCHEM SAFETY
1
Know where material safety data sheet are kept
MATERIAL SAFETY DATA SHEETS
2
Store chemical in an appropriate storage facility
3
Put chemicals away when not in use
CHEMICALS
4
Keep chemicals in their original containers
CHEMICAL
5
Dispose of chemicals in an appropriate manner (environmental friendly)



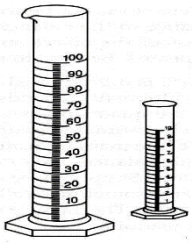
Conical flask



Beaker

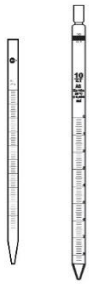


Volumetric flask

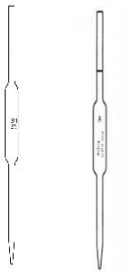


Graduated cylinder

Dropper

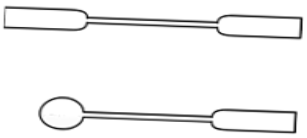


Pipette



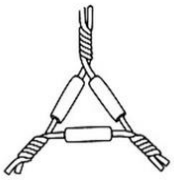
Volumetric pipette

Burette

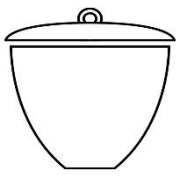


Spatula

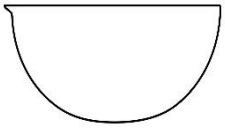
Desiccator



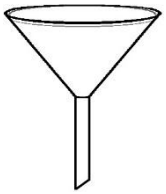
Clay triangle



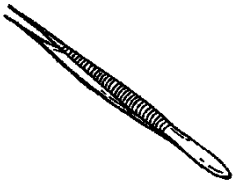
Porcelain crucible



Porcelain capsule



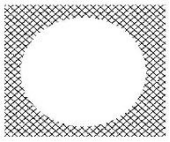
Funnel



Tongs

Watch glass

Bunsen burner



Asbestos wire

Washing bottle

Pipette bulb

Crucible tongs

Burette clamp

Support

## Concentration Definitions

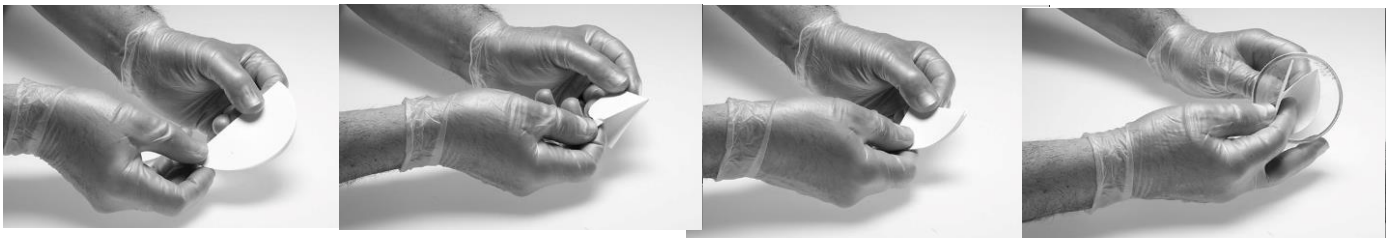
| Concentration Term | Ratio |
|---|---|
| Molarity (M) | $\frac{\text{amount (mol) of solute}}{\text{volume (L) of solution}}$ |
| Molality (*m*) | $\frac{\text{amount (mol) of solute}}{\text{mass (kg) of solvent}}$ |
| Parts by mass | $\frac{\text{mass of solute}}{\text{mass of solution}}$ |
| Parts by volume | $\frac{\text{volume of solute}}{\text{volume of solution}}$ |
| Mole fraction (*X*) | $\frac{\text{amount (mol) of solute}}{\text{amount (mol) of solute + amount (mol) of solvent}}$ |

TYPICAL CONCENTRATIONS OF CONCENTRATED ACIDS AND BASES
(as written on the labels of their containers)

| ACID/BASE NAME | WT% | DENSITY (sp. gr) (g/ml) | MOLARITY |
|---|---|---|---|
| Acetic acid | 99.7% | 1.05 g/ml | 17.4 |
| Ammonium hydroxide (aqueous ammonia) | 28% | 0.89 g/ml | 14.6 |
| Hydrochloric acid | 37% | 1.18 g/ml | 12.0 |
| Nitric acid ($HNO_3$) | 70% | 1.40 g/ml | 15.6 |
| Phosphoric acid | 85% | 1.69 g/ml | 14.7 |
| Sulfuric acid | 96% | 1.84 g/ml | 18.0 |

## TRANSITION RANGE OF pH INDICATORS

| Indicator | Low pH color | Transition pH range | High pH color |
|---|---|---|---|
| Gentian violet (Methyl violet 10B) | yellow | 0.0–2.0 | blue-violet |
| Leucomalachite green (first transition) | yellow | 0.0–2.0 | green |
| Leucomalachite green (second transition) | green | 11.6–14 | colorless |
| Thymol blue (first transition) | red | 1.2–2.8 | yellow |
| Thymol blue (second transition) | yellow | 8.0–9.6 | blue |
| Methyl yellow | red | 2.9–4.0 | yellow |
| Bromophenol blue | yellow | 3.0–4.6 | purple |
| Congo red | blue-violet | 3.0–5.0 | red |
| Methyl orange | red | 3.1–4.4 | yellow |
| Screened methyl orange (first transition) | red | 0.0–3.2 | grey |
| Screened methyl orange (second transition) | grey | 3.2–4.2 | green |
| Bromocresol green | yellow | 3.8–5.4 | blue |
| Methyl red | red | 4.4–6.2 | yellow |
| Azolitmin | red | 4.5–8.3 | blue |
| Bromocresol purple | yellow | 5.2–6.8 | purple |
| Bromothymol blue | yellow | 6.0–7.6 | blue |
| Phenol red | yellow | 6.4–8.0 | red |
| Neutral red | red | 6.8–8.0 | yellow |
| Naphtholphthalein | colorless to reddish | 7.3–8.7 | greenish to blue |
| Cresol Red | yellow | 7.2–8.8 | reddish-purple |
| Phenolphthalein | colorless | 8.3–10.0 | fuchsia |
| Thymolphthalein | colorless | 9.3–10.5 | blue |
| Alizarine Yellow R | yellow | 10.2–12.0 | red |





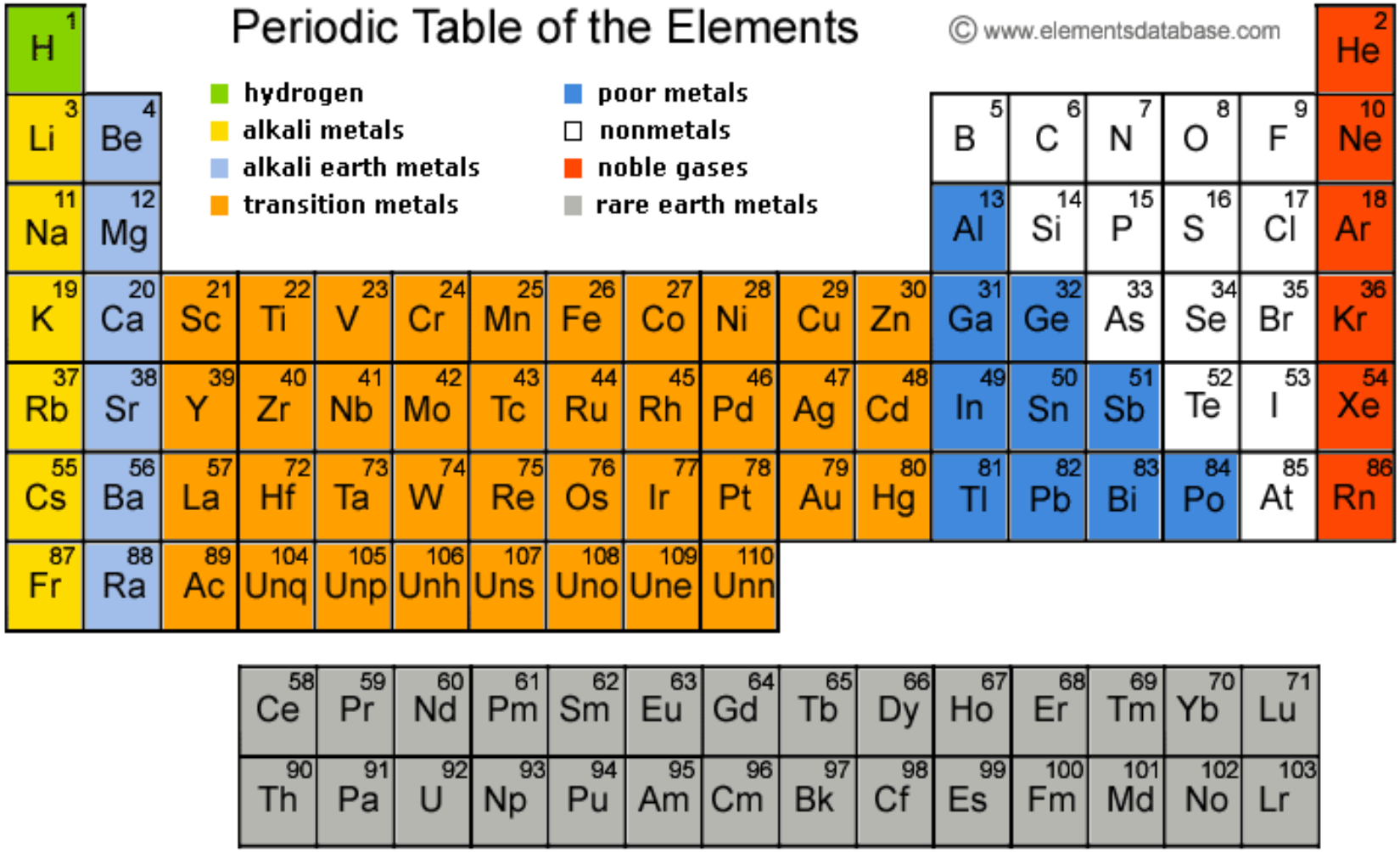











Periodic Table of the Elements
© www.elementsdatabase.com
hydrogen
alkali metals
alkali earth metals
transition metals
poor metals
nonmetals
noble gases
rare earth metals
H 1
He 2
Li 3
Be 4
B 5
C 6
N 7
O 8
F 9
Ne 10
Na 11
Mg 12
Al 13
Si 14
P 15
S 16
Cl 17
Ar 18
K 19
Ca 20
Sc 21
Ti 22
V 23
Cr 24
Mn 25
Fe 26
Co 27
Ni 28
Cu 29
Zn 30
Ga 31
Ge 32
As 33
Se 34
Br 35
Kr 36
Rb 37
Sr 38
Y 39
Zr 40
Nb 41
Mo 42
Tc 43
Ru 44
Rh 45
Pd 46
Ag 47
Cd 48
In 49
Sn 50
Sb 51
Te 52
I 53
Xe 54
Cs 55
Ba 56
La 57
Hf 72
Ta 73
W 74
Re 75
Os 76
Ir 77
Pt 78
Au 79
Hg 80
Tl 81
Pb 82
Bi 83
Po 84
At 85
Rn 86
Fr 87
Ra 88
Ac 89
Unq 104
Unp 105
Unh 106
Uns 107
Uno 108
Une 109
Unn 110
Ce 58
Pr 59
Nd 60
Pm 61
Sm 62
Eu 63
Gd 64
Tb 65
Dy 66
Ho 67
Er 68
Tm 69
Yb 70
Lu 71
Th 90
Pa 91
U 92
Np 93
Pu 94
Am 95
Cm 96
Bk 97
Cf 98
Es 99
Fm 100
Md 101
No 102
Lr 103

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**RESULTS AND CALCULATIONS:**

**NAME-SURNAME:** **DATE:**

**…./…./….**

**NUMBER:**

**RESULTS AND CALCULATIONS:**