Biopharmacy

Supervisor
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Wear gloves

Wear laboratory coats

Wear safety glasses

Wash hands

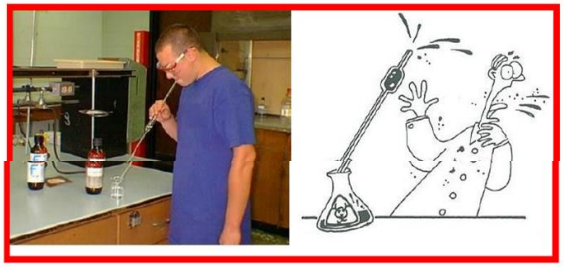
Tie back long hair

Wear closed-toe shoes that cover the top of the foot

Do not wear dangling jewelry and long sleeves

Do not handle personal items cell phones, calculators, pens, pencils, etc.)

Do not mouth pipette



Do not bring food and drinks

Do not handle broken glass with fingers; use a dustpan and broom.

The practical course will cover the following experiments!!

- Exp .1 Construction of calibration curve of Salicylic acid with the application of statistics
- EXP .2 In vitro evaluation of antacid
- EXP .3 In vitro evaluation of bulk forming laxatives
- EXP .4 Hydrolysis of acetyl salicylic acid solution in Sorensen phosphate buffer at pH 8
- Exp.5 pH and solvent effect on drug solubility
- EXP.6 In vitro dissolution of per-oral tablet

Introduction Biopharmaceutics and Pharmacokinetics

- **Biopharmaceutics** : the study of influence of **formulation** on **the therapeutic activity** of drug products
- **Pharmacokinetics** : deal with the mathematical description of biological processes which **affect the time course** of absorption and fate of drug in the body and which are themselves **affected by drugs**.

By kinetic we learn about :

- Rate of absorption
- Rate of elimination of a drug and can
- Calculate the half life of a drug in the body

So we can predict what will be the duration of correct dosage regimen for maintaining a therapeutic level

- During the practical course certain dosage form will be evaluated in vitro (means outside the body in the lab)
- In vivo (means inside the body)

Lab 1 :Preparation of calibration curve of salicylic acid with the application of statistics

Calibration curve is a curve which is prepared from a series of standard solutions to use it as a reference curve to obtain the concentration of an unknown sample of the same drug.

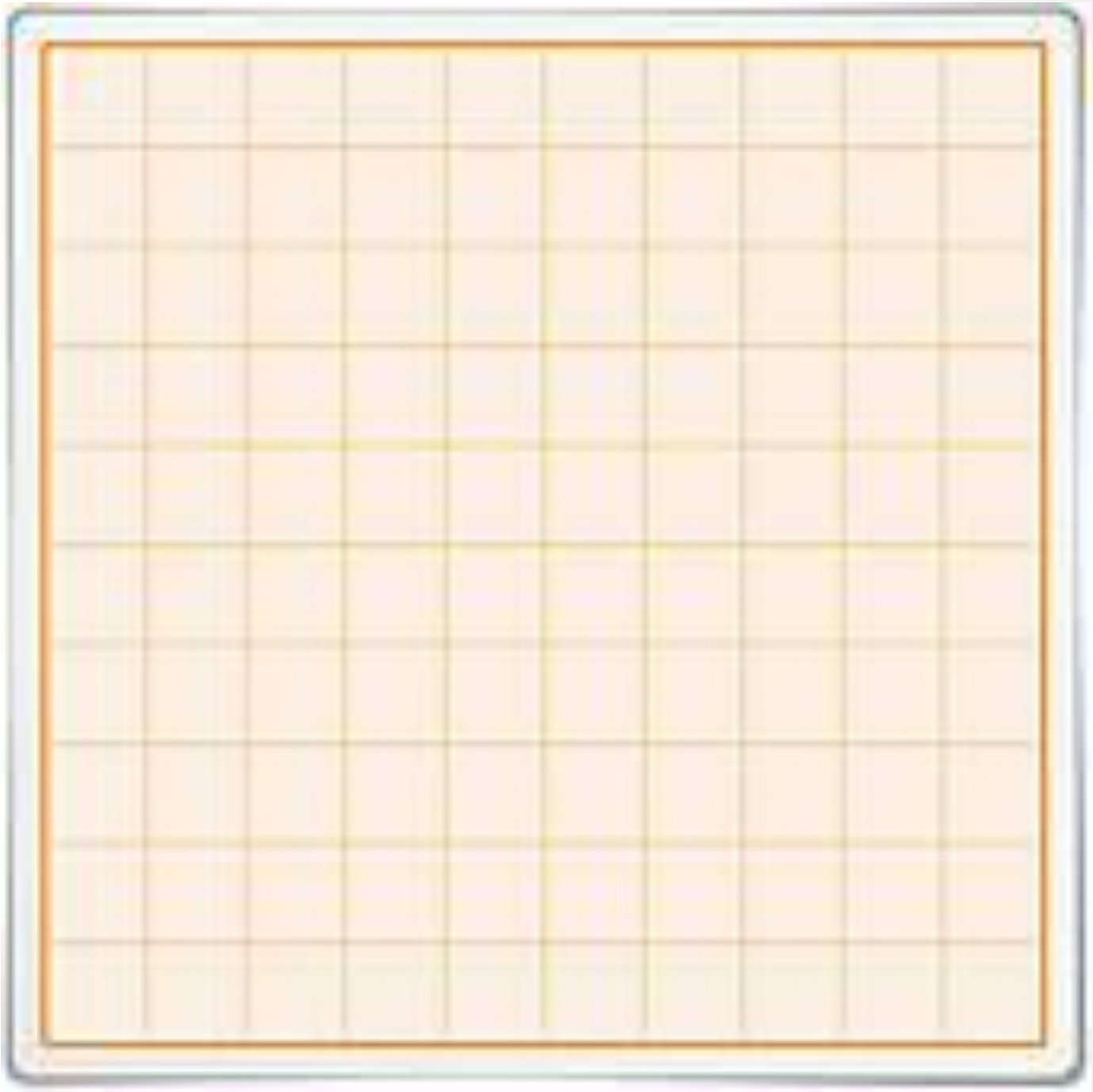
Curve fitting: To fit a straight line among scattered points to represent the linear trend of the points, one can use:

1- *Eye fitting*: often it is possible to fit the data points by eye to a straight line, but this method is not reliable.

2- *Least square fitting*: a commonly preferred method for obtaining estimates of parameters used in curve fitting, is the method of least square.

Eye fitting :

X values	Y values
1	0.5
2	1
3	1.5
4	2



Let us watch the following scientific video

The least square method is based on the equation which minimizes the sum of the squares of the deviations of the observed values from the line $\left[\sum(y-\bar{y})^2\right]$, where y is the observed value and $\bar{y}$ is the calculated value. In other words, the line of best fit is obtained when the sum of the squares of the vertical distances from the points to the line is a minimum. Such a line is called the linear regression line of y on x, based on the principle of least squares as in Fig. 1.

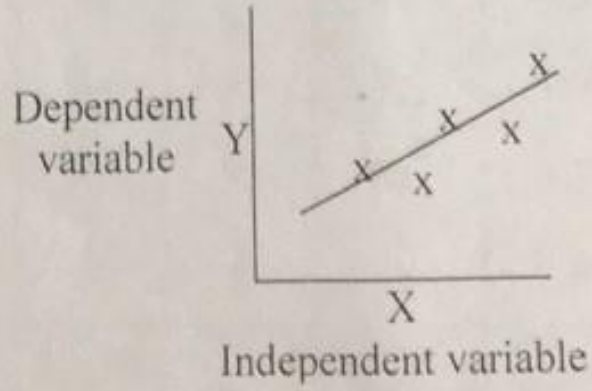
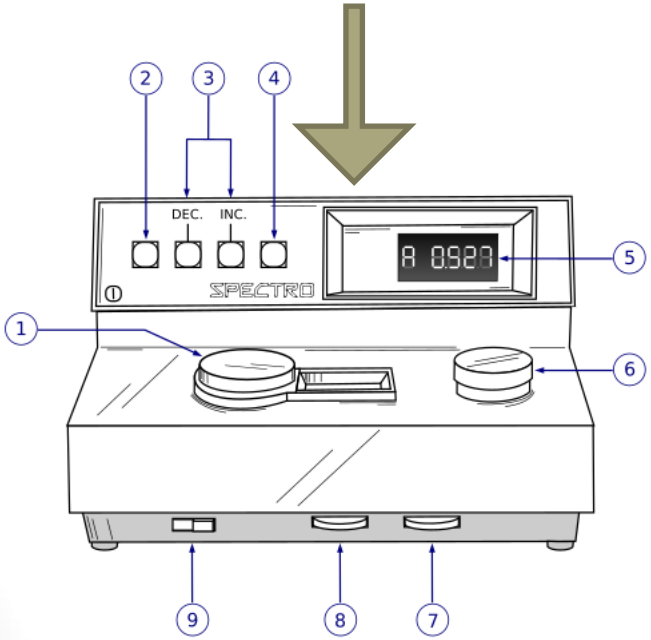


Fig. 1: Schematic plot of curve fitting by least square method.

- any value for X will have two Y values , **an observed one** and a **calculated one**



$$\bar{y} = c + b \,.\, x \,.....$$

To calculate Y :

$$\bar{y} = c + b \,.\, x \ldots\ldots\ldots\ldots\ldots \text{Eq. (1)}$$

$\bar{y}$ = Calculated value.

c = Intercept of the least square line with the ordinate.

b = slope of the least square line.

Number	x	y	x^2	x.y.
1	x_1	y_1	x_1^2	x_1y_1
2	x_2	y_2	x_2^2	x_2y_2
3	x_3	y_3	x_3^2	x_3y_3
↓	↓	↓	↓	↓
n	$(\sum x)$	$(\sum y)$	$(\sum x^2)$	$(\sum x.y)$

$$\hat{b} = \frac{\left(\sum x.y\right) - \left(\sum x\right)\left(\sum y\right)}{n\left(\sum x^2\right) - \left(\sum x\right)^2} \quad \ldots$$

$$c = \frac{\left(\sum y\right) - b\left(\sum x\right)}{n} \quad \ldots\ldots$$

Or you can use excel