Wednesday, 28th Sept 2022

CHEM PATHOLOGY

Qualitative Analysis
Quantitative Analysis
Semi-Quantitative Analysis

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- Atom is the smallest unit of a substance that takes part in chemical reaction.
- An element is a pure chemical substance made up of some type of atom.
- Compound contains atoms of different elements chemically combined in a fixed ratio.

QUALITATIVE ANALYSIS

It is a test in which the presence or absence of a substance (Analyte) in a mixture is detected by chemical means.

SEMI-QUANTITATIVE ANALYSIS

It is an estimation in which the degree of positivity of a test roughly indicate the quality or quantity of substance being analyzed e.g Presence of reducing substance in urine is expressed as

QUANTITATIVE ANALYSIS

It's an analysis in which the exact quantity of an analyte is measured e.g. Spectrophotometric Analysis, Titrimetric

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SIMPLE ANALYTICAL TECHNIQUE

An Analytical Technique is a method used to determine the conc. of a chemical composition or element.

There are wide varieties of techniques used for analysis: SIMPLE WEIGHING (gravimetric analysis)

TITRATIONS (Titrimetric Analysis

And very advanced techniques

- Chromatography
- Colorimetry

COLORIMETRY

It's an analytical technique which means measurement of Colours.

It's a technique used to measure the Conc. of Coloured Compounds in a solution. It involves quantitative estimation of Colour. The instrument used is Colorimeter.

It is classified into two

- Visual Colorimetry
- Instrumental Colorimetry

VISUAL COLORIMETRY

It's said to be non-instrumental technique where natural light is used as light source, and determination are usually made using either a colour comparator or by merging the colour of an unknown with that of a series of standards of known concentration, using the eyes as a detector.

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INSTRUMENTAL COLORIMETRY

In this technique, an instrument is used. Where the eye as a visual or sensing aid is replaced by a photoelectric cell so that error due to personal characteristic of each indicator is grossly eliminated.

The instrument used is PHOTOELECTRIC COLORIMETER or ABSORPTIOMETER.

SI UNITS

10^1	da	deca
10^2	h	hecta
10^3	K	Kilo
10^{-1}	d	deci
10^{-2}	C	Cati
10^{-3}	M	Milli

$1\ mg/dl = 1mg/100\ ml$

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VOLUMETRIC ANALYSIS

This is also called Titrimetric Analysis.

It's a widely used quantitative analytical techniqu

It involves measurement of volume of solution of kn Concentration which is used to determine the concentrat of the analyte.

It involves the gradual addition of a solution of accurately known conc. to another solution of unknow Conc. until the chemical reaction b/w the two solution Complete.

In a titration, the measured and controlled volume of a standardized solution containing a known conc

of reactant-A from a burette is added incrementally to a sample of known volume containing a substance to be determined (Analyte).

The Analyte is unknown concentration B

- The titration proceeds until reactants B is just consumed.

Instrument used is STOICHIOMETRIC COMPLETION.

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An indicator such as phenol red is a substance that has distinctive different colour in acid or base.

It is usually added to the rxn flask to signal when and if all the analytes has reacted.

The use of indicators

Enables the end point to be observed.

In this, the titrants reacts with a second chemical which is the indicator after completely reacting with the analyte in the solution.

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SPECTOPHOTOMETRY

It's the quantitative measurement of a reflection or transmission properties of a material as a function of movement. It's more specific that the general terms "Electromagnetic Spectroscopy" cause.

Spectophotometry deals with visible light near ultraviolet and near infrared.

It uses photometers that can measure a light beams intensity as a function of its colour (wavelength) it is known as spectophotometers.

In Spectophotorimetric analysis measurements of light intensity transmitted by a sample can be carried out at different wavelength regions which extends from ultraviolet to the infrared region of the electromagnetic spectro using spectrum photometer.

The difference between them is the method of producing monochromatic light (light of specific wavelength).

Spectophotometer makes use of diffraction grating or prism.

Types

Visible

Ultraviolet

Visible

It covers a range of 360-1000 nanometer

It has one light source and two photocell.

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Ultraviolet

It covers a ~~range of 185-1000 nanometer~~

It has ~~two~~ light source and two photocells.

A biochemical substance to be estimated either colorimetrically or spectrophotorimetrically. It must be coloured or should be able to form chromosomes through addition of suitable reagents. For a successful titrimetric analysis, these needs to be true :-

1) The titrants should be standard or standardized.

2) The reaction should proceed to a stable and well defined equivalence point.

3) The equillabrce point must be able to be de
cted
4) The titrants and samples volume or mass mu
be accurately known.
5) The reaction be nearly Complete at the eP i
Chemical equilibrium should favour the forma
tion of products.
6) The reaction rate should be fast enough
be practical.

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FLAME-EMISSION PHOTOMETRY

This is a branch of spectroscopy in which the species examined in the spectrometer are in the form of atoms. ANYAMELE EMMANUEL UZOMA

Flame photometry is based on measurement of the intensity of light emitted when a metal is introduced into flame.

A wavelength of colour tells what the element is (Qualitative) while the color intensity tells how much of the element is present (Quantitative).

The instrument employed used is Photoelectric Flame photometer. It is an instrument employed or used in ~~quantitative analysis~~ inorganic chemical analysis. to determine the conc. of certain metal ions.

When a metal soln of salt is ~~bond~~ burned, the metal produces a colored flame and each metal ion gives a different colored flame.

Catheterization.

Should be obtained

The urine must be anaysed within an hour of Collection, or if ~~reg refrigerat~~ refrigerated at 2-8°C, it can be analyz within 8 hours If the urine is not analyzed within these time limits, several Changes will occur such as baeteri. multiplication which may Cause false positive nitrite test.

Urease-producing organisms will degrade urea to amonia, So, it will alkanyze the PH

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PHYSICAL CHARACTERISTICS OF URINE

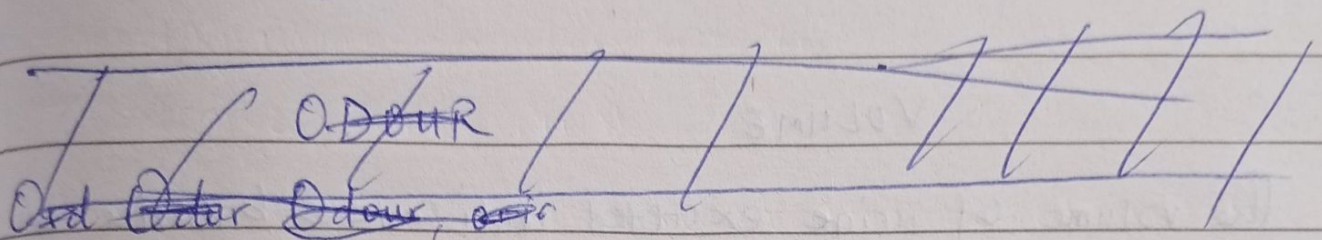
VISUAL APPEARANCE- The Colour of urine Correlates with Con (the darker the color, the more Concentrated the specimen The different Colours of urine is as a result of different excreted pigment.

Yellow & Amber are usually due to Urochromes.

Yellowish-brown to ~~gree~~ green Colour is a result of bile pigment oxidation. Red and brown Colour after Standing are due to porphyrins, whereas, reddish

brown in fresh specimens comes from haemoglobin or red cells

NB- Some drugs can cause change in colour



ODOUR

It has little diagnostic significance. The characteristics pungent odour or fresh odour is due to volatile aromatic acid Urinary Tract Infection (UTI) imparts a noxious faecal Smells to urine whereas, the urine of diabetics often Smells fruity.

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TURBIDITY

The Cloudiness of a urine specimen depends on a Ph and dissolved solid Compositions.

Turbidity, generally made due to loss of bacteriuria. Whereas a smoky appearance is seen in chemateuria. Tradelight cloudiness is observed when the specimen is full of mucus

NB- In alkaline urine, Suspended precipitate of amor phosphate and carbonase, may be responsible for turbidity, Whereas in acidic urine, amorphose ureate may be the cause.

VOLUME

The volume of urine excreted indicates balance bl fluid ingestion and water lost from the lungs lungs, sweat and intestine.

Most adults produce from 760 - 2000 ML every 2 hours

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