

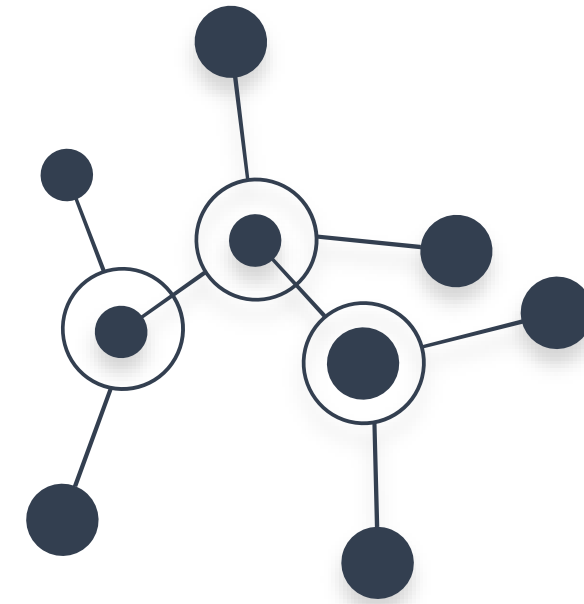
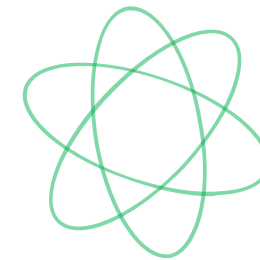


Introduction

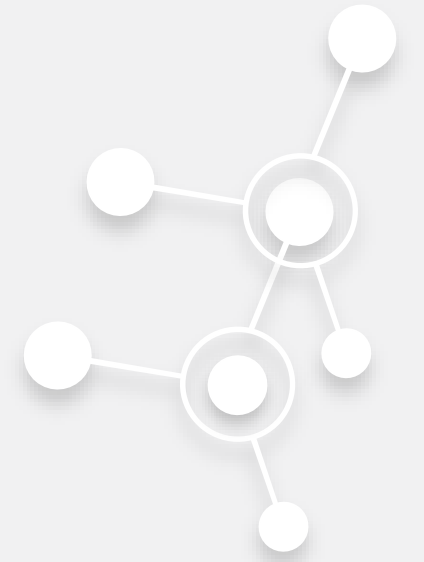
Specimen collection

Clinical Chemistry

Fifth Stage



Introduction to clinical laboratories



01

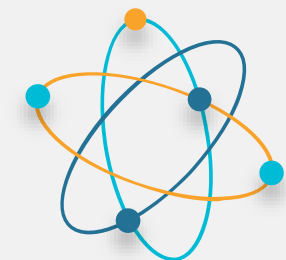
Clinical labs are important in diseases diagnosis, determination its severity and patient response to specific treatment

02

Diagnosis of any disease is first done by physical examination by physician and confirmed by lab diagnostic tests.

03

Lab values are very important in determination of disease severity, drug doses and in follow up.



The sections of clinical laboratory are



01

Clinical pathology

02

Hematology

03

Clinical chemistry

04

Clinical microbiology

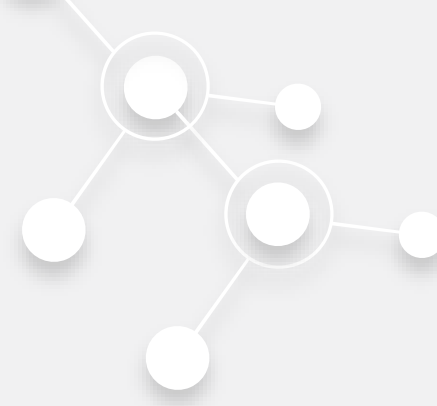
05

Serology

06

Histology

Clinical chemistry:



- It deals with the applications of biochemistry laboratory to find out the cause of a disease.
- Types of samples that are used in testing:
- Body fluids: blood, serum, plasma, urine, cerebrospinalfluid (CSF), feces, and other body fluids or tissues.

Biochemical tests in clinical medicine

- Lipid profile
- Diabetic profile
- Kidney profile
- Liver profile
- Electrolyte profile

Lab request and lab report forms

- Lab request form: it fills computerize or paper filled by the doctor then send it to the lab. The lab request contains a list of tests to be performed on specimen of patient. Each lab has its specific request; for example, chemistry request, hematology request... etc.
- Lab report form: it contains the result of patient.



 **LABORATORY REPORTING FORM** Arizona Department of Health Services
Office of Infectious Disease Services
150 N. 18th Avenue, Suite 140
Phoenix, AZ 85007
Tel: (602) 364-3676
Fax: (602) 364-3199

Reporting Laboratory

Name:*	
Director:*	
Address:*	
Phone:*	
Email:	
Contact name:	

Patient

Name:*	
Date of Birth:*	
Gender:*	☐ Male ☐ Female ☐ Unknown ☐ Transgender
Address:*	
Phone:*	
Email:*	

Specimen

Lab Reference/Accn#:	
Collection Date:*	
Specimen Type:*	
Test Type:*	
Result:*	
Result Date:*	

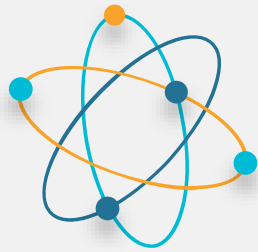
Ordering Facility

Healthcare Provider:*	
Facility Name:*	
Address:*	
Phone:*	
Email:*	

Lab Director/Designee Signature

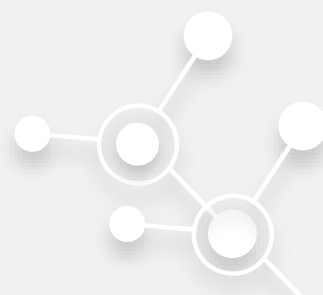
Date

*These fields are required, if available, per Arizona Administrative Code R9-6-204.
See <http://azdhs.gov/labreporting> for additional reporting information.
Revised 10/15/2017



Laboratory work flow cycle:

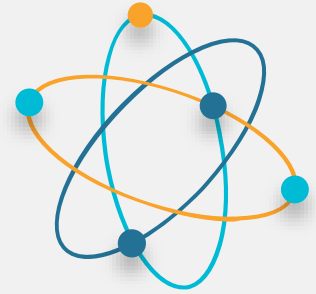
The flow cycle includes the entire steps of laboratory test, starting from test ordering by a doctor until reporting the results.



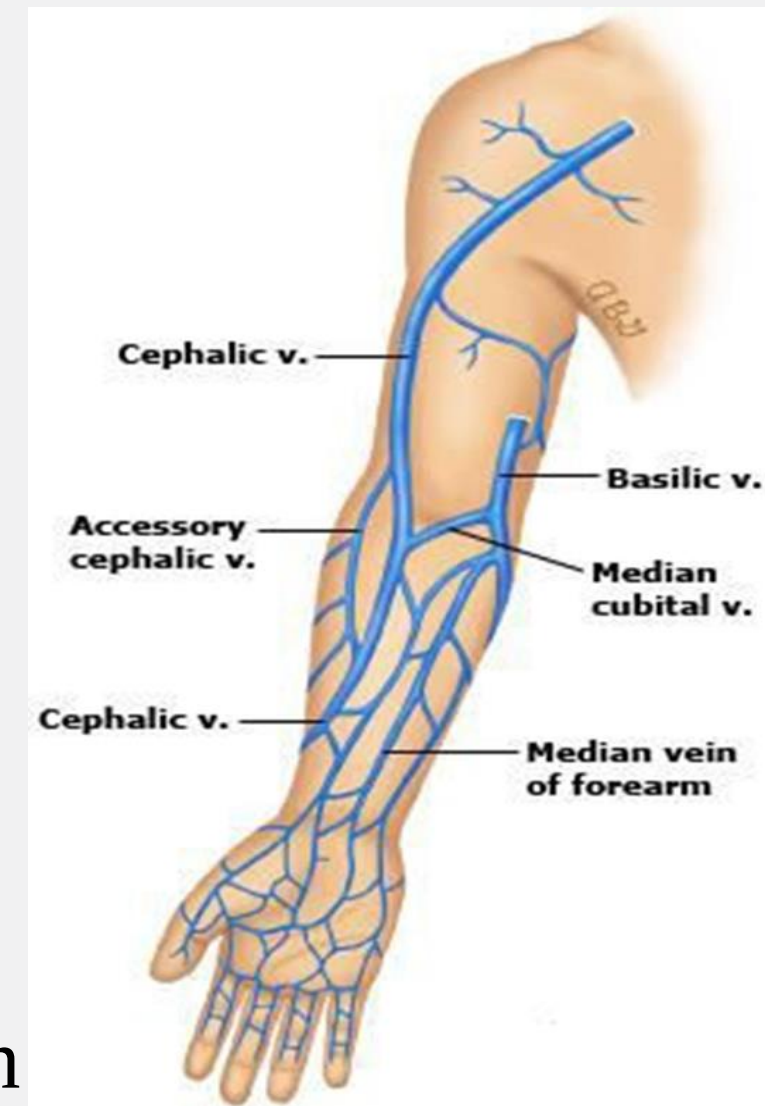
Three phases of laboratory testing:

- ✓ Pre-analytical: test ordering, specimen collection, transport and processing.
- ✓ Analytical-testing.
- ✓ Post-analytical: testing results transmission, interpretation, follow-up, retesting.

Phlebotomy



- Phlebotomy or blood collection: The term phlebotomy refers to blood draw from a vein, artery, or the capillary for lab analysis or blood transfusion.
- Selecting vein site: Usually vein is used to collect blood by venipuncture procedure.
- In adults: most venipuncture procedure use arm vein. On arm, one of three arm veins is used: median cubital vein "located on the middle", cephalic vein or basilic vein "located on both sides".
- Median cubital vein is the best choice, because it has good blood flow than cephalic and basilic which has slower blood flow.



- However if venipuncture procedure is unsuccessful in median capital; cephalic or basilic is used.
- Artery blood is rarely used in special cases as when blood gases, pH, PCO₂, PO₂ and bicarbonate is requested. It is usually performed by physicians.



Preparation of Blood Sample

One of three different specimens may be used:

- whole blood
- Serum
- Plasma

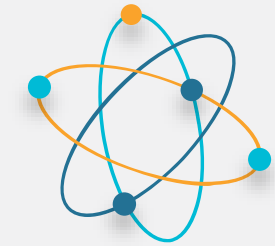
Whole-blood specimen: It must be analyzed within limited time. Over time, cells will lyse in whole- blood which will change the conc. of some analytes as potassium, phosphate and lactate dehydrogenase. Some cellular metabolic processes will continuo which will alter analytes conc. like glucose and lactate.



Difference between Serum and plasma:

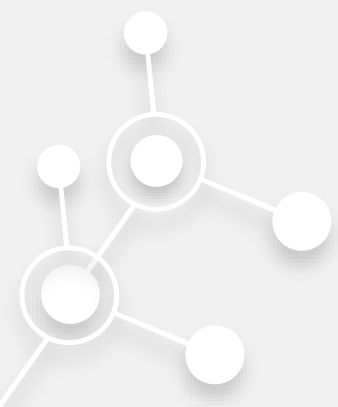
- Serum is the same as plasma except it doesn't contain clotting factors (as fibrin).
- Plasma contains all clotting factors. So, serum and plasma all has the same contents of electrolytes, enzymes proteins, hormones except clotting factors.
- Serum is mainly use in chemistry lab & serology.

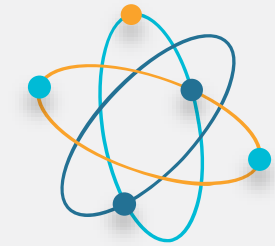




Procedure of Serum preparation

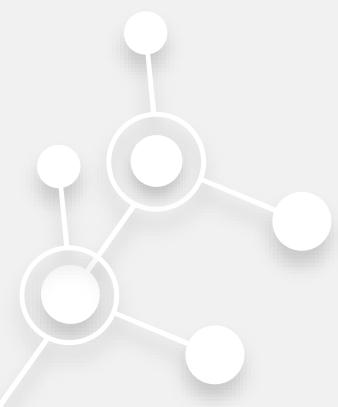
1. Draw blood from patient. Select vacutainer with no anti-coagulant.
2. Allow to stand for 20-30min for clot formation.
3. Centrifuge the sample to speed separation and affect a greater packing of cells.
4. Clot and cells will separate from clean serum and settle to the bottom of the vessel.
5. The supernatant is the serum which can be now collected by Dropper or pipette for testing purposes or stored (-20°C to -80°C) for subsequent analysis or use.

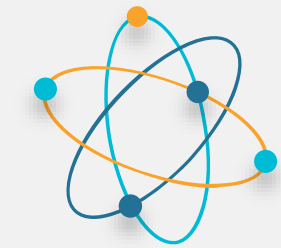




Procedure of plasma preparation

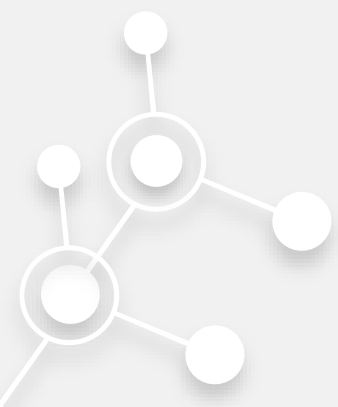
1. Draw blood from patient. Select vacutainer with an appropriate anticoagulant.
2. Mix well with anti-coagulant.
3. Allow to stand for 10min.
4. Centrifuge the sample to speed separation and affect a greater packing of cells.
5. The supernatant is the plasma which can be now collected for testing Purposes or stored (-20°C to -80°C) for subsequent analysis or use.

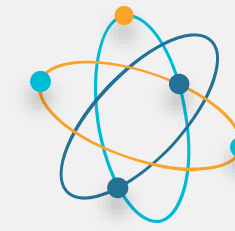




Specimen rejection criteria:

1. Specimen unlabeled
2. Specimen Improperly collected or preserved
3. Specimen submitted without properly completed request form
4. Hemolysis sample.



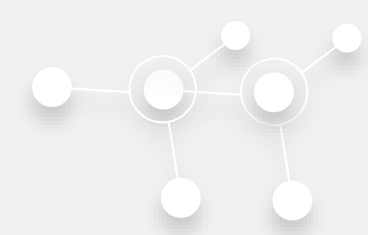


Hemolysis It means liberation of hemoglobin due to rupture of RBCs.

- Due to hemolysis plasma or serum appears pink to red color. It causes elevation in: K^+ , Ca^{2+} , phosphate, SGOT, SLDH and acid phosphatase.
- Hemolysis is occurred due to sampling, transporting and storage (too hot or too cold).
- According to the degree of hemolysis it is classified as

H^+ , H^{++} and H^{+++} .

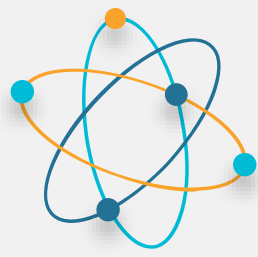
- H^+ may be accepted for some tests that are not affected by RBCs contents as glucose and lactate.
- H^{++} and H^{+++} not acceptable for any test.



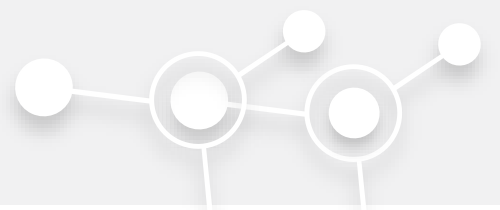
Changes in the serum color indicate one of the following:

1. Hemolyzed: serum appears pink to red due to rupture of RBCs.
2. Icteric: serum appears yellow due to high bilirubin.
3. Lipemic: serum appears milky or turbid due to high lipid.





Blood Collection Tubes



Color-coded Blood Collection Tube



Yellow



Blue



Gray



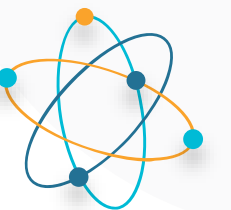
Light Green

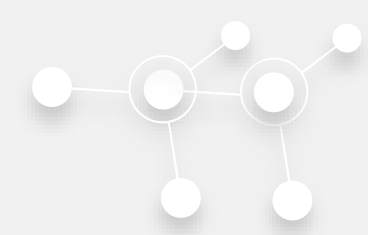


Red

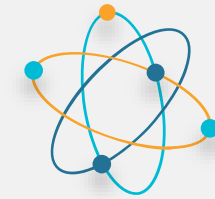


Lavender/Purple





Spectrophotometry



In chemistry, spectrophotometry is the quantitative measurement of the reflection or transmission properties of a material as a function of wavelength. It is more specific than the general term electromagnetic spectroscopy in that spectrophotometry deals with visible light, near-ultraviolet, and near-infrared.

Spectrophotometry involves the use of a spectrophotometer. A spectrophotometer is a photometer that can measure intensity as a function of the light source wavelength.

Important features of spectrophotometers are spectral bandwidth and linear range absorption or reflectance measurement

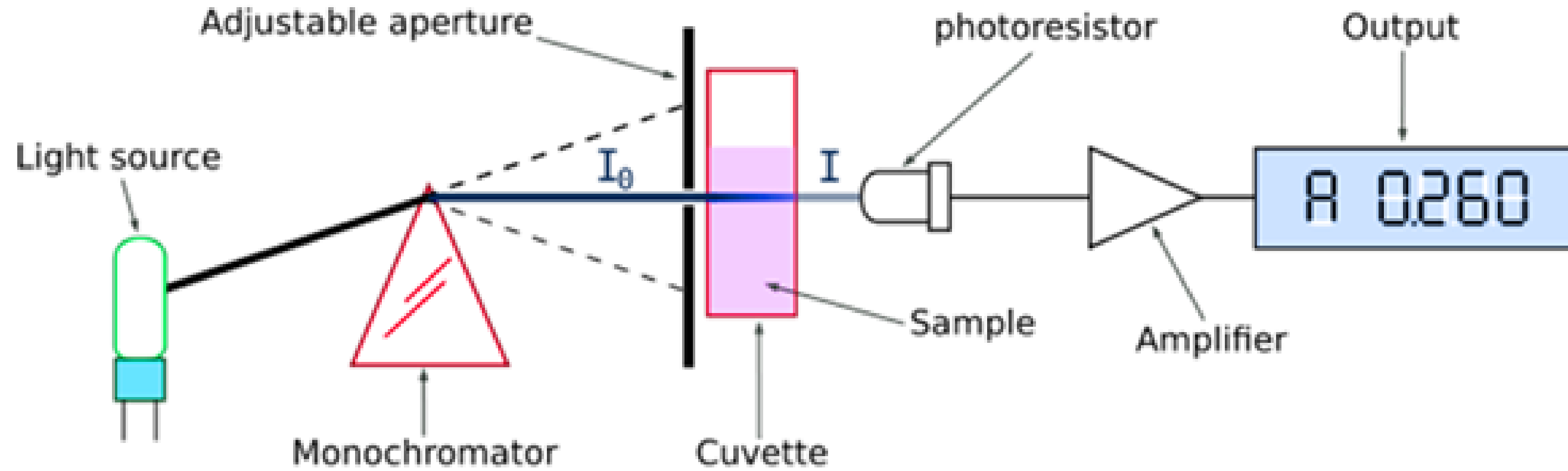
Absorbance and Transmittance

Absorbance is the measure of the quantity of light that a sample absorb (neither transmits nor reflects) and is proportional to the concentration of a substance in a solution.

The absorbance of a solution depends on

- Nature of substance
- Concentration of substance
- Wavelength of light
- Path of light

SPECTROPHOTOMETER





THANK

