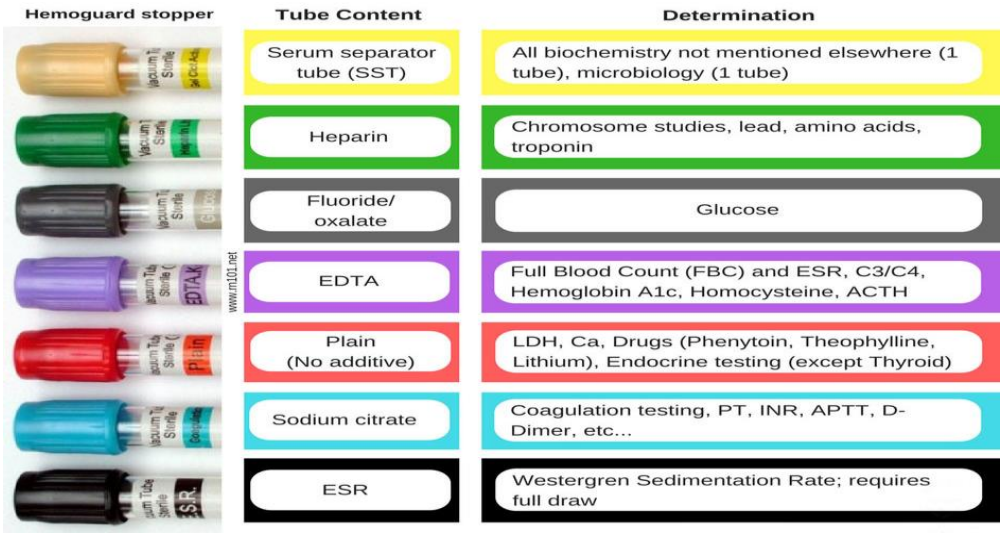
Erythrocyte Sedimentation Rate (E.S.R)

Blood is collected from a vein and mixed with an anti-coagulant (e.g. soluble oxalate compounds), then placed in a narrow vertical tube and the distance that the red blood cells have fallen in a given period of one (or two) hour/s is calculated in millimeters.

Ways of obtaining blood samples

1- Finger puncture: Hand should be warm with gentle massage and skin is cleaned with 70% alcohol, make needle prick or stab in the finger end side with sterile lancet to have free bleeding, squeeze the fingertip if needed.

2- Venipuncture: If large amounts of blood is needed, apply tournicate band firmly to upper part of arm, clean the antecubital fossa (median side of elbow) or back of hand, with sterile cotton soaked 70% alcohol. Use sterile syringe to introduce its needle into the filled vein and pull the plunger to withdraw 3-5 ml blood. Remove the band to restore circulation then remove the needle. A cotton or a blaster may be applied with pressure to puncture site to stop the bleeding. Blood then should be quickly transferred to anticoagulant prepared tube (EDTA, Heparin, Oxalates, Citrates, etc.), and shacked gently to mix well.



E.S.R. test can be performed in one of two ways

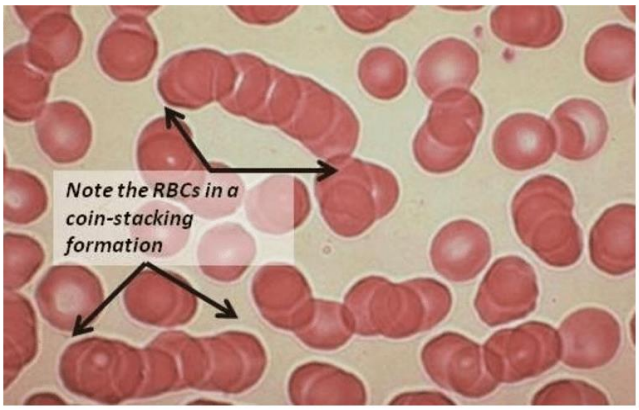
1- Westergren Method

The apparatus is along both end opened tube (20 cm) long called Westergren tube, calibrated in millimeters of 2 ml capacity; and a clamp holder set to hold the tubes in upright position. After pipetting blood from anticoagulant tube Westergren tube is filled to mark zero mm. using the mouth, and hold under the clam with aid of rubber-piece at the bottom of the tube to prevent blood leakage. The level of sedimenting corpuscles (RBCs setting) is read in millimeters at the end of one hour time lapsed.

2- Wintrobe Method

Wintrobe hematocrit tube for determining the P.C.V. can be used for measuring the red cell sedimentation rate, the two estimations being done on the same sample of blood. The Wintrobe hematocrit tube are thin test tubes with a flat bottom, measured 12 cm. in length and its inner diameter is 3 mm. The tube is calibrated so that 100 mm. correspond to 1 ml. Blood is drawn into a capillary pipette. The tip of pipette is passed right to the bottom of hematocrit tube and blood is expelled by gentle pressure on the teat as blood runs into the tube. The pipette is raised until the Wintrobe tube is filled to mark 10. The tube is allowed to stand one hour in a vertical position and E.S.R. value is determined. After that the hematocrit tube is centrifuged at speed of 3000 r.p.m. for 15-30 minutes and the volume of packed red blood cells is then read directly from tube calibration as a reddish layer at bottom preceded by a top layer of clear or milky plasma.

Definition of E.S.R.: Is a non-specific screening test for various malignant diseases and for monitoring inflammation states (Tuberculosis, necrosis, rheumatologic disorders). Due to high proportion of fibrinogen in the blood, this causes RBCs to stick to each other, forming stacks called (Rouleaux Formation) which settle faster to the bottom of the tube.



Normal values:

Men	(15-20)	mm/hr.		
Women	(20-30)	mm/ hr.		
Children (Newborn)	(0-2)	mm/hr.	(Neonatal to puberty)	(3-13) mm/hr.

Abnormal values:

Elevated E.S.R.	**Markedly Elevated E.S.R.**	**Lowered levels:**
1- Pregnancy, old age	1- Multiple myeloma	1- Polycythemia
2- Macrocytosis	2- Leukemia	2- Microcytosis
3-Tuberculosis, Infection	3- Polymyalgia	3- Congestive heart failure
4-Kidney inflammation	4- Rheumatoid arthritis	4- Sickle cell anemia