a. What is Centrifugation?

Centrifugation Definition. ... Centrifugation is the process where a mixture is separated through spinning. It is used to separate skim milk from whole milk, water from your clothes, and blood cells from your blood plasma.

b. What is Centrifugation used for?

Centrifuges are used mostly in science. In this application, centrifugal force — the force from spinning that moves things away from the center — separates liquids that have different weights. For example, a centrifuge is used to separate blood cells from plasma cells.

c. What is Centrifugation and its principle?

The centrifuge works using the sedimentation principle, where the centrifugal acceleration causes denser substances and particles to move outward in the radial direction. At the same time, objects that are less dense are displaced and move to the center.

d. What is an example of Centrifugation?

An example of a centrifuge is a machine that separates cream and milk.
An example of a centrifuge is a washing machine that has a spin cycle to draw the moisture out of the washed clothes.

e. What is Centrifugation and its application?

Centrifugation is a technique which involves the application of centrifugal force to separate particles from a solution according to their size, shape, density, viscosity of the medium and rotor speed. ... Centrifugation of protein solution, for example, allows elimination of impurities into the supernatant.

f.What is Centrifugation and its types?

Centrifugation Techniques

There are two types of centrifugal techniques for separating particles: differential centrifugation and density gradient centrifugation. Density gradient centrifugation can further be divided into rate-zonal and isopycnic centrifugation. Differential Centrifugation. Rate-Zonal Centrifugation.

g.What is the modern application of ultracentrifugation?

As a technique analytical ultracentrifugation encompasses a family of related hydrodynamic methods which are employed to monitor either transport (sedimentation velocity) or equilibrium (sedimentation equilibrium) processes.

h. What is ultracentrifugation in biology?

The ultracentrifuge is a centrifuge optimized for spinning a rotor at very high speeds, capable of generating acceleration as high as 1 000 000 g (approx. 9

800 km/s²). There are two kinds of ultracentrifuges, the preparative and the analytical ultracentrifuge.

i.What does ultracentrifugation means?

Centrifugation is a technique which involves the application of centrifugal force to separate particles from a solution according to their size, shape, density, viscosity of the medium and rotor speed. ... The larger the size and the larger the density of the particles, the faster they separate from the mixture.

j. What is the difference between centrifuge and ultracentrifuge?

is that ultracentrifuge is a high-speed centrifuge, especially one free from convection that is used to separate colloidal particles while centrifuge is a device in which a mixture of denser and lighter materials (normally dispersed in a liquid) is separated by being spun about a central axis at high speed.

k. What is relative centrifuge force(RCF)?

g Force or Relative Centrifugal Force (RCF) is the amount of acceleration to be applied to the sample. It depends on the revolutions per minute (RPM) and radius of the rotor, and is relative to the force of Earth's gravity.

l. How is RCF calculated?

Relative centrifugal force is the force acting on samples during centrifugation. It is expressed as multiples of the earth's gravitational field (g). RCF, RPM and r are linked by the equation for calculating RCF. $RCF = 11.2 \times r\ (RPM/1000)^2$ or $RCF = 1.12 \times 10^{-5}\ (RPM)^2$.

m. What is the difference between RCF and RPM?

Summary: “RPM” is “rotations per minute” while “RCF” is “relative centrifugal force.” RPM denotes the number of revolutions a rotating object is doing per minute while the RCF denotes the force applied on an object in a rotating environment. The RCF is calculated using the RPM and the radius.

n. What is 3000g rpm?

G to RPM Calculator. G force refers to Relative Centrifugal Force (RCF). RCF is positively related with the rotor radius and the rotation speed of the centrifuge. The g force rpm conversion formula is as follows: $RCF = 1.118 * 10^{-5} * r * (rpm)^2$. RCF = Relative Centrifuge Force, in “g”

o. What is the unit of RCF?

RCF (relative centrifugal force) is measured in force x gravity or g-force. This is the force exerted on the contents of the rotor, resulting from the revolutions of the

rotor. It is RCF, not RPM that separates aqueous solutions in the centrifuge.

p. How do I calculate RPM?

Stop counting when 1 minute has elapsed.

This is how many revolutions per minute, or RPM, the object makes. Instead of stopping the count at 1 minute, you may want to count for 2 or 3 minutes and then divide the count by the number of minutes to get the RPM if the object rotates slowly.

q. Is G RCF or RPM?

g Force or Relative Centrifugal Force (RCF) is the amount of acceleration to be applied to the sample. It depends on the revolutions per minute (RPM) and radius of the rotor, and is relative to the force of Earth's gravity.

r. Sedimentation coefficient.

The sedimentation coefficient *(s)* of a particle characterizes its sedimentation during centrifugation. It is defined as the ratio of a particle's sedimentation velocity to the

applied acceleration causing the sedimentation. The sedimentation speed (in m/s) is also the terminal velocity. It is constant because the force applied to a particle by gravity or by a centrifuge (typically in multiples of tens of thousands of gravities in an ultracentrifuge) is balanced by the viscous resistance of the fluid (water) through which the particle is moving. The applied acceleration *a* (in m/s^2) can be either the gravitational

acceleration *g*, or more commonly the centrifugal acceleration .

In the latter case, is the angular velocity of the rotor and *r* is the distance of a particle to the rotor axis (radius).

The viscous resistance is given by Stokes' law: $6\pi\eta r_0 v$, where η is the viscosity of the medium, r_0 is the radius of the particle and v is the velocity of the particle. Stokes' law applies only for large spheres in an infinite amount of fluid.

The centrifugal force is given by the equation: $mr\omega^2$, where r is the distance of the particle from the axis of rotation. When the two opposite viscous and centrifugal forces balance, the particle moves at constant (terminal) velocity. The terminal velocity is given by the equation:

Rearranging this equation gives the final formula:

The sedimentation coefficient has units of time, expressed in svedbergs. One svedberg is exactly 10^{-13} s. The sedimentation coefficient normalizes the sedimentation rate of a particle to its applied acceleration. The result no longer depends on acceleration, but only on the properties of the particle and the fluid in which it is suspended. Sedimentation coefficients quoted in literature usually pertain to sedimentation in water at 20°C.

Heavier particles sediment faster and have higher svedberg, or *s* values. Sedimentation coefficients are, however, not additive. When two particles bind together, they have reduced surface area. Thus, when measured separately they may have svedberg values that do not total that of the bound particle. This is the case with the ribosome. Ribosomes are typically identified by their sedimentation coefficient. For instance, the 70 S ribosome from bacteria has a sedimentation coefficient of 70 svedberg, although it is composed of a 50 S subunit and a 30 S subunit.

$$S = vt / a$$

$$Vt = mr\omega^2/6\pi\eta r_0$$

$$S = vt / r\omega^2 = m / 6\pi\eta r_0$$

s. What do you mean by sedimentation coefficient?

The sedimentation coefficient (s) of a particle characterizes its sedimentation during centrifugation. It is defined as the ratio of a particle's sedimentation velocity to the applied acceleration causing the sedimentation. The sedimentation speed (in m/s) is also the terminal velocity.

t. What is isopycnic sedimentation?

Isopycnic centrifugation. Definition: A method where the components of

a sample (e.g. DNA) are separated on the basis of their density in a centrifuge according to the centrifugal force they experience.

u. Isopycinic sedimentation of DNA in metrizamide

Metrizamide, an inert, non-ionic organic compound, dissolves in water to give a dense solution in which DNA bands isopycnically at a density corresponding to that of fully hydrated DNA. Density-gradient centrifugation in solutions of metrizamide has been used to determine the effects of very dilute solutions of salts on the buoyant density of native and denatured DNA. It has been shown that the buoyant density of DNA is dependent on both the counter-cation and the anion present. Interpretation of the data in terms of the degree of hydration of the macromolecule indicates that (i), NaDNA is more highly hydrated than CsDNA; and (ii), the hydration of NaDNA varies with anion in the order sulphate< fluoride< chloride< bromide< iodide.

It is suggested that isopycnic centrifugation in metrizamide is a simple method for determining the effects of salts (and other small molecules) on the hydration of nucleic acids under conditions of high ratios of salt to DNA (> 5 × 10^3 moles/mole) while high (0.999) water activity is maintained.

v. What is isopycinic ?

An isopycnic surface is a surface of constant density inside a fluid.

In geology, Isopycnic surfaces occur especially in connection with cratons which are very old geologic formations at the core of the continents, little affected by tectonic events. These formations are often known as shields or platforms. These

formations are, relative to other lithospheric formations, cooler and less dense but much more isopycnic.[1]

Isopycnic surfaces contrast with isobaric or isothermal surfaces, which describe surfaces of constant pressure and constant temperature respectively. It is common in conversational use to hear isopycnic surfaces referred to simply as "iso-density" surfaces, which while strictly incorrect, is nonetheless abundantly more clear.

The term "isopycnic" is commonly encountered in the fluid dynamics of compressible fluids, such as in meteorology and geophysical fluid dynamics, astrophysics, or the fluid dynamics of explosions or high Mach number flows. It may also be applied to other situations where a continuous medium has smoothly varying density, such as in the case of an inhomogeneous colloidal suspension. In general isopycnic surfaces will occur in fluids in hydrostatic equilibrium coinciding with equipotential surfaces formed by gravity.

Isopycnic typically describes surfaces, not processes. Unless there is a flux of mass into or out of a control volume, a process which occurs at a constant density also occurs at a constant volume and is called an isochoric process and not an isopycnic process.

The term "isopycnic" is also encountered in biophysical chemistry, usually in reference to a process of separating particles, subcellular organelles, or other substances on the

basis of their density. Isopycnic centrifugation refers to a method wherein a density gradient is either pre-formed or forms during high speed centrifugation. After this gradient is formed particles move within the gradient to the position having a density matching their own (this is in fact an incorrect description of the exact physical process but does describe the result in a meaningful way). This technique is extremely powerful.

w. Meselson–Stahl experiment

The Meselson–Stahl experiment is an experiment by Matthew Meselson and Franklin Stahl in 1958 which supported Watson and Crick's hypothesis that DNA replication was semiconservative. In semiconservative replication, when the double stranded DNA helix is replicated, each of the two new double-stranded DNA helices consisted of one strand from the original helix and one newly synthesized. It has been called "the most beautiful experiment in biology." Meselson and Stahl decided the best way to tag the parent DNA would be to change one of the atoms in the parent DNA molecule. Since nitrogen is found in the nitrogenous bases of each nucleotide, they decided to use an isotope of nitrogen to distinguish between parent and newly copied DNA. The isotope of nitrogen had an extra neutron in the nucleus, which made it heavier.

x.Hyphothesis of Messelson and sthal experiment.

Three hypotheses had been previously proposed for the method of replication of DNA.

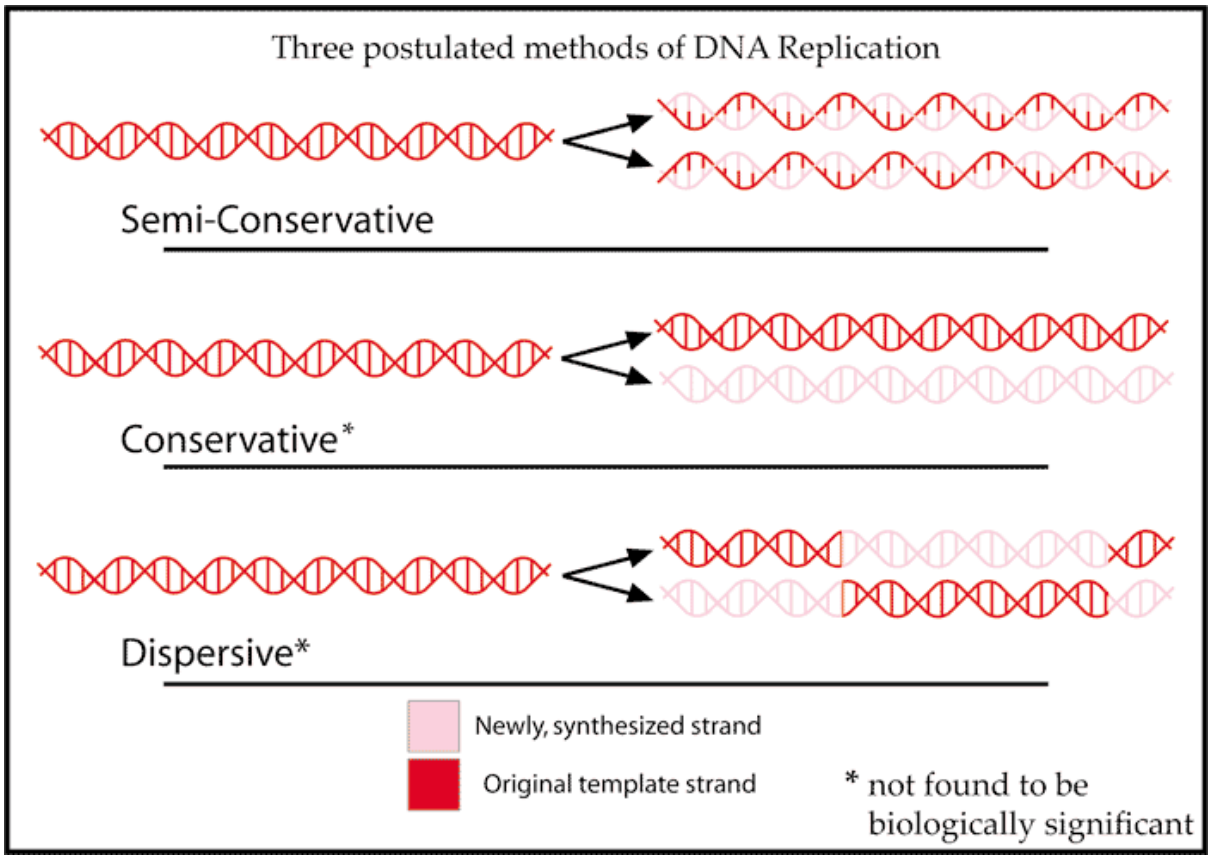
In the *semiconservative* hypothesis, proposed by Watson and Crick, the two strands of a DNA molecule separate during replication. Each strand then acts as a template for synthesis of a new strand.

The *conservative* hypothesis proposed that the entire DNA molecule acted as a template for the synthesis of an entirely new one. According to this model, histone proteins bind to the DNA, revolving the strand and exposing the nucleotide bases (which normally line the interior) for hydrogen bonding.

The *dispersive* hypothesis is exemplified by a model proposed by Max Delbrück, which attempts to solve the problem of unwinding the two strands of the double helix by a mechanism that breaks the DNA backbone every 10 nucleotides or so, untwists the molecule, and attaches the old strand to the end of the newly synthesized one. This would synthesize the DNA in short pieces alternating from one strand to the other.

Each of these three models makes a different prediction about the distribution of the "old" DNA in molecules formed after replication. In the conservative hypothesis, after replication, one molecule is the entirely conserved "old" molecule, and the other is all newly synthesized DNA. The semiconservative hypothesis predicts that each molecule after replication will contain one old and one new strand. The dispersive model predicts that

each strand of each new molecule will contain a mixture of old and new DNA.



***** All are from Net and Wikipedia.**