

Experiment No. 2

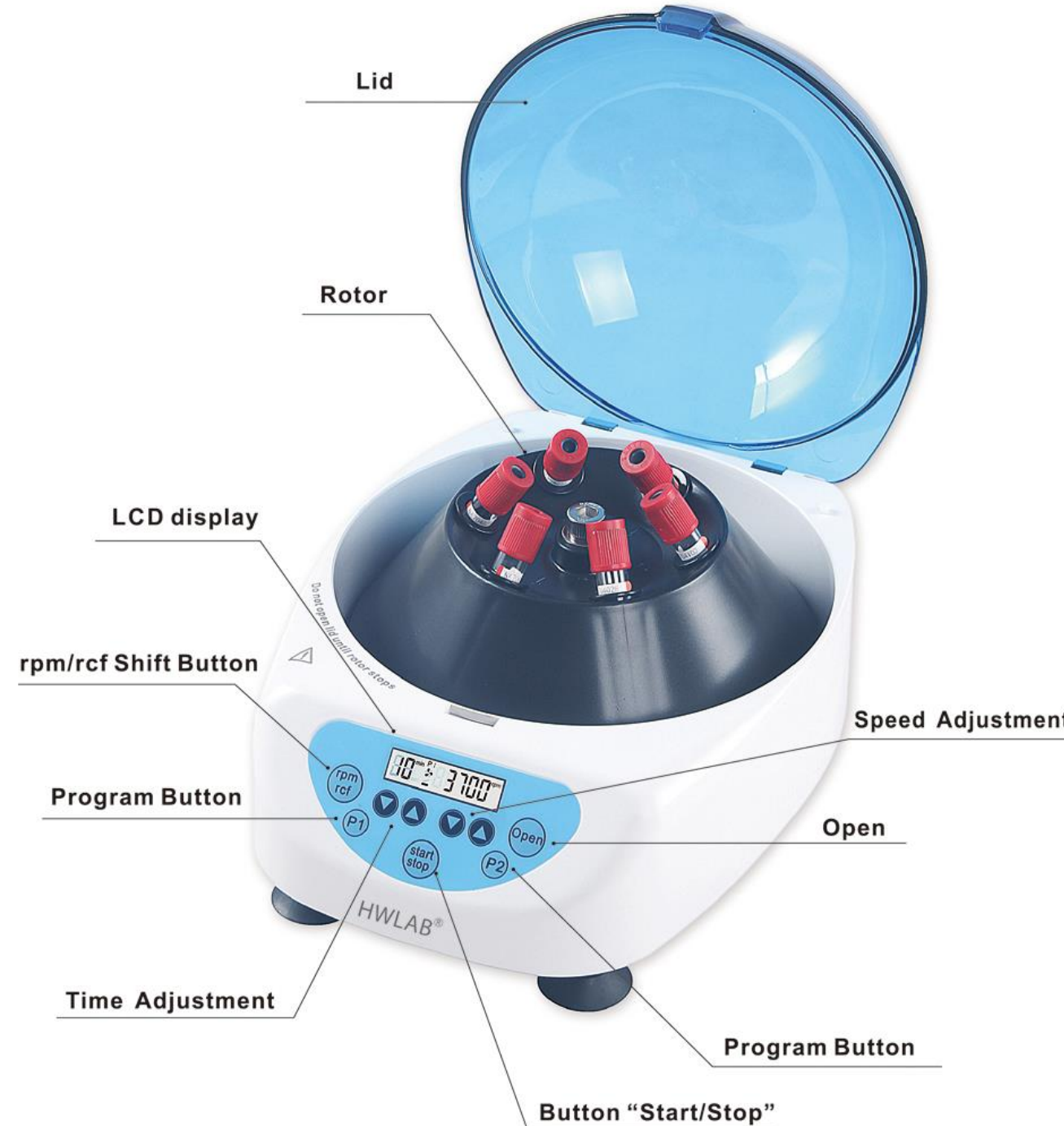
CENTRIFUGE

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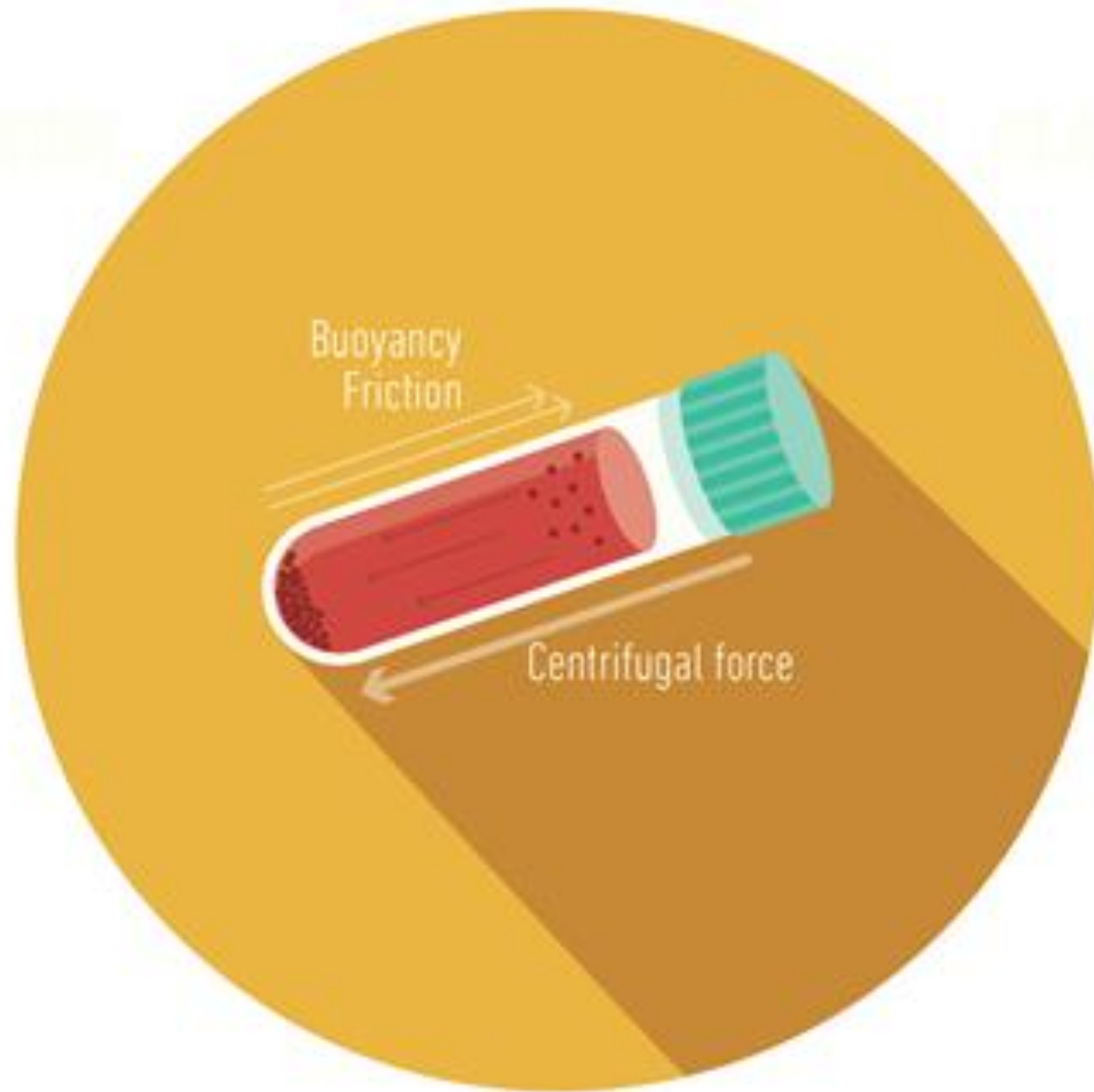
WHAT IS A CENTRIFUGE USED FOR?

Centrifuges are used in various laboratories to **separate fluids, gases, or liquids based on density.**



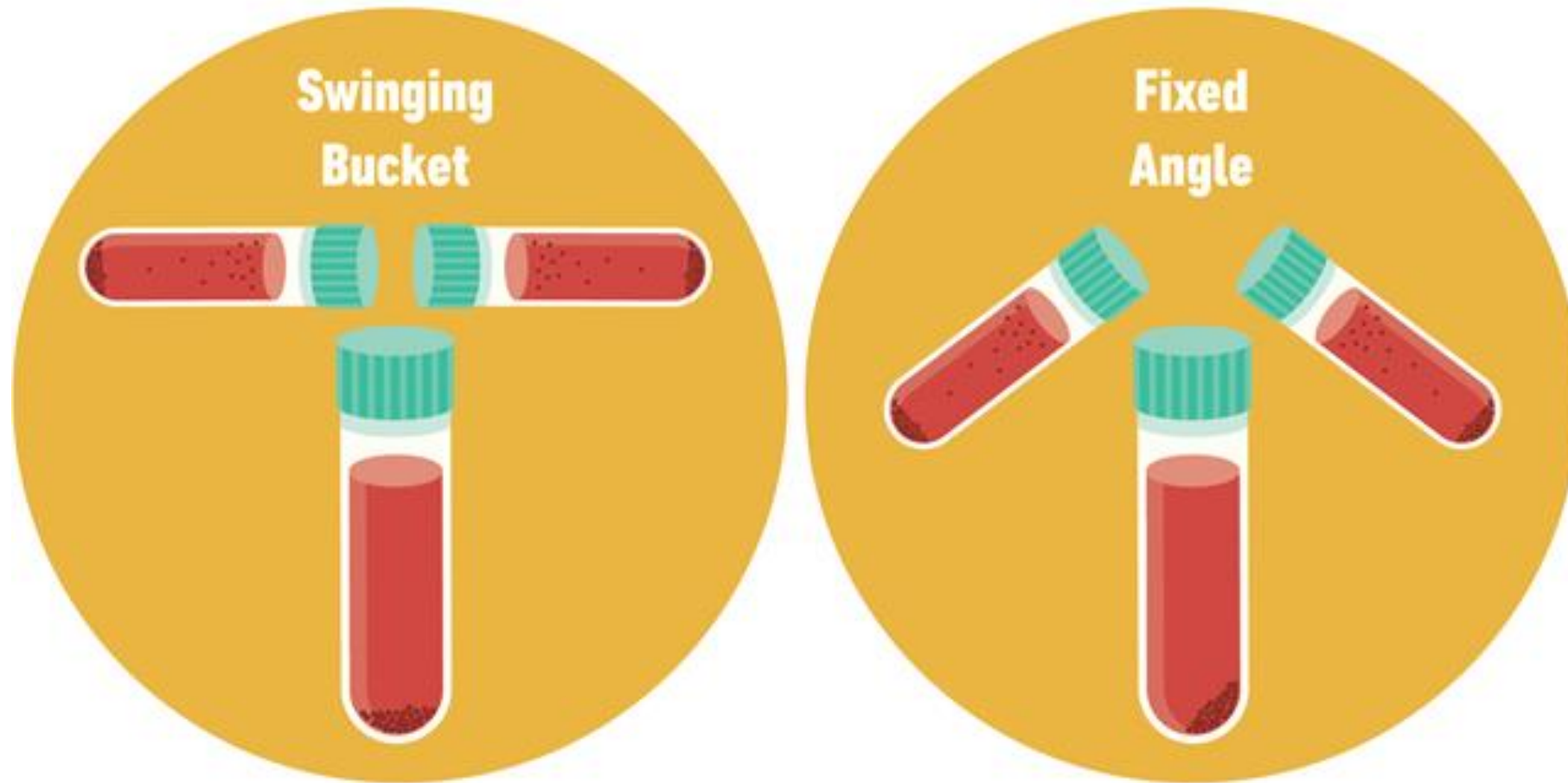
HOW DOES CENTRIFUGE WORK?

- A centrifuge is used to separate particles suspended in a liquid according to particle size and density, viscosity of the medium, and rotor speed.
- gravitational force will cause particles of higher density than the solvent to sink, and those less dense than the solvent to float to the top.
- As the rotor spins around a central axis, it generates a centrifugal force acting to move particles away from the axis of rotation. If the centrifugal force exceeds the buoyant forces of liquid media and the frictional force created by the particle, the particles will sediment.



CENTRIFUGE ROTOR TYPES

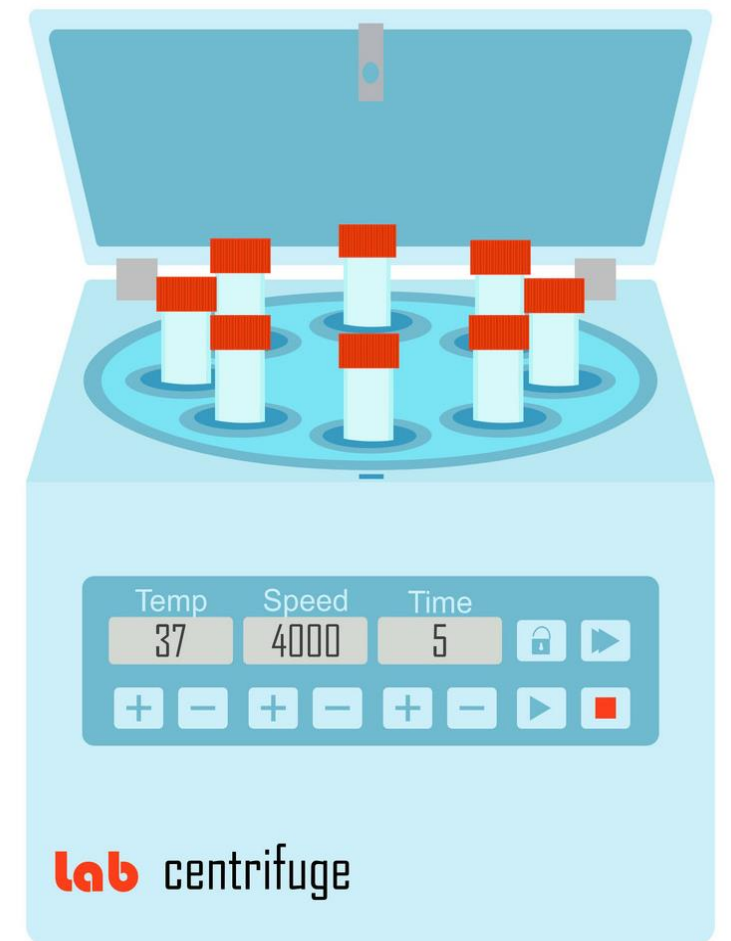
There are two very common rotor designs: fixed angle, and swinging bucket



HOW DO YOU CHOOSE A CENTRIFUGE?

1- Centrifuge speed

Centrifuges may be classified based on maximum speeds, measured as revolutions per minute (RPM). Speeds range from 0-7,500 RPM for low-speed centrifuges, all the way to 20,000 RPM or higher.



2- Centrifuge size

1- **Floor-standing** models offer greater sample capacity and can achieve high speeds. often used for DNA or RNA fractionation

2- **Benchtop models** have a general-purpose models are ideal for a wide range of applications. typically operate at lower speeds, and are suited to diagnostic applications, and washing debris from red blood cells.



WHAT SAFETY PRECAUTIONS SHOULD BE TAKEN WHEN WORKING WITH A CENTRIFUGE?

- 1- Always ensure the centrifuge is on an appropriate surface prior to operation.
- 2- Balance the centrifuge
- 3- Do not open the lid while the rotor is moving
- 4- If the centrifuge is wobbling or shaking, pull the plug

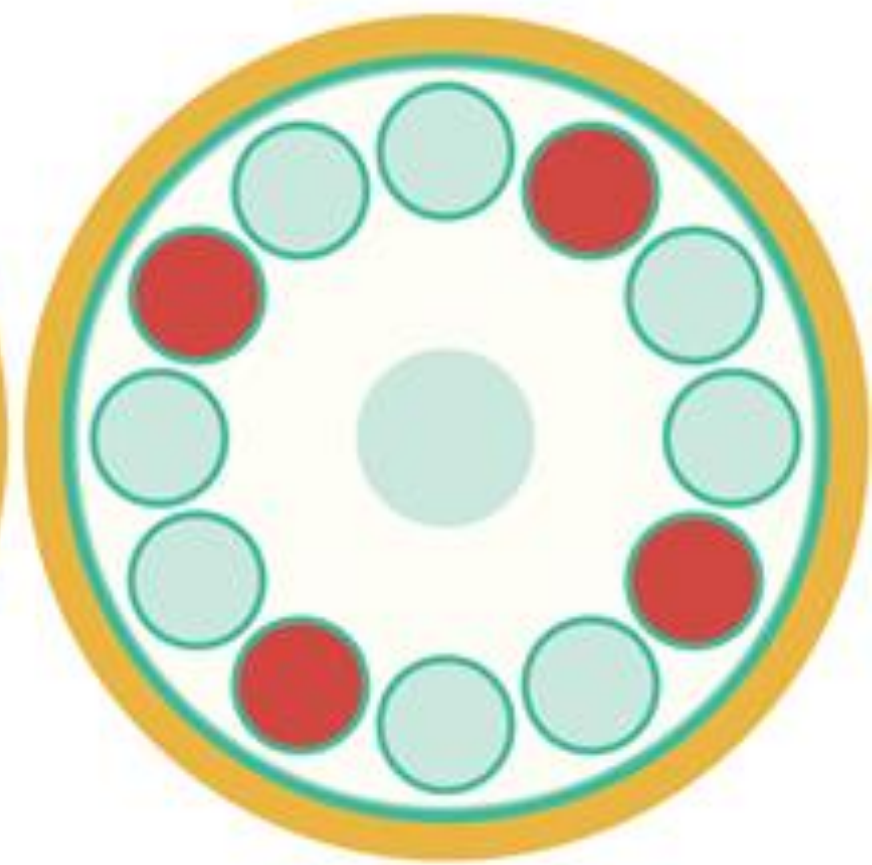
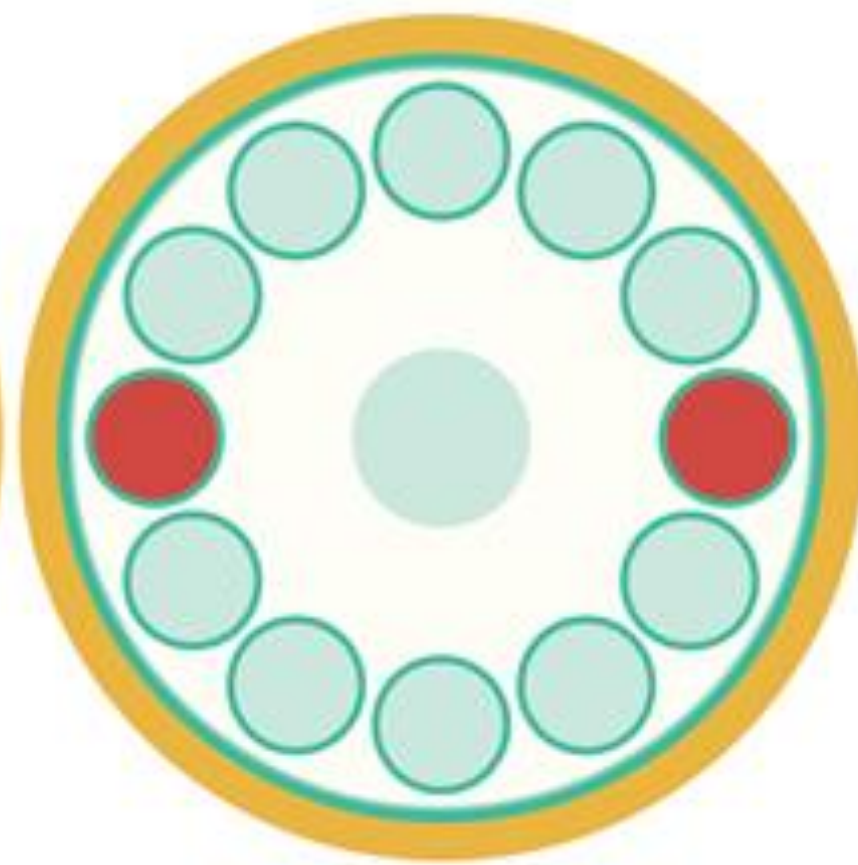


HOW DO YOU BALANCE A CENTRIFUGE?

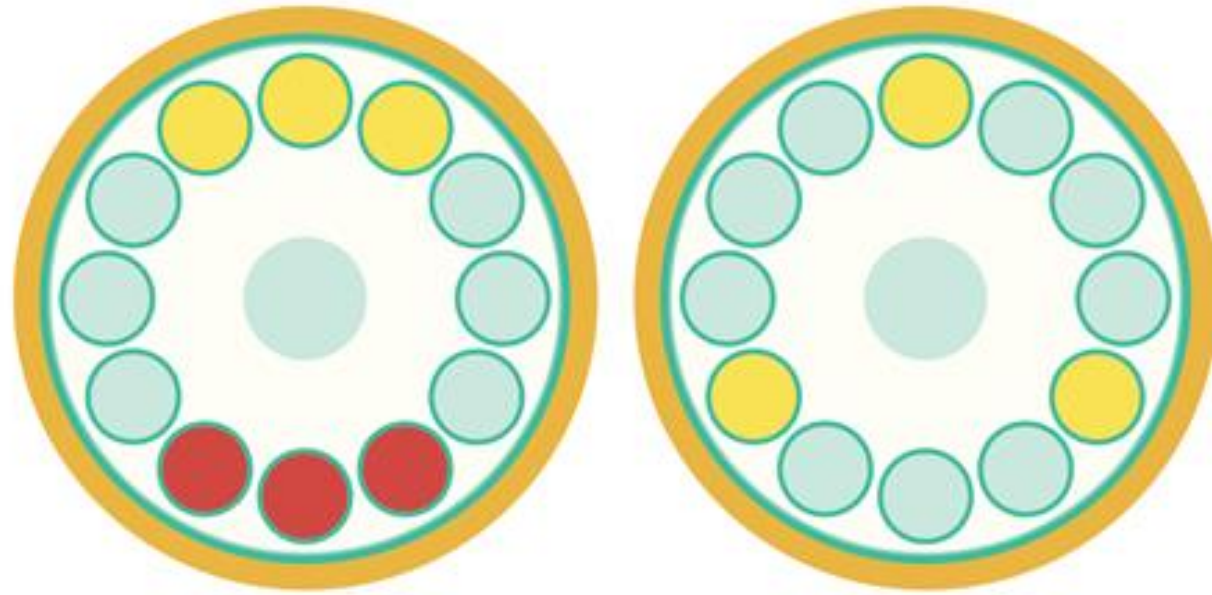
1-Ensure all sample tubes are evenly filled. If additional tubes are required for balancing, fill them with water or a liquid of similar density to the sample, and ensure the mass is balanced to the nearest 0.1 grams.

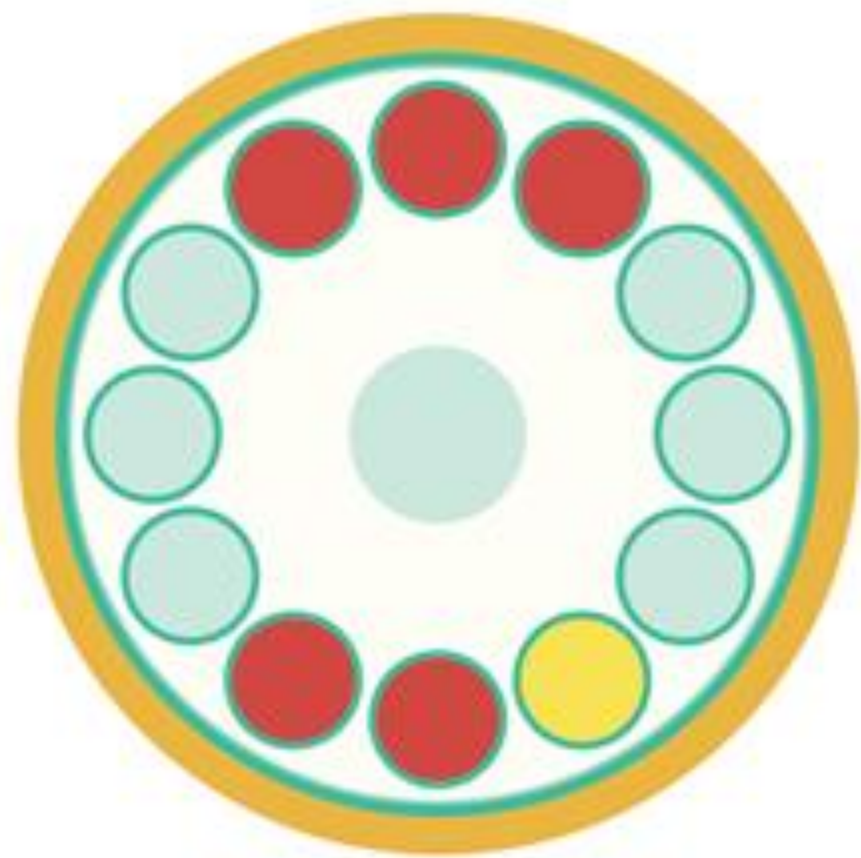
2-For each tube inserted in the rotor, add a tube of equal weight directly opposite it. This will ensure the center of gravity remains in the center of the rotor.

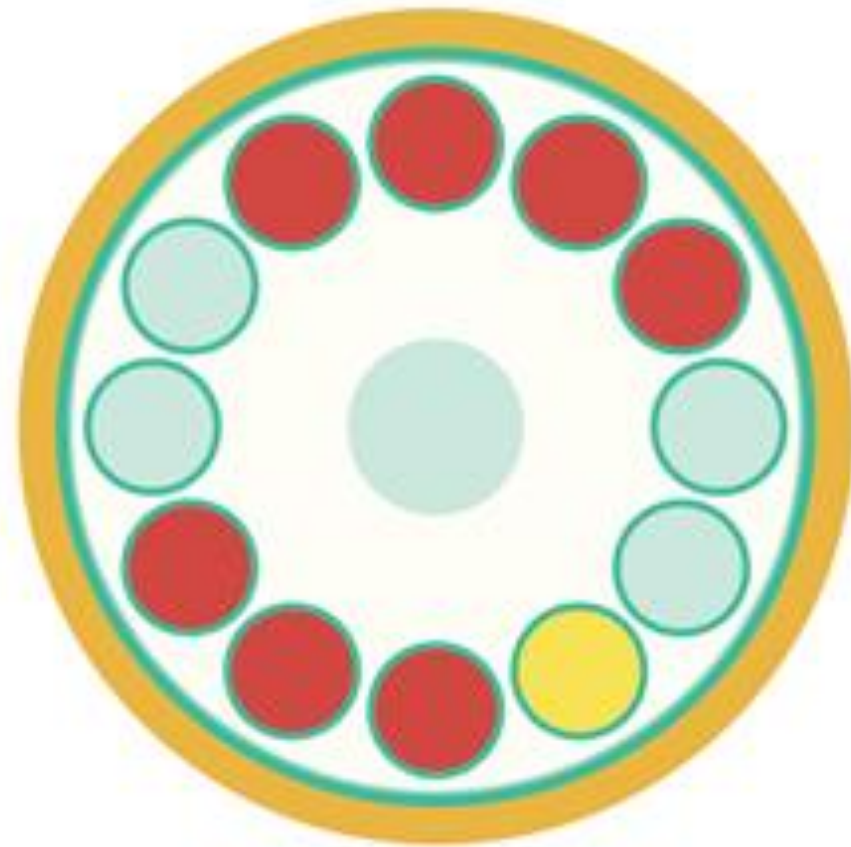
3-Rotate the rotor 90° and add two additional tubes directly opposite one another.



HOW TO BALANCE 3 TUBES, 5 TUBES, OR 7 TUBES IN A CENTRIFUGE WITH 12 POSITIONS







EXPERIMENTAL PROCEDURE:

- 1-Gather together the materials you wish to separate out.
- 2-Pour each of them (they must be liquids!) into the centrifuge containers.
- 3-Label each container with the materials you have placed inside.
- 4-Place the containers in the centrifuge. You may want to have a science teacher or other adult with you to help you operate the centrifuge.
- 5-Spin the materials at high speed.
- 6-Allow the centrifuge to come to a rest.

Discussion

- *What are the characteristics of centrifugation?*
- *How to choose a centrifuge?*
- *What are the different types of centrifuges?*
- *What can be purified with a centrifuge?*