

Short Communication

A SIMPLE PRECAUTION TO PREVENT BREAKAGE OF CENTRIFUGE TUBES DURING OPERATION

Saiyed Asad M. Ali

PCSIR Laboratories, Karachi 39

(Received October 30, 1978)

The step of centrifugation is a matter of simple operation, which is useful to both chemists and biochemists. Occasionally valuable samples are lost or destroyed during this operation due to the breakage of centrifuge tubes. Here I call the attention of your readers to follow a simple precaution, which is a foolproof method for preventing such an accident, and can be of immense benefit, when the labour and the time consumed in the preparation of the sample is considered in the event of losing the precious sample during centrifugation.

The centrifuge tube breaks during the operation due to the faulty placement, i.e. when, prior to operation, it is placed, in the centrifuge tube holder as depicted in Fig. 1A. Here the centrifuge tube is shown to be resting against the wall of the centrifuge tube holder in the direction away from the central axis of the centrifuge, leaving a gap (a) between the walls of the centrifuge tube and the holder at the side closest to the central axis. When the centrifuge is in operation and the holder with centrifuge tube assumes a horizontal position then this gap (a) lies in a horizontal axis as at AA. The accident occurs, when the centrifuge tube strikes against the lower wall of the holder through the gap (a) in order to shift its weight under the influence of a rotational force aided by the gravitational pull.

Figure 1C represents axes of centrifuge tube holder from the rest position to the maximum speed of the centrifuge. At fixed weight of the centrifuge tube and at a particular speed, the inclination of the holder axis is fixed, and is held in position by a tremendous force of rotation or circular motion. Since the centrifuge tube, is placed inside the holder, therefore, it will try to align its axis with the axis of the holder because both are under the influence of the same force of rotational or circular motion of the same magnitude. When the centrifuge tube is placed in a faulty position, then the axis of the holder and the centrifuge tube can assume two positions in relation to each other as represented at D-A,B. The axis of centrifuge tube can

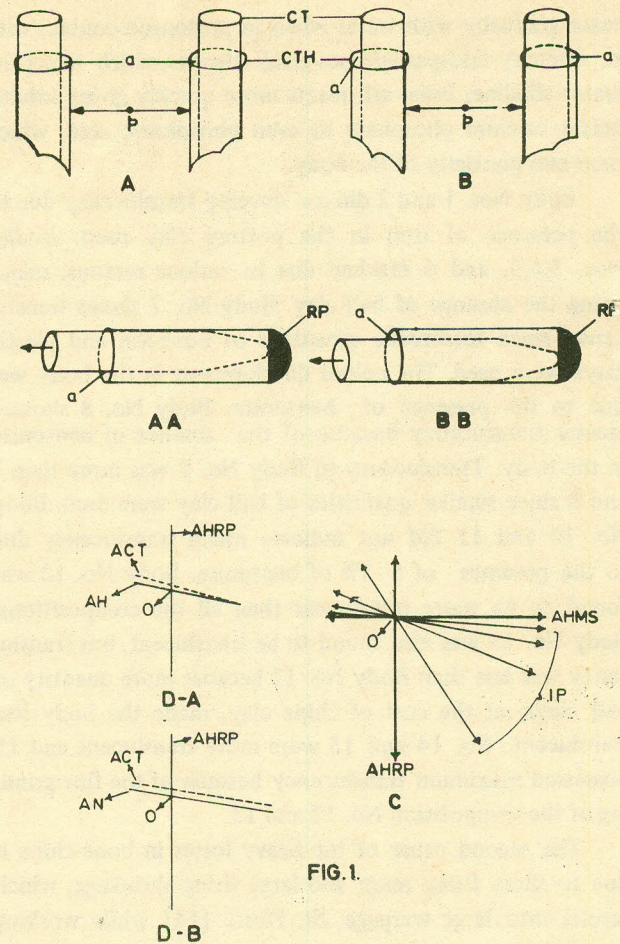


FIG. 1.

Fig. 1A. Two diagonally opposite centrifuge tube holders (CTH) are shown with dangerous placement of centrifuge tubes (CT); p, central axis of the centrifuge; a, gap at the wrong side. This gap or play is exaggerated deliberately for the sake of discussion. (AA) Horizontal position of CTH and CT during operation; \longrightarrow direction of the central axis of centrifuge; RP, rubber pad. (B) Safe position of centrifuge tube (CT) in holder (CTH). (BB) Horizontal position of CTH and CT during operation; \longrightarrow , direction of the central axis (p). RP, rubber pad. (C) AHRP, axis of CTH at rest position; IP, intermediate positions of CTH axes between rest and maximum speed; AHMS, axis of CTH at maximum speed; O, fulcrum point of CTH. (D-A) AHRP, axis of CTH at rest position; ACT, axis of centrifuge tube; AH, axis of CTH; O, fulcrum point of CTH. (D-B) same as at D-A.

either lie in an inclined position in respect to the axis of the holder (D-A) or it will remain parallel to the axis of the holder while lying above its plane as at D-B. In either case when the speed of the centrifuge has gone up to a certain

extent to generate enough rotational force, the axis of the centrifuge tube, which forms a certain angle above the axis of the holder (D-A) or which is lying parallel to but above the holder axis (D-B) flips and tries to come in line with the holder axis, because it is placed within the holder and revolving with the same speed. In this process the centrifuge tube strikes against the wall of the holder with a tremendous force caused by the conjoint effect of rotational force and the gravitational pull, and breaks as it hits the

holder.

A simple precaution of placing the centrifuge tube as at B, where the wall of the centrifuge tube rests against the wall of the holder, which is nearest to the central axis of the centrifuge, prior to operation, prevents the accident. A cotton plug inserted in the gap marked (a) (1B) may sometimes be found useful to secure the proper position of the centrifuge tube in the holder. During operation the centrifuge tube lies in a position as at BB and is safe.