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Water retention value (WRV)

Scope

Water retention value is a measure of the water retained by a wet pulp specimen after centrifuging under standard conditions.

Significance

Water retention value can be a useful tool in evaluating the performance of pulps relative to dewatering behavior on the paper machine. The usefulness of the method on a particular application may vary depending on type of stock, additives, machine configuration and other factors. The method is established to provide standard values of centrifugal force, time of centrifuging, and sample preparation so that results can be compared between investigators at standard values.

Apparatus

1. *Laboratory centrifuge* with free swinging head or horizontal heads.
2. *Centrifuge cups*, with sufficient room in bottom for blotter or absorbent wipe
3. *Glass filtering crucible*, (e.g., Pyrex □ Gooch-type filtering crucible, 30 ml, high form, coarse) or any suitable equivalent specimen holder. Various metal cups with fine wire screens are in common use. Fines loss on coarse mesh screens may significantly influence results.
4. *Plastic cups*, for filter crucible with small vent hole.
5. *Disposable blotter* or wipes
6. *Erlenmeyer flask*, 2000 mL.
7. *Rubber adapter*, crucibles to Erlenmeyer flask.
8. *Glass rod*.

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9. *Beaker, 250 mL*
10. *Balance, suitable for weighing crucibles or specimen holders sensitive to 0.001 g.*
11. *Drying oven.*
12. *Laboratory glassware cleaner.*
13. *Dessicator jar.*

Safety precautions

Use care in handling hot items from the oven.

Procedure

1. Measure a quantity of pulp in suspension to yield a specimen of 1400 g/m² oven dry grammage on the filter disk or screen of the specimen holder. The volume of suspension may be determined according to calculations given in Appendix A.
2. Place a preweighed filtering crucible or equivalent specimen holder on the rubber adapter atop the Erlenmeyer flask and apply a gentle vacuum to the flask. Pour the pulp suspension uniformly over the surface of the filter disk or screen to form a pad of uniform grammage. A glass rod may be useful in stirring or gentle movement of fibers.
3. Place a cap containing a tiny vent hole over the crucible or specimen holder and insert the assembly into a suitable centrifuge cup containing sufficient blotter or absorbent wipe in the bottom of the shield to absorb the expressed water. See Fig. 1.

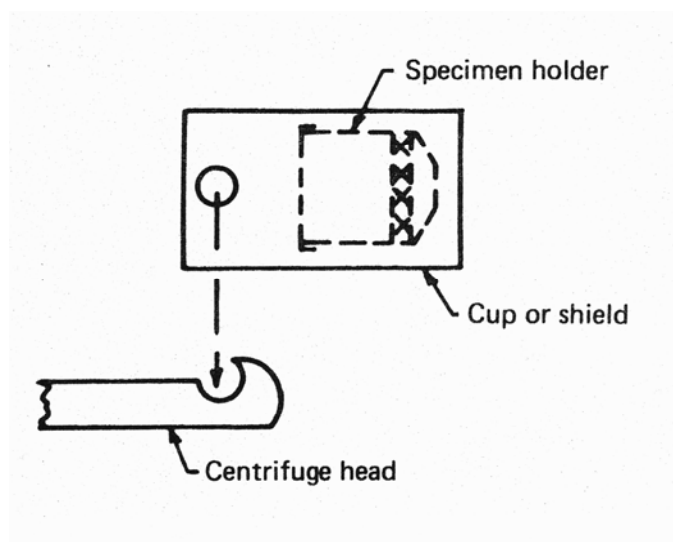


Fig. 1. Diagram of components for centrifuging.

4. Centrifuge the specimens at 900 G's for exactly 30 minutes at a temperature of $21^{\circ} \pm 3^{\circ}\text{C}$. The speed of the centrifuge required to produce 900 G's may be calculated according to the procedure of Appendix B.
5. Remove the filtering crucibles or specimen holders from the centrifuge cups, remove the vented caps, and weigh each specimen and holder to the nearest 0.001 g. Specimens should be weighed as quickly as possible after centrifuging to avoid evaporation loss. Alternately, the specimen or specimen and holder may be placed in tared weighing bottles to obtain the weight.
6. Dry the specimens and holders in a preheated oven for two hours or more at $105^{\circ} \pm 3^{\circ}\text{C}$. After drying, place the specimens and covered holders in a dessicator jar to cool for 30 minutes. Then weigh each specimen and holder