

Total Lipids by Ether Extract Using Goldfish Apparatus

Materials:

Goldfish beakers
Extraction thimbles
Collection tubes
Filter paper (Whatman #541 or equivalent)
Goldfish extraction unit

Reagents:

Petroleum Ether (EM Cat # PX0425-3, CAS # 64742-49-0)

Caution – extremely flammable. Vapor-air mixture is explosive.

Procedure:

1. Label and dry beaker. Cool in a desiccator and weigh.
2. Fold filter paper into an envelope, place on scale, and tare. Place 3.0 to 4.0 g sample into paper. Fold shut. Record weight. Place the filter paper envelope onto another piece of filter paper. Roll the envelope, fold the second piece over it, and roll so it will fit into the extraction thimble.
3. Turn on the Goldfish unit and water for condensers.
4. Add 40 ml of petroleum ether to the beaker. Put the thimble with the sample in the clamp above the burner. Place the beaker on the unit, fitting it tightly so no evaporation of ether occurs. Set the burner just below the beaker. The rate of extraction should be 2-3 drops per second. If the ether is boiling too rapidly, lower the burner.
5. Extract for 2-8 hours, depending on the oil content of the sample.
6. After extraction is complete, lower the burner, remove the beaker and thimble, and replace the thimble with a collection tube. Replace the beaker, raise the burner and allow to boil until almost all of the ether is collected. Some petroleum ether must remain in the beaker or the oil will begin to smoke and burn.
7. Remove beaker and pour collected ether into a container for recycled ether.
8. Allow the remaining ether in the beaker to evaporate at air temperature, and then place the beaker in 100 °C oven for 60-75 minutes.
9. Cool beaker in desiccator and weigh.
10. If the sample has a very high oil content (20% or higher) or is coarsely ground, the extracted sample can be ground again and extracted a second time. Save the sample packets from the first extraction, label, and dry in the oven before grinding in a coffee grinder. Repeat the procedure, adding the percentage oil to the first result.

Calculations:

$$\% \text{ Oil or Ether Extract} = \frac{[(\text{Beaker} + \text{Oil Wt.}) - \text{Beaker Wt}]}{\text{Sample Wt.} \times \text{dmf}} \times 100$$

Reference

AOAC method # 920.39, Association of Official Analytical chemists, 18th Ed., Revision 3, 2010.