Return To Secondary Lesson Plans

Title: Coal Ash Analysis
Level: Secondary
Day/Time: One class period
KERA Goals: 1.3, 1.5, 2.1

Objective:
This procedure is in conjunction with one of the samples obtained in the previous exercise. Ash content, one of the important environmental concerns, can be determined by massing the residue remaining after burning a sample of coal under controlled conditions. Duplicate results may be necessary for increased accuracy. Difficulty may be experienced in securing satisfactory determinations of ash for coal unusually high in calcite and pyrite. Gradual initial heating is necessary to avoid mechanical loss from a too rapid expulsion of the volatile matter. Caution: It is necessary to use the ventilation hood.

Materials:

Crucibles
Fischer burner
Tongs
Desiccator
Balance (sensitive to 0.0001 g)
Ventilation hood
Prepared coal samples

Activity #1

1. Clean crucible and dry one hour or longer in drying oven. Coal 15-20 minutes in a desiccator.

2. Mass the crucible and record in grams as W1.

3. Transfer 1 g of the sample to the massed crucible. Re-mass and record the sample mass as W2 (crucible mass - re-mass). Hint: In no case should the mass of a coal sample be less than 1 g.

4. Turn on the ventilation hood. Place the covered crucible in the ventilation hood over a burner. Heat constantly at least 25-30 minutes.

5. Turn off the burner and ventilation hood. As soon as the crucible returns to normal color (5-10 minutes), use the tongs and transfer the sample to desiccator.

6. After cooling for 30-35 minutes in thedesiccator, mass the sample to the nearest 0.0001 g. Record this mass in grams as W3.

7. Open the crucible and examine for complete combustion.

8. If coal is still visible, return to Step 4 and repeat.

Data Collection/Analysis:
1. Tables 1-3

Table 1 - Laboratory

Temperature	Humidity

Table 2 - Heating / Drying

Time Burner	Trial 1	Trial 2
Desiccator		

Table 3 -

Sample #	Mass Crucible	Sample Before Change	Sample After Change

2. Calculate the percent ash in the sample as follows:

$$\% \text{ Ash (uncorrected)} = \frac{W3 - W1}{W2} \times 100$$

Where W1 = mass of crucible
W2 = mass of sample in grams
W3 = mass of ash and crucible in grams

3. Calculate the percent ash to“moisture free” (MF) as follows:

$$\% \text{ Ash (MF)} = \frac{\% \text{ Ash (AR)} \times 100}{100 - \% \text{ AR moisture}}$$

4. Duplicate the sample tables for your report.

Provided by American Coal Foundation

Return To Secondary Lesson Plans