



BURN-OFF METHOD FOR CARBON FIBER DETERMINATION

Application

This procedure is used to determine the percent carbon fiber by burning off the polymer matrix and calculating the remaining ash percent. This procedure assumes only carbon fiber is present in the material.

Apparatus and Materials Required

Stainless Steel mesh. 12x12 square inch sheet 23 gauge stainless steel 10 mesh screen (available from Grainger.com or an equivalent supplier according to regional availability) to be used to create a 2x2x2 cubic inch cage

Analytical balance capable of weighing to the nearest 0.0001 g

Aluminum foil (Laboratory grade is not required for this purpose)

Muffle furnace capable of reaching 500 °C +/- 20 °C

Fume hood for handling loose carbon fibers to prevent fiber inhalation

Face Mask, 3M Particulate Respirator N95

Nitrile Gloves

Chemicals, materials, parts, and equipment referenced in this document must be used and handled properly. Each party is responsible for determining proper use and handling in its facilities.

Procedure

Be sure to wear proper safety equipment while handling carbon fibers such as gloves and a face mask.

1. Make the 2 inch x 2 inch x 2 inch square mesh cage per Figures 1-8.
2. Muffle furnace temperature should be 23 °C +/- 2 °C before the sample is put into the oven for burnoff.
3. Take approximately 2-5 g of the sample. Measure and record the weight of the sample "W0" to four decimal places.
4. Load the specimen into the cage as shown in Figure 7 followed by closing the lid and wrapping loosely with aluminum foil, Figure 8.
5. Measure and record the weight to four decimal places of the closed cage and specimen wrapped with aluminum foil "W1".
6. Place the cage in a room temperature oven.
7. Turn on the oven; program the oven to 475 °C with a 10 °C per minute ramp time.
8. Hold at 475 °C +/- 5 °C for 4-5 hours, and then turn off the oven
9. Remove the cage and foil containing the fibers from the muffle furnace and allow it to cool to room temperature.
10. Measure the weight "W2" of the cage, specimen and foil and record to four decimal places.

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Evaluation

1. Calculate the polymer weight percentage "PW%" using the following equation.

$$PW\% = \left[\frac{(W1 - W2)}{W0} \right] * 100$$

W0=Original sample weight

W1=Weight of original sample, cage and foil

W2=Final weight of sample, cage and foil after burnoff

2. Calculate the carbon fiber weight percentage "CF%" using the following equation.

$$CF\% = 100 - PW\%$$

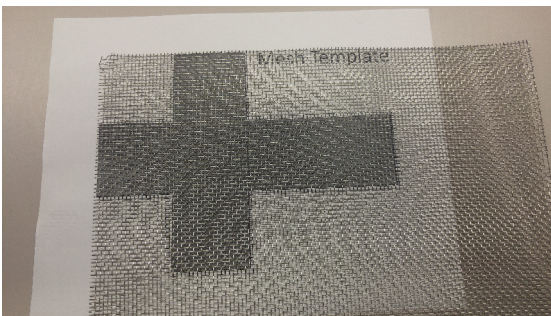


Figure 1: Mesh Template

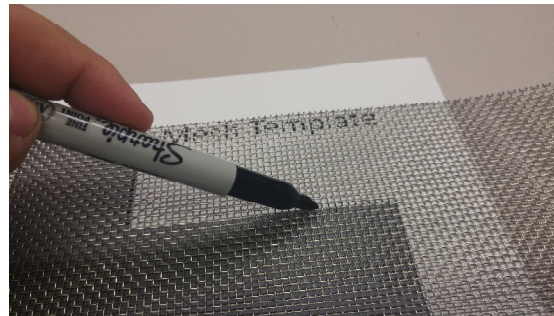


Figure 2: Outline the template

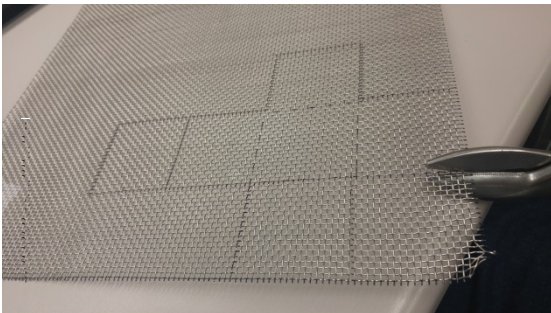


Figure 3: Cut the mesh

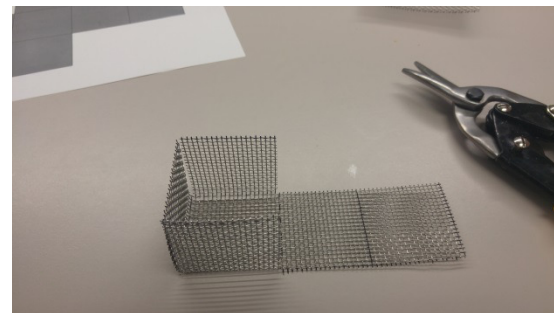


Figure 4: Form the cube