1. Procedure

Into a 1 l rocker bomb is charged 0.50 g of 2,2'-azobis(isobutyronitrile) (Note 1). The bomb is pressure-tested with nitrogen at 400 psi to detect leaks and then evacuated to less than 1 torr for 3 or 4 h. It is chilled in Dry Ice-acetone, and propylene (42 g, 1 mol, Note 2) and sulfur dioxide (256 g, 4 mol, notes 2 and 3) are distilled into it. The bomb is sealed and the polymerization is carried out at 40-45°C for 8 h. Excess reactants from the bomb are vented through a system designed to prevent contact with laboratory personnel. The product (ca 110 g) is removed from the bomb and washed twice with ethanol. The dried polymer is ground in a Wiley mill through a 20 mesh screen and rewashed with alcohol (Note 4). After drying at 80°C for about 15 h, a hard white product is obtained (96 g, 88%, Note 5) with an $\eta_{inh}$ of 3.3 dL/g (Note 6) and analyzing for 30.5% sulfur (theory, 31.5%); mp 300°C (dec).

2. Notes

1. The initiator should be kept under refrigeration prior to use.
2. The propylene and sulfur dioxide are purified products offered by the Matheson Company (both analyze over 99% pure).
3. Low yields are obtained without excess SO$_2$.
4. The solubility of the resultant product in sulfuric acid is markedly affected by its state of subdivision.
5. In a similar run on the same scale, 89 g of polymer was obtained with $\eta_{inh}$ 3.15 dL/g (sulfuric acid).
6. The $\eta_{inh}$ is determined in sulfuric acid at room temperature. An $\eta_{inh}$ 3.3 dL/g corresponds to a $M_w$ of 250,000.

3. Methods of Preparation

Olefin-sulfur dioxide copolymers are described in the patent literature and open literature and in several review articles. Areas of application for this class of polymers are varied and include blends with PVC, biomedical applications, and electron-beam resists for microelectronic circuitry.
4. References

2. Union Carbide Corporation, Chemicals Division, South Charleston, WV 25303; current address - Union Carbide Corp., Bound Brook, NJ 08805. The assistance of R. J. Cotter is thankfully acknowledged.