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A Method for PVC specimen preparation

Introduction

Plastics are used widely in many industrial applications. Particularly Polyvinyl Chloride or PVC has a variety of uses from home exterior rain gutters to plasma bags in the medial industry. PVC is one of the most widely used plastics. This application note details samples of PVC in the form of resin, thin films, gasket and pipe, which are to be prepared in cross section to a thickness of 1mm for general observation under optical light microscope. Using the materials and detailed methods listed below sample preparation was kept to a minimum for the level of detailed needed. However, additional observation might be needed under the scanning electron microscope.

Materials

The following equipment and consumable items were used for the preparation:

Equipment	Description
Model 650 Low speed diamond wheel saw with 4", .012" thickness, coarse/high diamond cut off wheel 	The Model 650 Low Speed Diamond Wheel Saw is a compact, multipurpose, precision saw designed to cut a wide variety of materials with minimal subsurface damage.
Model 920 8" Lapping and Polishing Machine. 	The Model 920 is a multi purpose grinding and lapping machine designed for accurately lapping and polishing a wide range of materials.
70 degree mounting wax	Sticky type orange colored wax used to hold a variety of materials while being sliced lapped and polished.
400 grit, 600grit, 1000grit, 1200 SiC paper discs. (optional) 1um Diamond abrasive film disc.	Used in the polishing process to removed scratches from slicing process.
AcryliMet cold mounting system	A 2-part quick setting epoxy sample mounting system

Method

1. Samples were mounted using AcryliMet epoxy cold mounting system. Samples cured in 30 minutes.

2. Samples were mounted for slicing using 70 degree mounting wax and sliced to less than 1.5mm using the Model 650 low speed diamond wheel saw. Individual slices took about 15 minutes per slice with a load of 150 grams. A coarse diamond size, high concentration diamond wheel was used to give the best balance of cut time and cut finish.

3. Short polishing times of 1-2 minutes were convenient using the Model 920 polisher and SiC papers: grits sizes 400, 600 1000, 1200. Samples were held without use of polishing device.

4. (Optional) A short final polish by hand, no rotation, using 1um diamond film allow for expedient sample processing with good surface finish.

5. Samples were clean thoroughly with H_2O to remove any abrasive particle from the polishing process. Additionally, all solvents were avoided because of the deformation they could possible cause.

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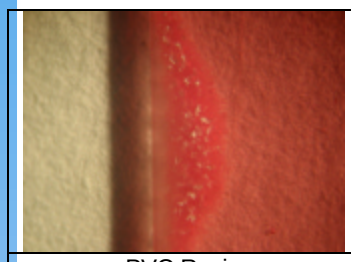
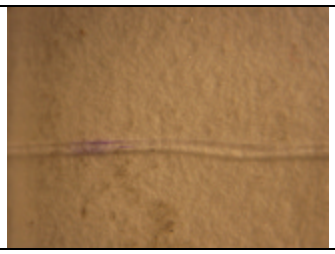
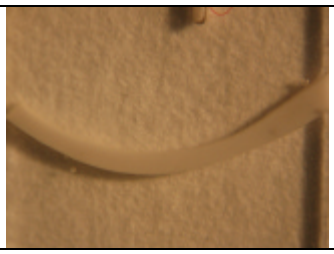
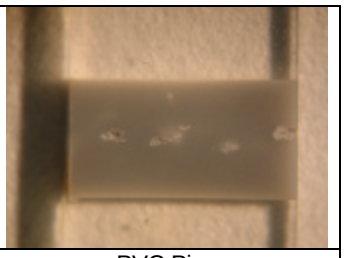
Results

			
PVC Resin	PVC Film	PVC Gasket	PVC Pipe

Conclusion

The PVC resin, film, gasket and pipe were prepared accordingly and the need for any further SEM observation could be possible. Depending on the level of specific detail needed for SEM observation the polishing process can be tailored to achieve the desired results. In general sample preparation of plastics like PVC can be considerably similar to other metallographic materials but still must be tailor to particular materials because of their ability to deform, the nature of deformation and thermo-sensitive nature.

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PVC Specimen Preparation Rev. 2

Introduction

PVC resin, film, gasket and pipe samples were prepared using materials and method listed below. The need for analysis to understand contamination debris within certain areas of specimens will assist in process problems. Customer request to have PVC materials sectioned within circled area and cross section through discolored debris.

Materials

The following equipment and consumable items were used for the preparation:

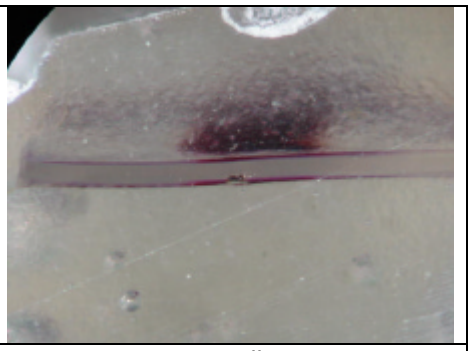
1. AcryliMet cold mounting system.
2. Model 865 Diamond Band Saw.
3. Model 920 8" Lapping and Polishing Machine.
4. 400 grit, 600grit, 1000grit, 1200 SiC paper discs.

Method

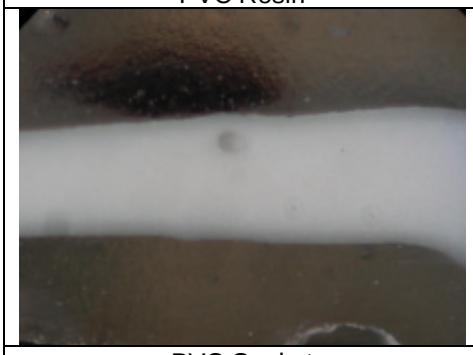
1. Cross section sites were identified and marked using permanent marker. Samples areas were cut out with surgical bladed knife.
2. Samples were mounted using AcryliMet epoxy cold mounting system. Samples cured in 30 minutes.
3. Using the Model 865 Diamond Band Saw epoxy material was trimmed to remove excess and expose polishing face close to cross section. (Less than one minute per sample)
4. Short polishing times of 2 to 3 minutes were convenient using the Model 920 polisher and SiC papers: grits sizes 400, 600 1000, 1200. Samples were held without use of polishing device.
5. Cross section faces were inspected under low magnification optical microscope.

Results

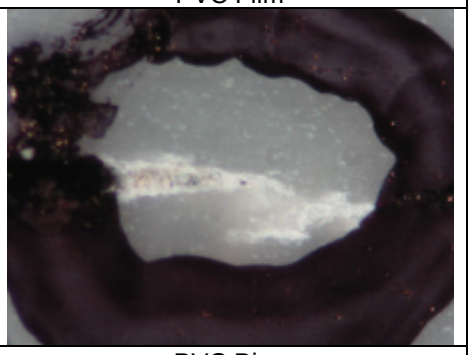
PVC Resin



PVC Film



PVC Gasket



PVC Pipe

Conclusion

The PVC resin, film, gasket and pipe were prepared accordingly for further SEM observation. Cross sectioning of particles within PVC was possible with careful polishing. Depending on the level of specific detail needed for SEM observation the polishing process can be tailored to achieve the desired results.