

Learning Objectives:

1. Students will be able to define casting and identify relevant industrial applications.
2. Students will be able to categorize objects based on mold design and casting material requirements.
3. Students will create their own silicone mold and plastic casted object.
4. Students will be able to identify possible challenges during casting based on the object's final form and mold/casting materials used.

Topics covered:

- Lecture
 1. Definition of casting
 2. Common casting applications
 3. Mold design requirements in the context of the final object
 4. Casting difficulties and common techniques used to address said challenges
- Lab
 1. Mold-making
 2. Casting
 3. Chemical reactions

Estimated Time for Activity:

Lecture: 30 minutes

Lab Part I - Mold-Making: 1 hour

Lab Part II - Casting: 1 hour

Supplies Needed:

- Lecture
 - Computer with Powerpoint
 - Projector
 - Optional: iClicker/Polling software
- Lab
 - Part I - Mold-making
 - * Gloves and safety glasses for each student

- * Container to hold mold during setting that is large enough for objects being molded (ex: Popcorn buckets)
 - * Object for molding (ex: bath toys)
 - * Oomoo 30 or some other silicone molding material
 - * Hot glue gun
 - * Release agent of some kind (We recommend Miller-Stephenson ms-122ad. If this is not an option, use a cooking spray containing flour, such as Baker's Joy)
 - This is only necessary if not using a container like a popcorn bucket, that can be removed easily due to its waxy coating
 - * Plastic cups or other disposable container for mixing of silicone components
 - * Measuring cups
 - * Tongue depressors
- Part II - Casting
- * Gloves and safety glasses for each student
 - * Silicone mold from part I
 - * Plastic cups or other disposable container for mixing of polymer components
 - * Pigment for coloring the polymer
 - * Smooth Cast 300 or similar two-part fast reacting polymer for casting
 - * Tongue depressors

Recommended Prior Knowledge:

- Understanding of casting
 - Importance in society as a whole
 - Different materials and molds possible
- Possible complications during metal solidification and polymer reactions

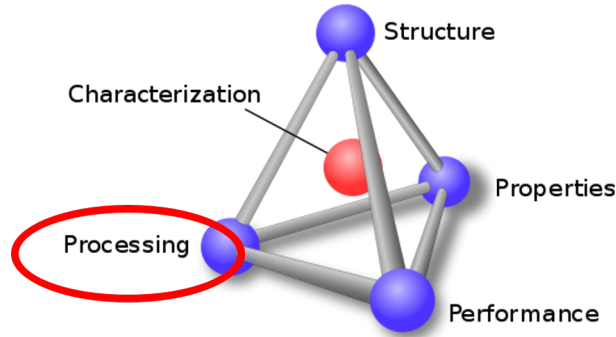
Recommended Prior Knowledge for Students:

- Basic understanding of chemical reactions

Discussion Points for Instructors:

- What objects in this room could have been made using casting? Why do you think this?
- If you have a two component resin system, why is it important to mix the two components very well?
- What types of objects would be very difficult to cast? Why? Can you think of a way to approach the problem in a different way?

Aspects of Materials Science Tetrahedron Covered in Module:



Complimentary Modules

- Composites
- Chocolate

Files Needed

- Casting Lecture (ppt or pdf)
- Mold-Making Instructor Lab Handout
- Mold-Making Student Lab Handout
- Casting Instructor Lab Handout
- Casting Student Lab Handout

For K-12 Instructors:

Assessment Ideas

- Lecture
 - Utilize a word cloud through PollEverywhere – ask “What was the most interesting thing you learned?”
 - Think, pair, share. What are the biggest challenges of casting?
- Lab
 - Lab check question - discuss

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