Rigid Plastic Packaging Container, or, RPPC, "Demo" video transcript

The volume of a rigid plastic packaging container or, RPPC, is one factor for determining whether a product's plastic packaging is an RPPC. More specifically, an RPPC with a volume capacity of eight ounces up to a maximum of five gallons falls within the program.

If you are unsure of a particular product's total packaging volume, you may consider contacting the container manufacturer to request the volume, or working with a package design engineer to evaluate the container's volume. If neither of these options are available, you may need to conduct the measurement yourself.

Regular shaped containers can easily be calculated using a standard formula. For example, a cube's volume can by calculated by multiplying the width times the length times the height. Using this rectangular prism as an example the width is 4.75 inches the length is 4 inches and the height is 3.5 inches. 4.75 times 4 times 3.5 is equal to 66.5 cubic inches. Therefore, the volume of this rectangular prism is 66.5 cubic inches.

Now all you need to do is convert 66.5 cubic *inches* into *ounces*. Here is the formula for converting inches to ounces: (shown onscreen "fl. oz = in^3/1.8046875")

66.5 cubic inches divided by 1.8046875 equals 36.85 fluid ounces. Therefore, this container may be an RPPC.

As another example, a cylinder's volume can by calculated by multiplying π time radius squared times the height. Using this cylinder as an example… π is always 3.14, the radius is 1.5 inches, squaring the radius 1.5 times 1.5 is 2.25 square inches and the height is 10.75 inches. π or 3.14 times 2.25 times 10.75 is equal to 75.95 cubic inches. Therefore, the volume of this cylinder is 75.95 cubic inches.

Now convert 75.95 cubic inches into ounces. Using our formula again, 75.95 cubic inches divided by 1.8046875 equals 42.08 fluid ounces.

For additional information on formulas to calculate regular shaped containers, such as cubes, rectangles, cylinders and other shapes go to the RPPC website at calrecycle.ca.gov/Plastics/RPPC/SelfDetermin. Once on this webpage, scroll to the bottom of the screen where you will find the Determining a Container's Volume or Equivalent Capacity tools.

Effective product packaging is used to maximize sales. However, the total volume capacity of the packaging container may not be easy to measure. In cases where irregular packaging is being used, and you need to conduct an evaluation on your own, several techniques are available.

The techniques include: the Rice Measurement Method, the Water Measurement Method, and the Volume Displacement or Water Dunk Test. Each of these methods can be used to determine the volume of a container. However, container determinations are almost always done for those containers that are questionably close to 8 oz.

The first method is the Rice Measurement Method. We suggest using rice however any fine grain material, including sand, can be a substitute.

As a regular shaped container, this rectangular box could easily be calculated by multiplying the width times the length times the height. However, for demonstration purposes, we will show you an alternative method for calculating this container's volume.

First, you will need to tape any gaps or small openings that may allow rice to slip through. Next, using a standard kitchen measuring cup, measure eight ounces of rice and level off the top. Finally, pour the rice into the empty package. Be sure to fill-in all the crevices. In this case, there is room for more rice. Using this method, the container has a volume *greater* than eight ounces.

Smaller containers hold a variety of products. Using the rice measurement technique, we are going to determine if this irregular shaped container meets this requirement. If necessary, tape any gaps or small openings that may allow rice to slip through. Next, measure eight ounces of rice using a standard kitchen measuring cup and level off the top.

Finally, pour the rice into the empty container. Be sure to fill-in all the crevices. Because of the indented closure of this irregular shaped container, the rice overfilled the capacity when closed. Using this method, the container has a volume *less than* eight ounces.

For irregular shaped containers that have several contours and indentations, the *water measurement* method might be preferred. This technique is slightly more accurate than the rice measurement technique. Using this technique helps to evaluate a container that is close to eight oz.

Using a standard kitchen measuring cup, measure eight ounces of water. Next, pour the water into the empty container. Be sure to fill-in all the spaces. In this case we have found that there is room for more water. Using this method, the container has a volume *greater than* eight ounces.

Again, using the water measurement technique, we are going to determine the volume of this small container. Begin by measuring eight ounces of water using a standard kitchen measuring cup. Now, pour the water into the empty container. Be sure to fill-in all the spaces.

In this case we have found that there is not enough room for eight ounces of water. Using this method, the container has a volume *less than* eight ounces.

Another method that works well to measure the volume of *irregular* shaped containers is the *Volume Displacement* or *Dunk Test.* For example, the volume of this irregular shaped container would be difficult to calculate using a standard formula. Therefore, the *volume displacement* test would work very well for this type of container.

First, fill the container with sand to weight the container so that it will sink into the water. Tape any tiny openings on your RPPC that could allow water to seep from, or into, the container. Next, pour any amount of water into a large measuring container, such as this eight cup container. Just make sure it is more than what you expect the container's volume to be. For this demonstration, we're using forty ounces of water.

Lower the container into the water. Finally, measure the amount of water that goes up. In our example, we placed 40 ounces of water in the measuring container and the water level went up to almost 56 ounces after dropping in the container. Therefore, the amount of water that the container displaced is about 16 ounces.

For additional tools that may assist you in conducting your own measurement, please visit the RPPC website at CalRecycle.ca.gov/Plastics/RPPC/SelfDetermin. Once on this webpage, scroll to the bottom of the screen where you will find the Determining a Container's Volume or Equivalent Capacity tools.