



Measuring Volume and Capacity with Porous Materials

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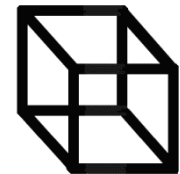
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Introduction

What is volume?

- volume is a property or an attribute of a three-dimensional space, like a cone, a cylinder or a cube
- quantify or calculate volume by finding the total number of same-sized units of volume that they need to fill the space
- measured in in^3 , ft^3 , cm^3 or m^3



What is capacity?

- capacity is the amount a container is capable of holding
- its units of measurement are milliliters, and liters



Introduction

Which containers have volume?

All of them!



Which volumes do we know?

12 oz.

1 Pint
or
16 oz.

?

Images taken from free powerpoints at <http://www.worldofteaching.com>

Introduction

Which containers are filled to capacity?



We hope the soda and milk containers are because we pay for the amount we buy.

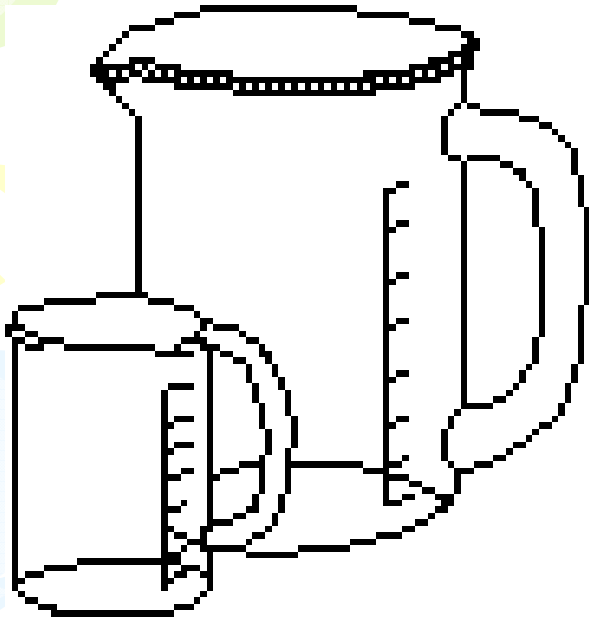
Introduction



What's filling the remaining capacity of the glass?

Nothing, air, space, etc.

Introduction



If I fill a 1 liter beaker with a granular material like stones, rocks, gravel, or sand, will it be filled to capacity?

No! There will be many empty spaces.

These spaces are called pores and these materials are called porous materials.

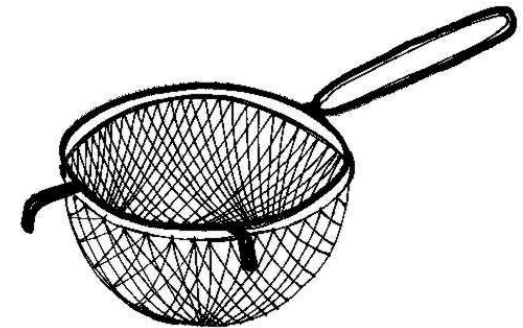


Which material has the largest pours? How about the smallest?

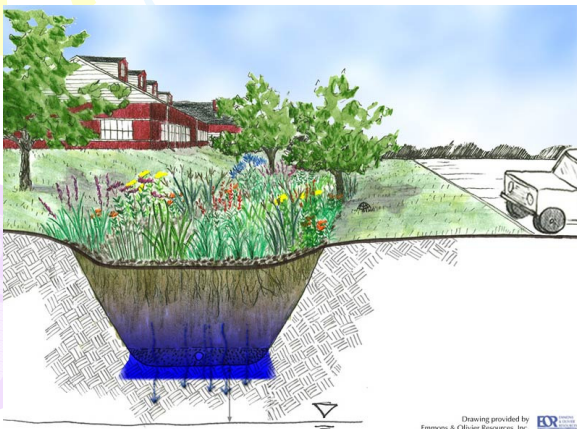
Introduction

Engineers use porous materials to filter things out of water, the same way you use a sieve to take your spaghetti out of the water you cooked it in.

Can you think of anything else that you filter?



Engineers also use these materials to store rain water underground until it can be absorbed into the soil.



Drawing provided by
Emmons & Oliver Resources, Inc. 

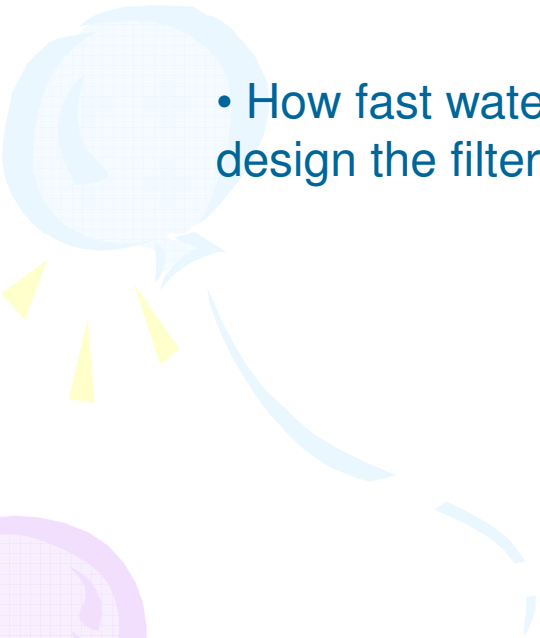
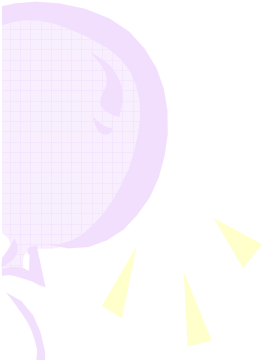
Introduction



In order to use these materials in an engineering design, we need to know:

- How much volume we can use to store water or fill with stuff we want to get out of the water?

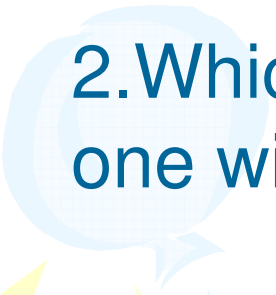

And

- How fast water will flow through the porous material, so that we can design the filter or infiltration basin large enough?
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- 



Activity

Investigating Questions

1. How much water can you fill between the pores of the rocks, stones, gravel and sand?
 2. Which material stores more water? (This is the one with the larger capacity.)
 3. Which material would you use if you wanted to store a large amount of water?
 4. Which material would you use if you wanted to remove small particles?
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Graphing Our Results

Capacity Results

