Kid's Corner

What is "Specific Gravity"?

When you look at an entry for a mineral in a mineral handbook or textbook, you will see a listing of that mineral's physical properties. When the properties are listed, the name of each property isn't always written out. So, instead of seeing "Hardness = 2.5" you might see "H: 2.5". Another physical property that is not usually written out is "Specific Gravity." It is usually written in a short form as "Sp. Gr. = ____" or "SpGr = _____" and some books just write "gravity".

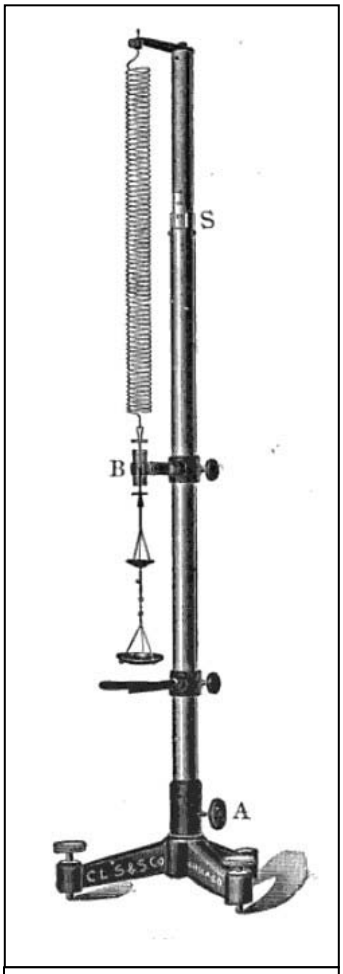
What is "Specific Gravity"? Many mineral collectors think that it has something to do with the weight of a mineral. The specific gravity of a mineral will affect its weight. But remember, the size of a specimen also affects the weight. A quartz specimen the size of your hand may weigh a pound or less. A quartz crystal that size of an adult human will weigh hundreds of pounds.

"Specific Gravity" is actually a comparison. It is a comparison between the weight of a mineral and the weight of an equal amount of water. In other words, specific gravity is a number that tells you how many times more a particular mineral species weighs than the same amount of water.

Here's a better way of understanding "Specific Gravity." The specific gravity of silver is 10. If you had a bucket of silver and a bucket of water that is exactly the same size, and both buckets are filled right up to the top, the bucket of silver will weigh 10 times as much as the bucket of water. Here's another example. If you have the same bucket of water, and now you have next to it a bucket of the same size filled with calcite, the calcite will weigh about 2 1/2 times as much as the bucket of water.

Now you try it. The mineral *fluorite* has a specific gravity of 3.4. This means a bucket of fluorite weighs 3.4 times as much as an equal bucket of water. Metallic minerals, like galena, pyrite, and hematite have higher specific gravities than minerals that don't contain metals (like lead and iron). Galena's specific gravity is 7.5. So (here we go again) a bucket of galena weighs...you got it… 7.5 times as much as an equal bucket full of water.

The mineral with the highest specific gravity is platinum. The specific gravity of pure platinum is 21.5. If you were rich enough to buy a bucket of pure platinum, it would weigh how many times an equal bucket of water? That's right, 21.5 times as much!



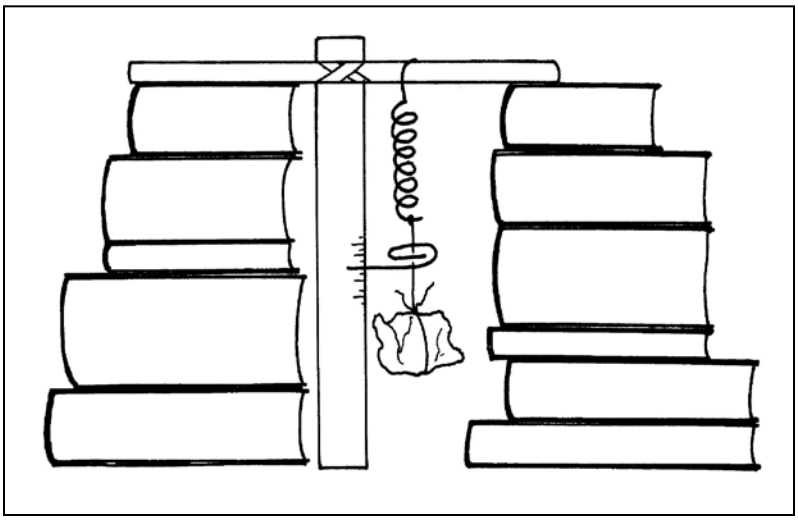
An engraving of a Jolly Balance from *A Manual of Physical Measurements, page 57* , by John O. Reed and Karl E. Guthe, 1913. This image is in the public domain.)

To the left is a picture of a piece of laboratory equipment that was invented to measure specific gravity. It is called a "Jolly Balance." It is called this not because it makes you happy, but after its inventor, a German physicist named Philipp von Jolly. It is designed so that you can first measure the weight of a piece of a mineral in air, and then the weight when the same specimen is place in a cup of water. Then, the following formula is used to determine the specific gravity:

$$\frac{\text{Weight of Mineral in Air}}{(\text{Weight of Mineral in Air}) - (\text{Weight of Mineral in Water})}$$

You can create your own Jolly Balance by using some basic materials you have at home or in your laboratory. Collect the following items: ruler, spring (or rubber band), string, pencil or stick, two wooden blocks or stacks of books, a paperclip and a jar filled with water.

Tie a mineral specimen to a string and tie the other end of the string to the spring on your Jolly Balance. Let the mineral hang down and record the reading indicated by the paper clip pointer on your ruler. Be as accurate and precise as possible (for instance, measure to the nearest 1/16th of an inch rather than the nearest 1/8th of an inch). Raise the mineral and place the cup of water under the mineral. Let the mineral hang down into the cup of water. Record the reading indicated by the paper clip pointer, again to the nearest 1/16th of an inch. These are the two numbers you need to calculate the Specific Gravity. Use the formula above. Hint: use a spring or rubber band that is not too strong. It needs to be able to stretch easily, but not so easily that the mineral specimen pulls it right down to the table top!



Source: Mini Miners Monthly, Vol 6 No 7., from www.diamonddanpublications.net