

ORE GRADE

Purpose

To calculate the percentage of galena in a piece of ore containing only calcite and galena and to work out the grade of the ore.

Activity

- 1. Work out the density of calcite using the piece of calcite provided. First weigh the calcite.*
- 2. Then place the beaker of water on the balance and press the tare button. Read the balance with the calcite suspended in the water. The last reading gives the volume of the sample.*
- 3. Calculate the density. Density = weight/volume*
- 4. Work out the density of galena in the same way..*
- 5. Weigh the piece of ore and then calculate its density.*
- 6. Now make a graph to enable you to calculate the percentage of galena in any sample which is a mixture of only calcite and galena. Place your graph paper in landscape orientation. On the x axis plot the percentage 0 to 100% using 2cm for each 10%. On the y axis plot the density, 0 to 8 g per cc using 2cm for each unit of density. On the left hand side on the 0% line plot the density of pure calcite and on the 100% line plot the density of pure galena. Draw a straight line between the two points.*
- 7. Use your graph to work out the percentage of galena in your sample.*
- 8. Check your result by using the following equation to calculate the percentage by weight of galena in the sample.*

$$D_s = P_g \times D_g + (1 - P_g) \times D_c$$

D_s = density of sample

D_g = density of galena

fraction

D_c = density of calcite

P_g = proportion of galena as a

9. Now try to calculate the percentage of lead in the ore. This would be its grade. Galena is PbS and lead has an atomic weight of 207 x and sulphur 32. Therefore the grade = $207/(207+32) \times \%galena$ in ore.

Teacher's Section

Requirements

Pieces of pure calcite and pure galena about 5cm by 5cm by 5cm.
A piece of mixed ore about the same size. Each sample should have a nylon (fishing line) loop about 15cm long attached to it with araldite.
A beaker or coffee jar large enough to fit each sample.
Balance with tare facility if possible otherwise ordinary balance.

Notes

Make sure your samples do not contain any barite or fluorite.
Measuring the density can be done with a normal balance without the tare facility by weighing in air and water or with a displacement can.

Time

Lab work 15minutes, calculations and write up 1 hour.