Density of different Earth materials

**Aim:** To identify materials that could be representative of the crust, mantle and core by calculating their density

**Materials:** Electronic balance, rock samples, Density displacement can, string, measuring cylinder

**Risks**

|  |  |
| --- | --- |
| **What are the risks in doing this experiment** | **How can you manage these risks to stay safe?** |
| Some of the samples may be composed of material that is toxic if ingested | Wash your hands regularly and after you have completed the investigation |
| Breakage of the measuring cylinder or damage to the balance | Take appropriate care with the laboratory equipment |

**Method**

1. Using the electronic balance, measure the mass of the sample and write this down

2. Add water to the density container to just above the hole so that it is stable and no water comes out

3. Tie the strong around the rock

4. Ensure that a measuring cylinder is below the spout, slowly lower the rock into the container and collect the water that comes out.

5. Record this volume in your table

6. Repeat this procedure for each of the other samples.

**Results**

1. Draw this table into your book

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Sample** | Sample mass (g) | Volume of water displaced (cm3)  (1ml = 1 cm3) | Test sample density  (g cm-3) | Layer of the Earth density matches |
|  |  |  |  |  |

2. When you have finished measuring the mass and volume of each rock sample, calculate the density of each sample using the following formula:

Test sample density = Test sample mass  
 Test sample volume

3. For each test sample identify to whether the density is similar to the continental crust (density less than 2.8 g cm-3);oceanic crust (density of 3.0-3.5 g cm-3); the mantle (density of 4.2- 4.7 g cm-3) or from the core (density above 10.0 g cm-3)

4. Draw a graph of your results

**Extension**

Most of the rocks of the crust have densities less than 2.8 g cm-3 and the density of the mantle rocks varies between 3.3 and 4.5 g cm-3. The average density of Earth is 5.6 g cm-3. Explain why the materials of the core must be significantly more dense than the crust and mantle materials.