Science 10F – Chemistry – Density Lab

**Purpose**: To find the composition of several objects. (To find out what element they are made of.)

**Hypothesis**:

**Materials**: 16 metallic objects

 Digital Scale

 Ruler

 Calculator

 Graduated cylinder

**Procedure**: 1. Measure all dimensions of the object to find the volume

1. Find the mass of the object
2. Calculate the density of the cube using the formula.
3. Repeat steps one to three for each object.
4. Use property tables in the textbook to determine the object’s composition.

**Results: Data Table**

|  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Object** | **Type of Object** | **Length (cm)** | **Width (cm)** | **Height (cm)** | **Radius (cm)** | **Volume Equation Used** | **Total Volume (cm3)** | **Mass (grams)** | **Density (g/cm3)** | **Other Physical Properties (e.g. colour, how hard or soft it is, how magnetic, …)** | **Composition (What is the object made of?)** |
| 1 | Cube |  |  |  |   |  |  |  |  |  |  |
| 2 | Cube |  |  |  |  |  |  |  |  |  |  |
| 3 | Irregular Shape |  |  |  |  | Water Displacement |  |  |  |  |  |
| 4 | Sphere |  |  |  |  |  |  |  |  |  |  |
| 5 | Cylinder |  |  |  |  |  |  |  |  |  |  |
| 6 | Cube |  |  |  |  |  |  |  |  |  |  |
| 7 | Rectangular Prism |  |  |  |  |  |  |  |  |  |  |
| 8 | Rectangular Prism |  |  |  |  |  |  |  |  |  |  |
| **Object** | **Type of Object** | **Length (cm)** | **Width (cm)** | **Height (cm)** | **Radius (cm)** | **Volume Equation Used** | **Total Volume (cm3)** | **Mass (grams)** | **Density (g/cm3)** | **Other Physical Properties (e.g. colour, how hard or soft it is, how magnetic, …)** | **Composition (What is the object made of?)** |
| 9 | Irregular Shape |  |  |  |  | Water Displacement |  |  |  |  |  |
| 10 | Cylinder |  |  |  |  |  |  |  |  |  |  |
| 11 | Cube |  |  |  |  |  |  |  |  |  |  |
| 12 | Cylinder |  |  |  |  |  |  |  |  |  |  |
| 13 | Cube |  |  |  |  |  |  |  |  |  |  |
| 14 | Cylinder |  |  |  |  |  |  |  |  |  |  |
| 15 | Rectangular Prism |  |  |  |  |  |  |  |  |  |  |
| 16 | Cylinder |  |  |  |  |  |  |  |  |  |  |

Analysis

1. Show ALL your calculations for object 1. Explain why you chose the composition you did. (5 marks)
2. Show ALL your calculations for object 9. Explain why you chose the composition you did. (5 marks)

**Conclusion**:

Densities of some Elements (in g/cm3)

|  |  |  |
| --- | --- | --- |
| Potassium | 0.86 | Silvery white, soft, highly reactive, alkali metal, essential to all life; found in all living matter; salts used in fertilizers |
| Carbon (graphite) | 2.25 | Grey-black solid, very soft; used in lubricants, pencil leads, electrical apparatus |
| Boron | 2.37 (brown)2.34 (yellow) | Brown amphorous powder or yellow crystals, used in hardening steel and for producing enamels and glasses |
| Aluminum | 2.7 | Silver-white metal |
| Bromine | 3.12 | Red-brown liquid, liquid causes severe chemical burns; vapour is harmful to lungs; used to make certain pain-relieving drugs |
| Carbon (diamond) | 3.51 | Colourless, solid crystals, very hard, used for drilling through rock. |
| Barium | 3.62 | Silver-white solid, used in X-ray diagnosis |
| Titanium | 4.5 | Lustrous white solid, alloys are widely used in the aerospace industry |
| Zinc | 7.14 | Hard, bluish-white metal |
| Chromium | 7.2 | Very hard, shiny silvery solid |
| Tin | 7.31 | Soft metal, slightly yellow solid, rust resistant |
| Manganese | 7.43 | Grey-white solid, special magnetic properties |
| Iron | 7.86 | Shiny, silver solid, rusts readily |
| Nickel | 8.9 | Silvery white, resists corrosion, magnetic properties |
| Cobalt | 8.9 | Hard, silver-white, magnetic metal |
| Copper | 8.95 | Soft metal, shiny, reddish sold, good conductor of heat |
| Lead | 11.34 | Shiny, blue-white solid, soft metal; forms poisonous compounds |
| Mercury | 13.6 | Shiny, silvery liquid, only liquid metal; forms poisonous compounds |
| Gold | 19.3 | Shiny, yellow solid, very soft metal; highly resistant to tarnishing |