**Properties of Matter Lab**

**Problem: How does volume affect the density in a substance?**

**Hypothesis: If\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_then,**

**\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_.**

**IV: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_**

**DV: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_**

**Constants:**

1. **\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_**
2. **\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_**
3. **\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_**
4. **\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_**
5. **\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_**

**Procedure:**

1. Find the mass of an empty and dry graduated cylinder using a balance. Never try to dry the inside with a paper towel. It will just get stuck inside of it and leave small pieces of paper behind. Only dry the outside if it is wet.

2. Fill it with the 10 mL of substance A assigned to your group. Make sure the bottom of the meniscus is touching the correct line on the cylinder. A second student should do the same with another graduated cylinder, except use 15 mL.

3. Find the mass of the cylinders and substance A using a balance. Record the data in chart 1.

4. Calculate the mass of substance A alone. It will be the difference between the masses of the empty cylinders and the masses of the cylinders plus substance A.

5. Slowly pour substance A from both cylinders into the Erlenmeyer flask.

6. Using the same graduated cylinders, repeat the process with substance b. Make sure the bottom of the meniscus is touching the correct line on the cylinder.

7. Find the mass of the cylinders and substance B using a balance. Record the data in chart 1. It will be the difference between the mass of the empty cylinders and the mass of the cylinder plus Substance B.

8. Repeat steps 2- 5 using substance C, D, E, and F.

Chart 1

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| Substance | Mass of Graduated Cylinder | Mass of substance and Graduated Cylinder | Mass of substance | Volume | Volum | Density  (Mass/Volume) |
| A |  |  |  | 10 |  |  |
| B |  |  |  | 10 |  |  |
| C |  |  |  | 10 |  |  |
| D |  |  |  | 10 |  |  |
| E |  |  |  | 10 |  |  |
| F |  |  |  | 10 |  |  |
| G |  |  |  | 10 |  |  |

Chart 2

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| Substance | Mass of Graduated Cylinder | Mass of substance and Graduated Cylinder | Mass of substance | Volume | Volume | Density  (Mass/Volume) |
| A |  |  |  | 15 |  |  |
| B |  |  |  | 15 |  |  |
| C |  |  |  | 15 |  |  |
| D |  |  |  | 15 |  |  |
| E |  |  |  | 15 |  |  |
| F |  |  |  | 15 |  |  |
| G |  |  |  | 15 |  |  |

Scoring Guide (I fill this out)

|  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  | Surpassing……….Meeting……………Approaching………Beginning(Little / No Attempt) | | | | | | | | |
| Accurately measures mass | 5 | 3.5 | 3 | 2.5 | 2 | 1.5 | 1 | 0.5 | 0 |
| Accurately measures volume | 5 | 3.5 | 3 | 2.5 | 2 | 1.5 | 1 | 0.5 | 0 |
| Understands the relationship between mass and volume | 5 | 3.5 | 3 | 2.5 | 2 | 1.5 | 1 | 0.5 | 0 |
| Understands how density can be used to identify an unknown substance. | 5 | X | X | X | 1 | X | X | X | 1 |