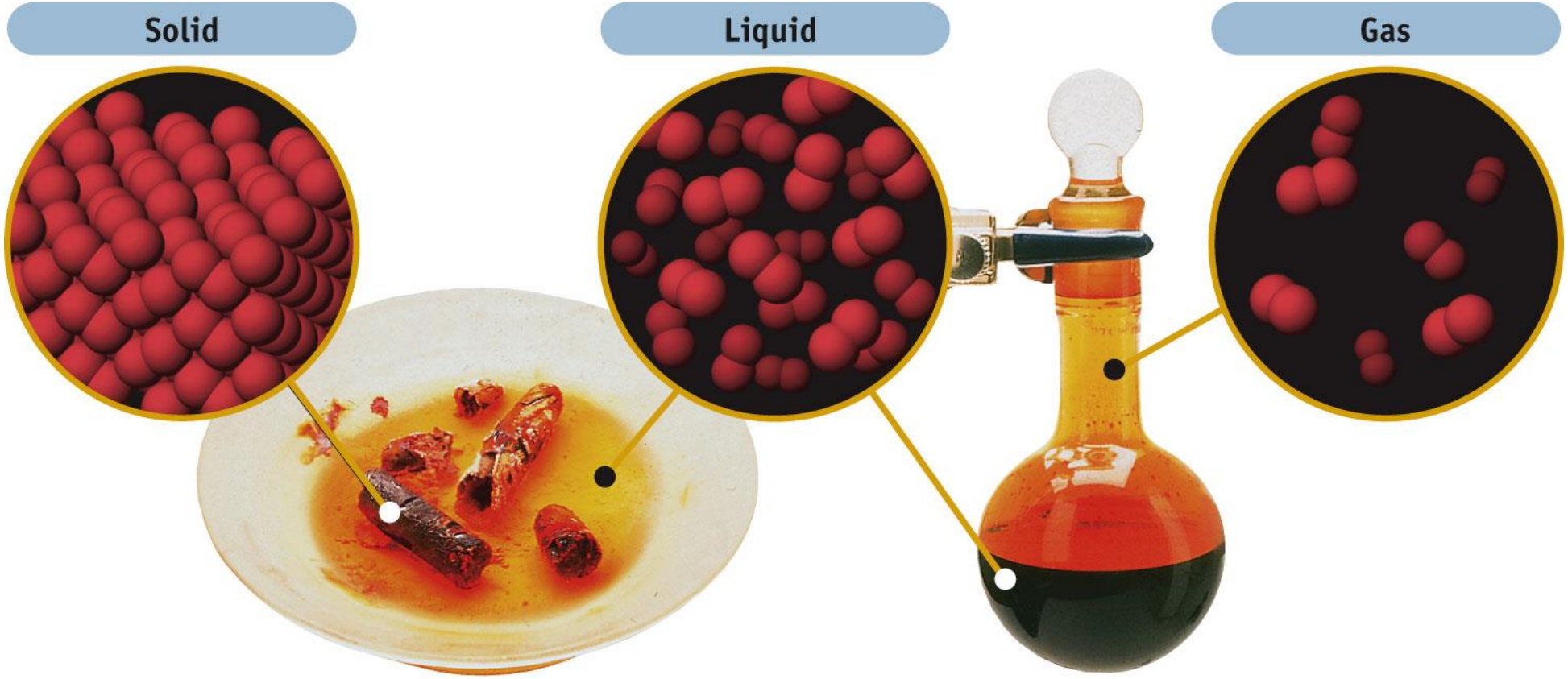
Density Lab Notes

Density

- Amount of matter per unit volume

- Tells you if the matter is packed really tightly, or if there is a lot of empty space in the sample.

In general, which is more dense?



Bromine solid and liquid

Bromine gas and liquid

Temperature Dependence

- As you increase the temperature of a substance its density decreases
  - Same amount of matter
  - The matter has more energy so it increases in volume because the particles move around more. (no change in phase is implied)

Measuring Density

1

Measure Mass:
BALANCE

$$Density = \frac{mass}{volume}$$

2

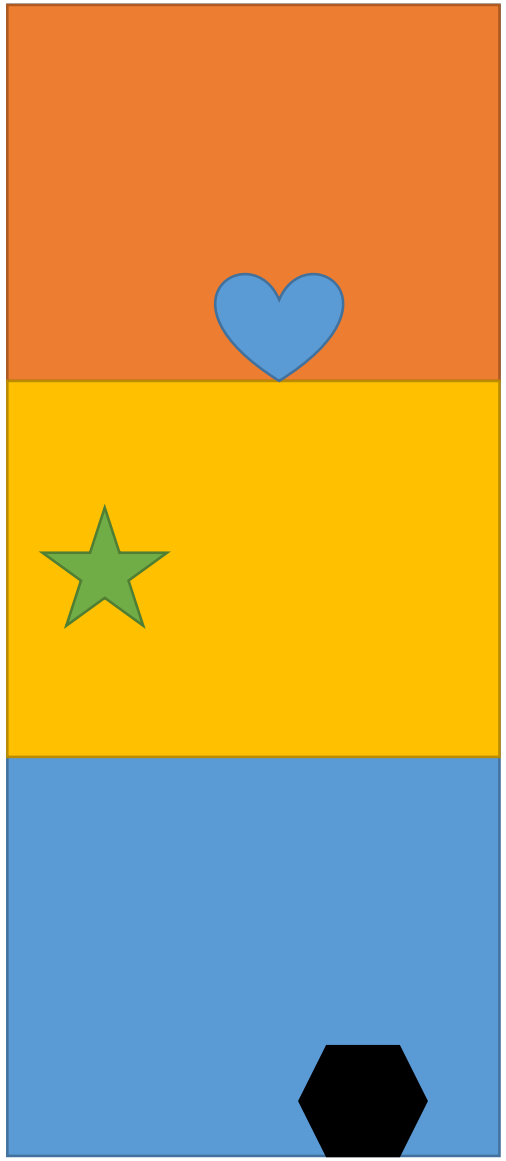
Measure Volume:
A. Geometry (solids)
B. Volume Displacement (solids)
C. Liquids

Measure Volume:

- Geometry: Regular Solids
  - Use a ruler
  - Use Geometry to calculate the volume
- Volume Displacement: Irregular Solids
  - Use a graduated cylinder
- Liquids
  - Use graduated cylinder, pipette, flasks

Density Gradient Tube

- Liquids will layer based on their densities.
  - More dense below less dense.
- Estimate densities of solids based on where they end up in the density gradient tube. Assume you know the densities of the liquids.
  - Star is about the same density as yellow liquid.
  - Heart is more dense than orange, and less dense than yellow.
  - Hexagon is more dense than blue liquid.



Procedure

- SKIP: Temperature dependence of Liquid
- Be careful about your sig figs! Carry them through the calculations correctly!
- For the Density of Liquids, do not worry about exact volume! Make sure you KNOW your group's volume and mass. Density doesn't care if you use 3mL or 15mL.
- SKIP: Unknown