

How do chemists know what a mystery substance is?

Name _____

Date _____

Test 1 is Wednesday

For Test 1 review all the notes and homework with the help of <http://genest.weebly.com>



Uranium. U: atomic mass 238.029; atomic number 92; oxidation states 6+, 5+, 4+, 3+. Occurrence in the earth's crust $2 \times 10^{-5}\%$; melting point 1132.3°C; boiling point 3818°C; density 19.05 g/cm³. Silver-white radioactive metal, softer than glass. Uranium is malleable, ductile, and can be polished. Half-life of the U-238 isotope is 4.51×10^9 years. Specific heat is 0.117 J/g•C°; heat of fusion 12.1 kJ/mol; heat of vaporization 460 kJ/mol. Burns in air at 150–175°C to form U₃O₈. When finely powdered, it slowly decomposes in cold water, more quickly in hot water. Burns in fluorine to form a green, volatile tetrafluoride; also burns in chlorine, bromine, and iodine. Reacts with acids with the liberation of hydrogen and the formation of salts with the 4+ oxidation state. Not attacked by alkalis.

Element	density[g/mL]
Aluminum	2.70
Titanium	4.54
Zinc	7.13
Tin	7.31
Iron	7.87
Nickel	8.90
Copper	8.96
Silver	10.50
Lead	11.35
Mercury	13.55
Uranium	19.10
Gold	19.30

- Based on the above information, tell what pieces of **lab equipment** from our room you would need to determine whether a bullet were made of Uranium:

- If you found a ring, in a locked chest, under a mountain, in a dragon's lair, behind the PDQ, and you took mass and volume measurements, you might find the following:

DATA:

Mass: 15.28 g

Final volume: 43.7 mL

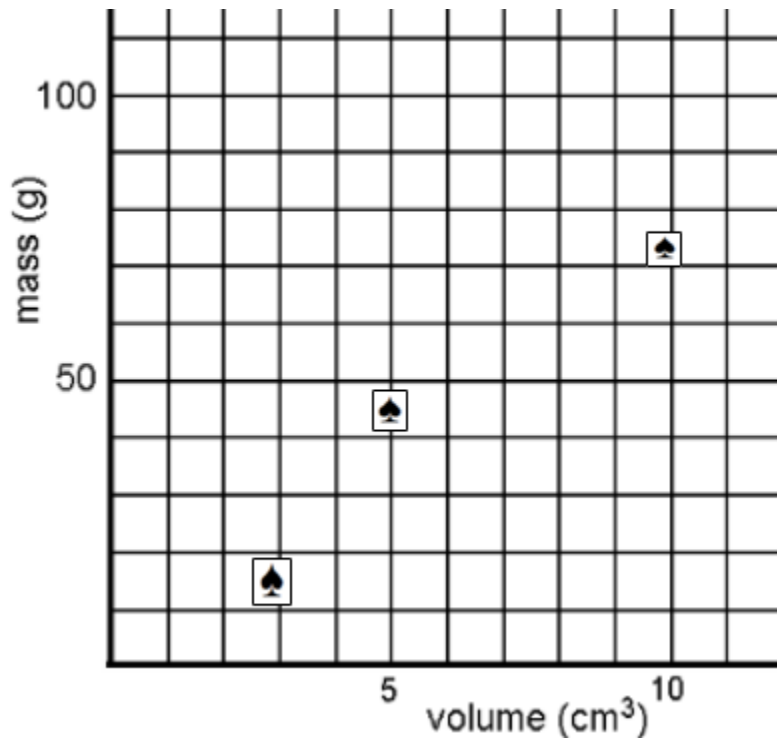
Initial volume: 42.2 mL

Volume of ring: _____

Density: _____

What material is the ring made of?

3. If you were on a werewolf tour, walking near Timisoara, Romania and found several large bullets, and measured their mass and volume, you might get the graph above. Chemical tests show that the bullets are all three made of the same pure element. Draw a best fit line that takes into account the point (0,0) and your three data points (♠)



- What is the slope of the graph?
- We didn't measure (0,0), why are we allowed to include it in our data?
- Are these bullets effective against werewolves? Explain.
- Why are these data points not all in a straight line?