



Cycle 7 Chemistry I Lesson 5 “Counting Atoms” Unit

Working with Mass of Individual Atoms

Warmup: 1 mole of gold (Au) has a mass of 196.97 grams, and contains 6.022×10^{23} atoms. What is the mass of 1 atom of gold?



Classwork:

Find the Mystery Phrase
Gilding the state House dome?



Chapter menu

Resources





Cycle 7 Chemistry I Lesson 5

“Counting Atoms” Unit

How much Gold?

The dome of the state House in Boston is 15 meters in diameter and is approximately half of a sphere (a hemisphere). How many grams of gold (Au) are needed to cover it in a single-atom layer of gold?

Density of gold: 19.32 g/cm^3

Surface area of a sphere is $4\pi r^2$





How much Gold?

Density of gold: 19.32 g/cm^3

Step 1: How many grams are in a 1 cm^3 cube of gold?

Step 2: How many moles are in this cube?

Step 3: How many atoms are in this cube?

Step 4: How many Au atoms fit in a centimeter? Take the cube root of the answer to step 3.

Step 5: How many Au atoms fit in a square centimeter? Square the answer to step 4.





How much Gold?

Surface area of a sphere is $4\pi r^2$

Step 6: The diameter of the House dome is 15 meters.
What is the radius of the House dome?

Step 7: Convert the result of step 6 from m to cm.

Step 8: The dome is a hemisphere! Surface area is half that of a sphere, so it is $2\pi r^2$

Step 9: Multiply the result of step 8 by the result of step 5 to obtain the number of atoms of Au

Step 10: How many moles of Au is this? Grams?



Chapter menu

Resources

