The Mole and History of The Term "Mole"

1mole =602,214,150,000,000,000,000,000 Avogadro's Number
The number of carbon-12 atoms in 12 grams of unbound carbon in the ground state.

Avogadro's number, the number of particles in a mole, can be experimentally determined by first "counting" the number of atoms in a smaller space and then scaling up to find the number of particles that would have a mass equal to the atomic or molecular mass in grams.

The History of the Term"Mole"

The Avogadro constant is named after the early nineteenth century Italian scientist Amedeo Avogadro, who is credited (1811) with being the first to realize that the volume of a gas (strictly, of an ideal gas) is proportional to the number of atoms or molecules. The French chemist Jean Baptiste Perrin in 1909 proposed naming the constant in honor of Avogadro. American chemistry textbooks picked it up in the 1930's followed by high school textbooks starting in the 1950s.

The unit "mole" was introduced into chemistry around 1900 by Ostwald, and he originally defined this unit in terms of gram. Gram is a unit of mass; but what is the mole a unit of? Ostwald did not say;[3] however, several years later, he did make it clear that the concept of mole should be linked to the ideal gas. [4]

[3]"...the molecular weight of a substance, expressed in grams, shall henceforth be called mole [. . . das in Grammen augedruckte [. . .] Molekulargewicht eines Stoffes soll fortan ein Mol heissen]" Ref. 7).

[4] "That amount of any gas that occupies a volume of 22414 mL in normal conditions is called one mole [eine solche Menge irgendeines Gases, welche das Volum von 22412 ccm im Normalzustand einnimt nennt man ein Mol]"

References

Ref. 7. Ostwald, W. *Grundriss der allgemeinen Chemie;* Leipzig: Engelmann, 1900, p. 11

Ref. 8. Ostwald, W. *Grundriss der allgemeinen Chemie*, 5th ed.; Dresden: Steinkopff, 1917, p. 44

From-http://dbhs.wvusd.k12.ca.us/webdocs/Mole/Origin-of-Mole.html

Real World Moles

A human body contains very roughly one hundred trillion cells; there are roughly six billion people on Earth; so the total number of human cells on the planet is approximately $100 \times 10^{12} * 6 \times 10^{9} = 6 \times 10^{23}$, which is very close to one mole.

Since the Earth has a radius of about 6400 km, its volume is approximately 10^{21} m^3. Since about 500 large grapefruit will fit in one cubic meter, it therefore follows that a mole of grapefruit would have approximately the same volume as the Earth.

If you had exactly one mole of sheets of paper, you could make one million equal stacks from sea level on the earth that would pass the sun.

If you had a mole of pennies, you could give out enough money to everyone in the world so that they could spend a million dollars every hour, day and night, for the rest of their lives.

If you wanted to use trial and error to find the combination to an e-mail password that contained exactly six alphanumeric characters, it would take you up to 6^36 different tries, which is approximately 10^{28}, which is over 17,000 moles.