



Scientific Notation

Macroscopic  
Numeric shorthand  
602,216,900,000,000,000,000,000  
Microscopic  
 $6.02 \times 10^{23}$   
SCIENTIFIC NOTATION

Chemists deal with numbers that range from macroscopic to microscopic. For ease of use, they use numeric shorthand known as scientific notation to work with different quantities in calculations. For example, it would be inconvenient to write out the chemical quantity of a mole as 602,216,900,000,000,000,000,000. Using scientific notation makes the number more manageable at  $6.02 \times 10^{23}$ .

Based on multiples of 10

Very large or very small numbers

$$10^0 = 1$$

exponent

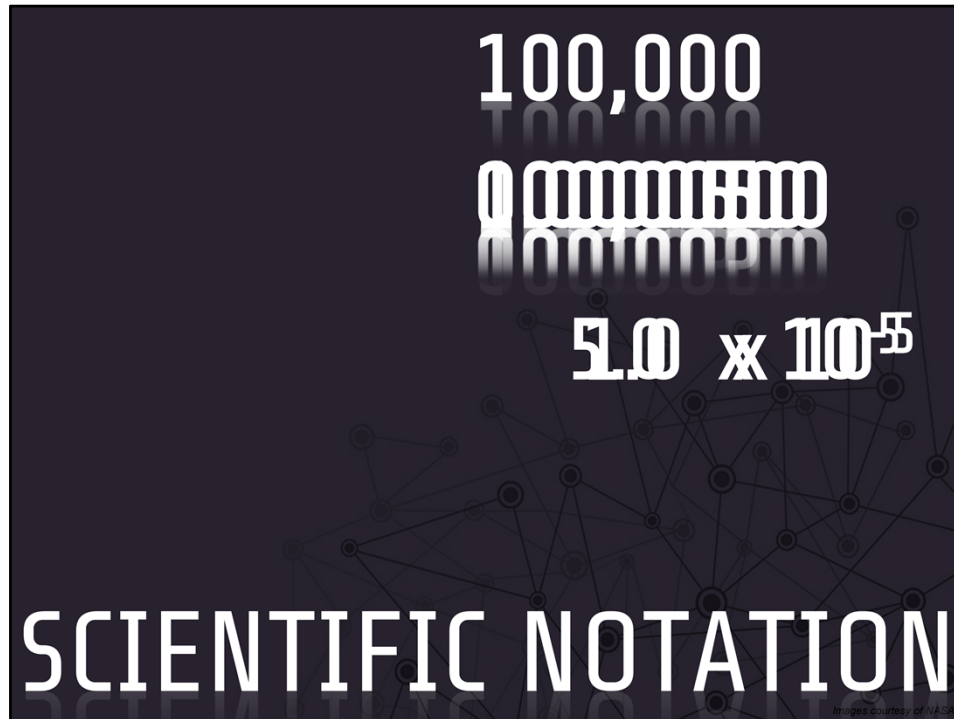
coefficient

$$a \times 10^n$$

**SCIENTIFIC NOTATION**

The system is based on multiples of ten and can be used to represent very large or very small numbers. For simplicity, powers of ten tell you how many times to multiply by ten. The trick is to remember that  $10^0 = 1$ . In the following formula,  $a \times 10^n$ , the “a” is called the coefficient and the “n” is called the exponent.

**Introductory Module: Fundamentals of Science**  
**Topic 3 Content: Scientific Notation Presentation Notes**



When converting numbers in scientific notation, it is sometimes easier to think of how to move the decimal. If the number is large, like 100,000, think of the number as 100,000.0. To transform the number into scientific notation, move the decimal to the left. For each time you move the decimal to the left, you are getting a power of 10. The correct way to write 100,000 is  $1.0 \times 10^5$ . If the number is small, like 0.00005, you would move the decimal to the right each time. For each time you move the decimal to the right, you are getting a negative power of ten. The correct way to write this small number is  $5.0 \times 10^{-5}$ .

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100	$1 \times 10^2$
10,000	$1 \times 10^4$
1,000,000	$1 \times 10^6$
1,000,000,000	$1 \times 10^9$

**SCIENTIFIC NOTATION**

In the study of chemistry, it is important to be comfortable working with tiny and enormous numbers. A good way to begin is by learning to recognize just how much larger ten thousand is as compared to one hundred, and how much larger one million is to ten thousand. Even larger is how much one billion is to one million. Using scientific notation allows you to better understand the scope of the numbers that you use.