Scientific Notation

Chem Worksheet 1-5

Name _____

Period _____

When writing very large or very small numbers it is convenient to represent these numbers using **scientific notation** (also called exponential notation). Numbers written this way contain two parts: a number between 1 and 10; and the number ten raised to a power, or exponent. For example, 5.8×10^6 is written in scientific notation. When the exponent is positive, such as 5.8×10^6 this represents a large number. If the exponent is negative, like 2.1×10^{-3} this represents a small number.

A simple way to put a number in scientific notation is to count the number of places the decimal must be moved in order to create a number between 1 and 10. In the number 24,500 the decimal is found at the end. To make the number between 1 and 10, the decimal must be moved 4 places.

If decimal is moved left then write positive exponent
If decimal is moved right then write negative exponent
If number has positive exponent move decimal to right
If number has negative exponent move decimal to left

24,500.

When the decimal is moved this creates the number 2.45. The zeros at the end may be omitted because they are not significant. Since the decimal is moved 4 places to the left the exponent is positive 4. The number is written 2.45×10^4.

Now consider the very small number 0.000000035. To make the number between 1 and 10 the decimal is moved 8 places to the right.

0.000000035

When this number is written in scientific notation it looks like this: 3.5×10^{-8}. Since the decimal is moved to the right the exponent is negative.

Examples

Rewrite the number 440,000 in scientific notation.

440,000. Decimal moves 5 places to the left.

4.4×10^5

Rewrite the number 8.4×10^{-5} in standard notation.

Move the decimal 5 places to the left.

0.000084

Write the following measurements in scientific notation.

1. 1700 m
2. 0.00125 s
3. 0.025 kg
4. 8200000 cm^3
5. 25000 kPa
6. 0.00074 mol
7. 18 mL
8. 0.001 km
9. 78.7×10^1 ºC

The following measurements are in scientific notation. Write them in standard notation.

10. 6.85×10^{-4} kg
11. 7.25×10^3 g
12. 2.4×10^3 m
13. 4×10^{-2} L
14. 1.48×10^5 psi
15. 1.2×10^8 m
16. 3.82×10^{-1} mol
17. 1.975×10^4 km
18. 8.4×10^3 ºC
19. 5.20×10^{-4} kPa
20. 3.7×10^{16} atoms
21. 7.000×10^6 cm

Do the following calculations.

22. $(5.2 \times 10^{-2}) \times (1.5 \times 10^2)$
23. $(3.2 \times 10^{-4}) \div (1.1 \times 10^{-7})$
24. $(9.0 \times 10^4) + (4.2 \times 10^3)$
25. $(2.2 \times 10^{-5}) - (3 \times 10^{-6})$
26. $(4.2 \times 10^2) + (1.2 \times 10^3)$
27. $4(2.8 \times 10^{-2}) \div 5.5 \times 10^2$