

4. Use a periodic table to fill in the missing information in the following table.

Name	Symbol	Atomic Number Z	Mass Number A	Number of Neutrons	Number of Electrons
oxygen	$^{16}_8\text{O}$	8	16	8	8
NITROGEN	$^{14}_7\text{N}$	7	14	7	7
SULFUR	$^{34}_{16}\text{S}$	16	34	18	16
(DEUTERIUM) HYDROGEN-2	$^2_1\text{H}$	1	2	1	1
(TRITIUM) HYDROGEN-3	$^3_1\text{H}$	1	3	2	1
MAGNESIUM	$^{24}_{12}\text{Mg}$	12	24	12	12
MANGANESE	$^{25}_{12}\text{Mn}$	12	25	13	12
URANIUM	$^{238}_{92}\text{U}$	92	238	146	92
KRYPTON	$^{84}_{36}\text{Kr}$	36	84	48	36

**Problems**

1. The radius of a Cl nucleus is 4.0 fm, and the radius of a Cl atom is 100 pm. (1 fm =  $1 \times 10^{-15}$  m; 1 pm =  $1 \times 10^{-12}$  m). How many times larger is the diameter of the Chlorine atom than the diameter of the Chlorine nucleus?

$$\frac{100 \times 10^{-12}}{4 \times 10^{-15}} = 25,000 \therefore \text{A CHLORINE ATOM'S RADIUS IS 25,000 X LARGER THAN A CHLORINE NUCLEUS RADIUS.}$$

2. Identify two objects that have this same ratio of lengths.

$$25000 \text{ FT} / 1 \text{ FT} = 4.7 \text{ MILES} / 1 \text{ FT}$$

3. How many times larger is the volume of the atom than the volume of the nucleus?

$$\begin{aligned} \frac{4}{3}\pi r^3 &= \text{VOL (OF A SPHERE)} \\ \text{NUCLEUS} &= \frac{4}{3}\pi (4 \times 10^{-15} \text{ m})^3 = 2.68 \times 10^{-43} \text{ m}^3 \\ \text{ATOM} &= \frac{4}{3}\pi (100 \times 10^{-12} \text{ m})^3 = 4.19 \times 10^{-30} \text{ m}^3 \\ &= \frac{4.19 \times 10^{-30} \text{ m}^3}{2.68 \times 10^{-43} \text{ m}^3} = 1.56 \times 10^{13} \end{aligned}$$

$\therefore$  A CHLORINE ATOM'S VOLUME IS  $1.56 \times 10^{13}$  LARGER THAN THE VOLUME OF ITS NUCLEUS.