CHEM 130 **Name** _____
Quiz 3 – September 9, 2016

Complete the following problems. Write your final answers in the blanks provided. You must show your work to receive full credit. Show your answers to the correct number of significant figures with the correct units.

1. The two naturally occurring isotopes of nitrogen have masses of 14.0031 amu and 15.0001 amu. Determine the percentage of nitrogen -15 (^{15}N) in naturally occurring nitrogen (8 pts)

Since only two isotopes exist:

$$f_{14} + f_{15} = 1 \text{ and}$$
$$14.0031f_{14} + 15.0001f_{15} = 14.0067 \text{ (This is our definition of atomic mass)}$$

So

$$f_{14} = 1 - f_{15}$$
$$14.0031(1 - f_{15}) + 15.0001f_{15} = 14.0067$$
$$14.0031 - 14.0031f_{15} + 15.0001f_{15} = 14.0067$$
$$(15.0001- 14.0031)f_{15} = 14.0067-14.0031$$
$$0.997f_{15} = 0.0036$$
$$f_{15} = 0.0036_1$$
$$\%^{15}N = 100\% \times 0.0036 = 0.36\%$$

Answer_____0.36%_____

2. Complete the table below. (8 pts.)

Name	Symbol	# Protons	# Neutrons	# Electrons
chromium – 53	^{53}Cr	24	29	24
magnesium-52 (I know this doesn't exist)	^{52}Mg	12	40	12
sodium-23 ion	$^{23}Na^{+}$	11	12	10

3. How many atoms are present in a rectangular block of copper that is 22.0 mm long, 11.5 mm high and 4.3 mm wide? The density of copper is 8.92 g/cm^3. (9 pts)

$$V = l \times w \times h = 2.20 \text{ cm} \times 1.15 \text{ cm} \times 0.43 \text{ cm} = 1.088 \text{ cm}^3$$

$$1.088 \text{ cm}^3 \times \frac{8.92 \text{ g Cu}}{\text{cm}^3} \times \frac{1 \text{ mol Cu}}{63.546 \text{ g Cu}} \times \frac{6.022\times10^{23} \text{ atoms}}{1 \text{ mol Cu}} = 9.196\times10^{22} \text{ atoms}$$

Answer____9.2×10^{22} atoms ____

Possibly Useful Information

$\%\ \text{by mass} = \frac{\text{g component}}{\text{100 g sample}}$	d = m/v	v = l x w x h