

1. (10 points) Sulfur is a (*metal*) (*nonmetal*) (*metalloid*) _____ with a symbol of _____ and an atomic number of _____. It is in Group _____ and in period _____ of the periodic table. The element has _____ protons in the nucleus. A sulfide ion has the formula _____ and has _____ electrons. The most abundant isotope of sulfur is ^{32}S , an isotope with _____ neutrons in the nucleus. A metal in the same period as sulfur would be _____ (*give its name or symbol*).

2. (14 points) Complete the following table of names and formulas.

Cation	Anion	Formula	Name
Al^{3+}		$\text{Al}(\text{OH})_3$	
			copper(II) carbonate
Mg^{2+}	ClO_4^-		
			iron(III) oxide
Ni^{2+}	CH_3CO_2^-		
Cu^{2+}		CuSO_4	

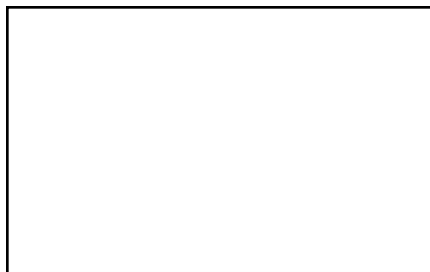
3. (3 points) Give the name or formula of each of the following *nonionic* compounds.

Name	Formula
nitrogen dioxide	
ammonia	
	HBr

4. (4 points) In one of the boxes below sketch an atomic level view of solid iron. In the other box, sketch a molecular level view of nitrogen gas. Use a circle to represent an atom. Include at least 20 atoms of iron or of nitrogen in your drawing.



Iron metal



Nitrogen gas

5. (2 points) The density of iron is 7.874 g/cm^3 . What volume of iron contains 0.10 mol of iron?
- i) 0.013 cm^3
 - ii) 0.71 cm^3
 - iii) 1.4 cm^3
 - iv) 44 cm^3
 - v) none of the above
6. (3 points) Classify each of the following as a *chemical* or *physical* change:
- (a) _____ A cup of household bleach changes the color of your favorite T-shirt from purple to pink.
 - (b) _____ The fuels in the space shuttle (hydrogen and oxygen) combine to give water and provide the energy to lift the shuttle into space.
 - (c) _____ An ice cube in your glass of lemonade melts.
7. (2 points) Which of the following contains the largest number of atoms?
- a) A piece of copper with a mass of 0.10 g.
 - b) A piece of platinum with a volume of 0.10 cm^3 . (The density of platinum is 21.45 g/cm^3 .)
 - c) 0.10 mL of liquid mercury. (Mercury has a density of 13.6 g/cm^3 .)
8. (5 points) A cylindrical piece of sodium is 12.00 cm long and has a diameter of 4.5 cm. The density of sodium is 0.971 g/cm^3 . How many atoms does the piece of sodium contain? [The volume of a cylinder is $V = \pi r^2 \cdot \text{length}$.]

You must show your work here! Pay attention to units!



Cutting a cylinder of sodium.

8. (4 points) Fill in the blank or circle the correct answer.

a) A flask has a volume of 800 mL. In liters, the volume is _____ L

b) A sample has a mass of 0.156 g. In milligrams, this mass is _____ mg.

c) What is the *most correct* answer for the following mathematical operation

$$(0.012345) \cdot (5.3 \times 10^{-3}) = \underline{\hspace{2cm}}$$

i) 6.5429×10^{-5}

ii) 6.54×10^{-5}

iii) 6.5×10^{-5}

iv) 6.5×10^5

d) Sodium metal melts at 371 K. On the Celsius scale, this temperature would be _____ °C

9. (3 points) Tylenol has the molecular structure illustrated here. Its formula is

C _____ H _____ N _____ O _____

Models of tylenol (acetaminophen)

