

1) (2.5 points) Describe the following underlined matter using only one of the following terms: heterogeneous mixture, compound, element, or homogeneous mixture.

- a) an apple that has been cut in half het. mix b) a freshly opened bottle of Coke® het. mix
c) coffee, freshly brewed drip hom. mix d) sugar, (sucrose) compound
e) mercury, in a thermometer element

2) (1.5 points) Describe the following as a chemical or physical change

- a) melting solid oxygen P b) bleaching black hair to blonde hair C
c) a raw egg is cooked to a hard-boiled state C

3) (4.5 points) TRUE or FALSE

- a) The Bohr model of the atom can explain the emission spectrum of the Li^- ion. F
b) The visible emission spectrum of hydrogen shows 4 different colored lines of light. This fact supports the idea that an electron's energy is quantized. T
c) The total number of orbitals with $n = 3$ is 6. $n^2 = 9$, $\begin{matrix} s, p, d \\ \downarrow \downarrow \downarrow \\ 1 \quad 3 \quad 5 \end{matrix}$ F
d) Melting ice is an endothermic process. T
e) Water, H_2O , is not a mixture of oxygen and hydrogen. T
f) Decreasing the distance between two electrons will decrease the electric potential energy between them. F
g) Most of the volume of an atom is contained in the nucleus. F
h) According to Dalton, all oxygen atoms have the same diameter. T
i) The mass of a nitrogen-14 atom is exactly 14 amu. F

4) (2 points) Which of the states of matter is most easily compressed? Suggest a reason for this.

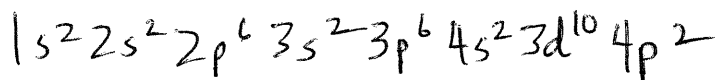
Of the three states of matter, gas, liquid, and solid, a gas is most easily compressed because the distance between particles is the greatest.

5) (6 points) Complete the isotope table for the following isotopes (charged and uncharged). Be sure to complete the isotope symbol.

Symbol # of Particles	$^{207}_{82}\text{Pb}$	$^{27}_{13}\text{Al}^{3+}$
Neutrons	125	14
Atomic Number	82	13
Mass Number	207	27
Protons	82	13
Electrons	82	10

6) (3 points) Write the ground state electron configuration for Ge. Use the long form.

✓ Ge $32e^-$



1s
2s 2p
3s 3p 3d
4s 4p 4d 4f

7) (3 points) Lithium has 2 naturally occurring isotopes with atomic masses of 6.10512 amu (lithium-6) and 7.01600 amu (lithium-7). Calculate the natural abundance (in %) for each isotope. You will need one more piece of information. Where will you get it? Now, set up and solve the equation.

$$\underset{\text{amu}}{6.10512} (x) + \underset{\text{amu}}{7.01600} (1-x) = \underset{\text{amu}}{6.941}$$

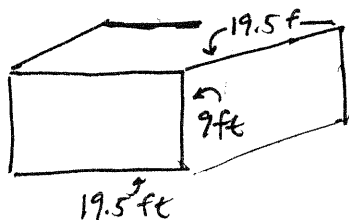
$$6.10512x + 7.01600 - 7.01600x = 6.941$$

$$\underbrace{(6.10512 - 7.01600)}_{\text{amu}} x = -0.075_{00} \text{ amu}$$

$$(-0.91088 \text{ amu}) x = -0.075_{00} \text{ amu}$$

$$x = 0.082_3 \rightarrow 8.2_3\% \text{ } ^6_3\text{Li} \quad 91.7_7\% \text{ } ^7_3\text{Li}$$

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$$D = \frac{M}{V}$$

$$M = V \cdot D$$

$$M = \underbrace{(19.5 \text{ ft})(19.5 \text{ ft})(9.0 \text{ ft})}_V \cdot \underbrace{\frac{1.19 \text{ g}}{1 \text{ L}}}_D$$

$$M =$$

$3.4_{22} \times 10^3 \text{ ft}^3$	1.19 g	1 Mg	$(12)^3 \text{ in}^3$	$(2.54)^3 \text{ cm}^3$	1 mL	1 L
1	1 L	10^6 g	$\frac{1 \text{ ft}^3}{12^3 \text{ in}^3}$	$\frac{1 \text{ in}^3}{2.54^3 \text{ cm}^3}$	1 cm^3	1000 mL
2 sf	3 sf	ex.	ex	ex	ex	ex

$$M = 0.115311 \text{ Mg}$$

$$= 0.11_{53} \text{ Mg}$$

$$= 1.1 \times 10^{-1} \text{ Mg}$$