

2) **[3 marks]** A beaker was completely filled with a certain liquid. The mass of the beaker and liquid was 1000.00 grams. A rock of mass 240.00 grams and density 8.00 g/mL was added to the beaker, which caused some of the water to spill out (the volume of water spilled exactly equalled the volume of the rock). If the mass of the rock, beaker, and the liquid that didn't spill out of the beaker was 1216 .00 grams, what was the density of the liquid?

3) **[3 marks]** A 4.00-kg sample of S_8 was converted to SO_2 , and a 600-gram sample of S_8 was converted to S_2O_3 . Calculate the ratio $\frac{\text{mass of O in } SO_2}{\text{mass of O in } S_2O_3}$.

4) **[4 marks total]** The average atomic mass for gallium is 69.723 u.

a) **[3 marks]** Complete the following table for gallium:

Nuclide Symbol	isotope mass (u)	percent abundance
	68.9256	
	70.9247	

b) **[1 mark]** Assuming neutral atoms, which of the two isotopes of gallium has more electrons?

5) **[3 marks]** Give the symbol for an element that satisfies the conditions indicated:

occurs naturally as a diatomic liquid _____

a group IVA semiconductor _____

a group IA non-metal _____

has no stable isotopes and has $A = 238$ _____

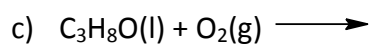
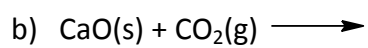
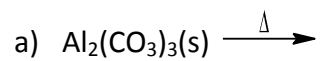
a transition metal that's not a solid at room temperature _____

a group VIIA solid _____

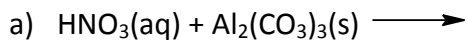
6) [8 marks] Complete the following table:

Formula	Name
CaCl_2	
	potassium nitride
Fe_3P_2	
	cobalt(III) oxide
KClO_2	
	aluminum sulphite
NiCO_3	
	ammonium perbromate
$\text{Li}_2\text{S}\cdot 9\text{H}_2\text{O}$	
	mercury(I) nitrite dihydrate
$\text{H}_2\text{S}(\text{g})$	
	periodic acid
HClO	
	calcium hydroxide
ClO_2	
	diphosphorus pentoxide

7) **[4 marks]** Complete and balance the following reactions. Indicate the phases of all reactants and products. You only need to show the molecular equations. Assume a reaction occurs in each case.



8) **[4 marks]** Complete and balance the following equations, providing the molecular, full ionic, and net ionic equation for each. Indicate the phases and (where necessary) charges for all reactants and products. If you do not expect a reaction to occur, indicate so after the molecular equation arrow with an "NR."



i) ME:

ii) FIE:

iii) NIE:



i) ME:

ii) FIE:

iii) NIE:

9) **[2 marks]** Give the oxidation number of sulphur in each of the following compounds or ions:

S_8 _____

$\text{S}_2\text{O}_3^{-2}$ _____

SO_3^{-2} _____

SO_4^{-2} _____