

**EXAM 2**

NAME \_\_\_\_\_  
last first

Significant Figures must be correct. All set-ups must be shown

**The following are molar masses you may or may not need:**

$\text{CO}_2 = 44.0$	$\text{N}_2 = 28.0$
$\text{Ca(OH)}_2 = 73.1$	$\text{H}_2 = 2.02$
$\text{Eu} = 151.96$	$\text{H}_2\text{O} = 18.02$
$\text{CuCO}_3 = 123.5552$	$\text{CuO} = 79.5454$

1. A 31.34 g mixture of potassium chloride and cupric carbonate are heated in an evacuated (no pressure) 3.0 L flask at 1250 K. The potassium chloride does not react but the cupric carbonate decomposes.



After the reaction goes to completion, the pressure is 4.00 atm? What is the percentage of KCl in the original mixture? (12 points)

Answer \_\_\_\_\_  
/12

(20 points) 7 A chemist wants to find the empirical formula and the molecular formula of a compound that contains only carbon, hydrogen, and nitrogen. Complete combustion of 35.0 mg of the compound produced 41.1 mg H<sub>2</sub>O. A 65.2 mg sample of the compound was analyzed for nitrogen, giving 35.6 ml N<sub>2</sub> (g) at 740 torr and 25 °C. The effusion rate of the compound as a gas was measured and found to be 38.2 ml/min. The effusion rate of argon gas under identical conditions is 58.0 ml/min. Find the empirical formula and the molecular formula of the compound.

What is the empirical formula of the compound?

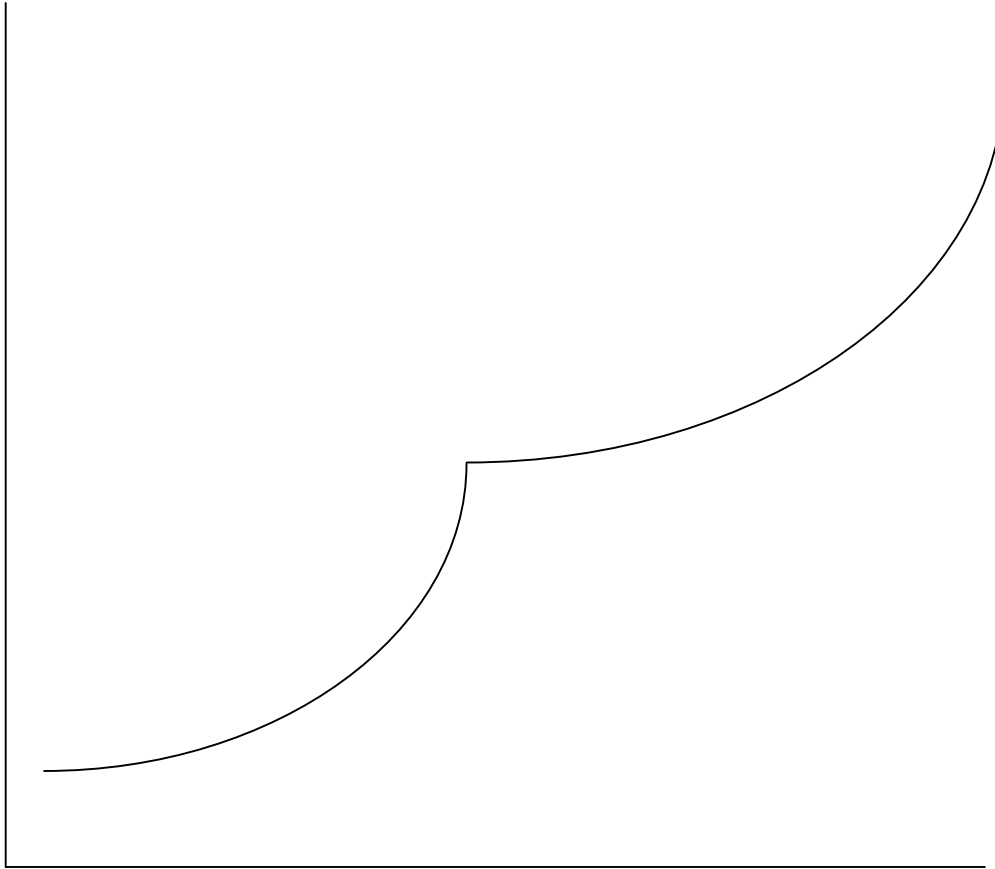
ANSWER \_\_\_\_\_

What is the molecular formula of the compound?

**10.** (10 points) Explain how real gases ideal gases are both similar and different. Be specific and organized. Give examples. Have an introductory and a concluding sentence. Make clear claims (thesis statements). Back up your claims with evidence. Write clear sentences using correct grammar and punctuation. Explain why this is important to a chemist. Demonstrate your knowledge of gases.

/16 points

For question 7, consider the following diagram and answer what follows (19 points)



Complete the above phase diagram as it should look for water 1 point

Label the axes

On the correct axis put 1 atm at the approximate position

On the correct axis put 100 °C in the approximate position 4 points

Label the following points with the appropriate letter.

- |                      |   |          |
|----------------------|---|----------|
| Critical Temperature | a |          |
| Critical pressure    | b |          |
| Triple point         | c |          |
| Boiling point        | d |          |
| Melting              | x |          |
| Evaporation          | y |          |
| Sublimation          | Z | 7 points |

Label the following regions with the appropriate letter.

- |        |   |  |
|--------|---|--|
| Solid  | e |  |
| Liquid | d |  |
| Gas    | f |  |
- 3 points

Label 2 points g and h and draw a line between them that would show melting at constant pressure

Label 2 points l and j and draw a line between them that would show sublimation at constant pressure. 4 points

Explain how this diagram shows that water is more dense as a liquid than as a solid label points k and L and draw a line between them to illustrate your explanation. 5 points