Exp # 1

Name: Example Report

Student ID: 6000345

Chemistry Experiment Report

Class Section: 03

Experiment Title: Classification of Matter

Unk#: 42

Bench / Locker : B / 39

(write N/A if no unknown for this experiment)

This box is for use by your instructor.

pre-lab	report	total

Unknown Composition or Identity:

A report must be submitted for all lab experiments conducted to receive credit for your participation. You may only report on experiments you conducted.

Reminder: All experiment reports should include each of the following sections. Each section should start on a new page and be clearly labeled.

- Cover Page (this page)
- 1. Pre-Lab
  - Describe the objectives of this experiment (what you hope to conclude).
  - Any pre-lab questions must be considered and answered before the start of the lab period. Your instructor will initial those pages and they must be included in your lab report to receive full credit for them.
  - If there is a pre-lab quiz it will be graded and returned to you during that lab period. It should be attached to your report to ensure you receive full credit.
- 2. Data
  - Empirical data, only what you observed and others could if they repeated your experiment. Observations both qualitative and quantitative (measurements).
- 3. Analysis (calculations)
  - Provide demonstrations (justification) of how your conclusions were developed from your observations. Most often accomplished with dimensional analysis or algebra (calculations). For some experiments other methods will be demonstrated and need to be applied.
  - It is only "known" if it can be justified … otherwise it's a guess.
- 4. Conclusions
  - Your final answers. What you came to know by doing this experiment. Be clear and brief, conclusions should not be more than one page and are often only a few sentences.
  - If other factors effected your final answer, briefly describe them on this page and suggest how they may have effected your experiment.
- 5. Questions
  - Attach and answer any post lab questions.

(download this page from your class website to print and attach to each report you submit)

DATA

PART A:

We heated a small amount of a blue solid in a test tube, using a bunsen burner. We're told the blue solid is a pure substance.

Observations:

- The substance was described as copper (II) sulfate pentahydrate ($CuSO_4 \cdot 5H_2O$)
- Vapors escape the blue substance.
- The vapors condense to a clear liquid at the top of the test tube.
- The blue substance changes color; it becomes white.
- When the condensed liquid falls back into the test tube, it turns the substance blue again.

Part B:

We are provided with a vial (or plastic bag) containing an unknown. We're told it's either a pure substance, homogenous mixture, or heterogeneous mixture.

Observations/Measurements:

- Our unknown is labeled #42.

Initial Conditions:

Weight of Unknown + Vial	5.35 g
Weight of Vial alone	0.95 g

Substance 1, after separation:

- Substance 1 was soluble in water.
- It tried to a white solid.
- My instructor described it as sodium chloride (table salt)

Containers used:

Weight of Evaporating Dish	69.98 g
Weight of Watch Glass	58.75 g

Weighings of dried sample:

	1st weighing	2nd weighing	3rd weighing
Dish, Glas + Subst. #1	130.75 g	129.52 g	129.51 g (using this as dry weight)

Substance 2, after separation:

- Substance 2 was not soluble in water.
- It stayed in a solid phase when mixed with water.
- It was caught in our filter paper.
- It dried to a brown powder.
- My instructor described it as silicon dioxide (sand)
- Left filter paper + substance #2 to dry in my locker until next period.

Containers used:

Mass of filter paper	0.98 g
Mass of beaker	115.72 g

Weighings of dried sample:

	1st weighing	2nd weighing	3rd weighing
Filt Paper, Beaker & Subst. #2	121.48 g	120.20 g	120.20 g (using this as dry weight)

Part C:

We chose green, pink, and purple pen ink to analyze. We were told the pen inks were either a pure substance or a homogenous mixture.

Observations/Measurements:

- The original pen ink was uniform in appearance, no phases were observed.
- The green ink separated during chromatography to produce a yellow and blue spot on the chromatography paper.
  - The blue spot traveled 90% of the way up the paper.
  - The yellow spot traveled 50% of the way up the paper.
- The pink ink did not separate during chromatography.
  - The pink spot traveled 30% of the way up the paper.
- The purple ink separated during chromatography to produce a blue spot and a pink spot.
  - The blue spot traveled 90% of the way up the paper.
  - The pink spot traveled 30% of the way up the paper.

Part D:

We prepared four mixtures and looked for signs a chemical reaction in each.

	Added…	To….	Observed:
#1	6M NaOH	6M HCl	the test tube got uncomfortably hot to the touch; bubbles formed
#2a	Mg strip	6M HCl	bubbles formed quickly and the Mg dissolved
b	Fe shot	6M HCl	bubbles formed slowly on the iron, the iron slowly turned black
#3	NaHCO (baking soda)	6M HCl	upon mixing the test tube became cold to the touch; bubbles formed and escaped the tube
#4	0.1M K	0.1M BaCl	both substances were originally a colorless clear liquid, upon mixing the mixture turned a bright opaque yellow.

CALCULATIONS

PART A:

We were asked to determine if the blue substance, described as copper (II) sulfate pentahydrate, was an element or a compound based on our observations.

We're told it's a pure substance, so it must be one of those two. All pure substances are either compounds or elements.

When we heated the blue solid it decomposed into a colorless gas and a white solid. Elemental solids contain only one type of atom, only one element. They cannot be decomposed into simpler substances. Because the blue substance broke into two other substances, it cannot be an element. It must there, fore be a compound.

PART B:

5.35 g unk + vial
− 0.95 g vial
4.40 g unk

Unk #42 — 4.40 g

69.98 g dish
+ 58.75 g glass
128.73 g container

129.51 g sub #1 + container
− 128.73 g container
0.78 g sub #1
(2 s.f.)

% sub #1 = $\frac{\text{sub \#1}}{\text{Unk}} \cdot 100 = \frac{0.78\text{ g}}{4.40\text{ g}} \cdot 100 = 17.72727\%$
(3 s.f.) (∞ s.f.)

sub #1 = 18% 2 s.f.

0.98 g paper
+ 115.72 g beaker
116.70 g container

120.20 g sub #2 + container
− 116.70 g container
3.50 g sub #2
(3 s.f.)

% sub #2 = $\frac{\text{sub \#2}}{\text{Unk}} \cdot 100 = \frac{3.50\text{ g}}{4.40\text{ g}} \cdot 100 = 79.545454\%$
(3 s.f.) (∞ s.f.)

sub #2 = 79.5% 3 s.f.

PART C:

We were asked to determine if each pen ink was a pure substance or a mixture. Mixtures have variable properties and can be physically separated.

The green pen ink separated into yellow and blue material during chromatography. That separation demonstrated that it wasn't a pure substance, but a mixture of a yellow and blue substance.

The pink pen ink did not separate during chromatography. None of our observations indicated it was anything but a pure substance.

The purple pen ink separated into a pink and blue substance during chromatography. We noted that the blue component traveled the same distance up the chromatography paper s the blue component in our green ink. Likewise the pink component behaved like the pure pink ink. Because the purple link was separable it cannot be a pure substance. Since the components of the purple ink had properties similar to those of the pure pink ink and the blue component of the green ink, we hypothesize that the the purple ink is a mixture of those two substances.

PART D:

We were asked to mix different substances and determine whether a chemical reaction took place upon mixing.

We know a chemical reaction occurs when we see evidence of substances changing into other substances. This is demonstrated by a new substance appearing and we know if a substance exists because of it's properties. Therefore if we see new new properties (physical or chemical) appearing, it indicates a new substance has been made and therefore a chemical reaction has occurred. Changes in energy also can suggest a chemical reaction.

In test #1, we saw bubbles appearing. Since both substances we mixed were liquids at room temperature this means a substance that was a gas at room temperature was produced. The reaction also got hot, indicating a change in energy. This demonstrated a chemical reaction occurred.

In test #2, we saw bubbles appearing and the magnesium strip disappeared. The bubbles appearing indicated a gas was created. This demonstrated a chemical reaction occurred. When we added the acid to iron nothing seemed to happen. But after letting it sit for a while we saw the iron had turned black and small bubbles where on the surface of the iron shot. The appearance of those bubbles, indicated a new substance was formed and so a chemical reaction had occurred.

In test #3, we saw bubbles appear we also felt the test tube get cold. Both the appearance of bubbles and the change in heat indicated a chemical reaction had occurred.

In test #4, we combined two colorless clear liquids and the mixture became a bright solid yellow color. That yellow color could not have come from either of the two substances or from a blending of their colors, so a new substance must have been formed. A chemical reaction had to produce that new substance.

CONCLUSIONS

In part A, we determined that copper (II) sulfate pentahydrate is as compound, because we were able to break it down into a simpler substance.

In part B, we determined the unknown #42 is 18 % substance 1 (salt) and 79.5% substance 2 (sand).

In part C, we determined the green pen ink was a mixture, the pink pen ink was a pure substance, and the purple pen ink was a mixture.

In part D, we determined the following mixtures all produced a chemical reaction.

6M NaOH	6M HCl	is a reaction
Mg strip	6M HCl	is a reaction
Fe shot	6M HCl	is a reaction
NaHCO (baking soda)	6M HCl	is a reaction
0.1M K	0.1M BaCl	is a reaction

QUESTIONS

Q1. What question should you ask yourself to decide:
(a) If a sample of matter is a pure substance or a mixture?

ANS: Does it have variable properties?
also, Can it be separated by a physical process?

(b) If a sample of matter is homogenous or heterogenous?

ANS: Can I find distinct phases in it?

(c) If a sample of a pure substance is an element or a compound?

ANS: Can it be decomposed into simpler substances?

Q2. Is water a compound or an element? Pour water over ice cubes in a cup. Does the cup contain heterogenous or homogenous matter? Explain how you knew each answer.

ANS: Water can be broken down into hydrogen and oxygen, it's a compound. Ice cubes in water is an example of heterogenous matter. I know it's heterogeneous because there are phases, zones within the mixture with distinct properties. Ice and liquid water are the same substance, but exist in the sample in different states (solid and liquid).

Q3. In part B, is Substance 1 on the filter paper the same as Substance 2 left in the evaporating dish after evaporation? How do you know?

ANS: They are different substances, because substance 1 is soluble in water and substance 2 is not.

Q4. Describe the property you used to separate your mixture in part B. Was this a chemical or physical property?

ANS: Solubility in water is a physical property. Salt is still salt whether it's dissolved in water or a solid powder.

Q5. In part B, do the masses for Substance 1 and Substance 2 add up to the original mass for the unknown? If they are different explain why there is a difference.

ANS: They don't. We lost about 0.12 grams. We hypothesize that this loss was because we used very little water to speed up the last step, and it resulted in some of the salt being lost on the funnel and filter paper.

Q6. In part C, based only on your experiment and observations do you think all of the pen inks you observed are the same substance? If not, how are they different?

ANS: The pen inks were different substances. We know this because some were more soluble than others in water, and thus moved farther up the chromatography paper. Also, the differences in color indicated different substances. We think that the pure pink pen ink might be the same as one of the substances in the purple ink mixture because it has the same solubility and color.

Q7. Any new property appearing can indicate a new substance was formed, and therefore a chemical reaction occurred. But in the lab there are three indicators that are extremely common. What are the three things you might observe that most frequently indicate a chemical change (reaction) has occurred?

ANS: The appearance of bubbles (indicating a substance that is a gas at room temperature has been produced) and the appearance of a distinctly new color are two. Also, a reaction absorbing or releasing heat, getting hot or cold, indicates an energy change which is frequently the result of a chemical reaction.