Materials: 1 M $NiSO_{4(aq)}$, 1 M $NaOH_{(aq)}$, 1 M $Fe(NO_3)_{2(aq)}$, spot plate, balance, plastic dropper

Procedure and observations:

1. 3 drops of $NaOH_{(aq)}$ were placed in a cavity on the spot plate.
2. Then 3 drops of $NiSO_{4(aq)}$ were placed in another cavity on the spot plate.
3. A plastic dropper was placed on the spot plate, and the whole thing was transferred onto a balance.
4. The mass was recorded in a data table.
5. The dropper was picked up to add the $NiSO_{4(aq)}$ to the $NaOH_{(aq)}$, and then the dropper was left on the balance.
6. A greenish solid formed in the mixture. There was no difference in mass recorded.

Questions:

ST Part

1. Why did the mass remain the same from the point of view of atoms?
2. Was this a chemical reaction? Evidence?
3. Why would someone come to the wrong conclusion if they waited too long to reweigh the products of the reaction?
4. a) If the electronic balance reads 2.04 g, which decimal place is an estimate, if any?
   b) What does 2.04 ± 0.01 g signify?
5. Without certain materials, the splitting up of water with electricity is a very slow process. What can be used to speed up electrolysis?_____
6. Why is a pipette more accurate than a graduated cylinder of the same size?_____
_____

STE

1. In the 1st part of the lab, $NaOH_{(aq)}$ + $NiSO_{4(aq)}$ reacted to produce two compounds. Based on the knowledge that all sodium compounds are water-soluble, write an equation that reveals the two products, including the precipitate. _____

2.
    a) In making ethyl benzoate we used two types of compounds that can be used to make all sorts of interesting esters. What were those compounds?
    b) After reacting $NaHCO_3$ + HCl → H_2O + CO_2 + NaCl, _____revealed that the compound HCl was evaporating.

3. Of the following, which do you believe will affect whether or not you see a precipitate after mixing two ionic substances, as you did in the lab today? There may be more than one answer.

    ___the type of ions that could potentially bond to each other

   ___the concentration of the reactants

    ___the pH

4. a) Show how you would attach a voltmeter and an ammeter in a parallel circuit so that you can measure the voltage and current across one specific resistor.

    b) If you compare the same parallel circuit to the one with the voltmeter and ammeter, how many extra wires do you need to attach the two meters?

Theory Part

1. Which of the following materials form domains?
    a. plastic
    b. silver(Ag)__
    c. copper(Cu)__
    d. cobalt(Co)__
    e. neodymium(Nd)_

2. What will happen to a ferromagnetic material like nickel if it comes into contact with a temporary magnet?

3. Draw the domains within a permanent spherical magnet.
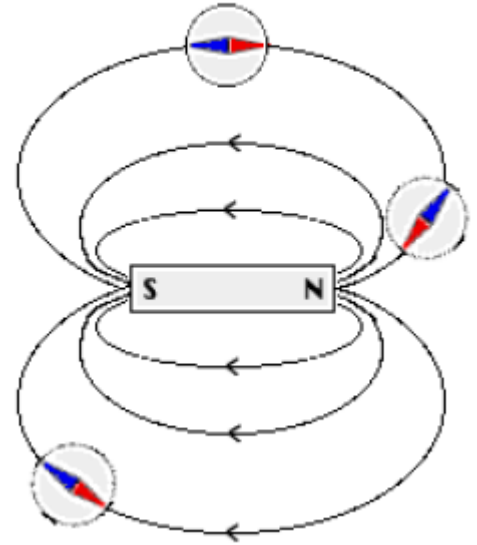
4. a) In the diagram above, are the magnetic field lines drawn correctly?
    b) Label the North end of each compass needle.
    c) Modify the diagram so that it represents a stronger magnet.

5. a) In the diagram below, can you predict whether the 2 magnets are attracting?

   b) Are the magnetic field lines correctly represented in between the two opposite
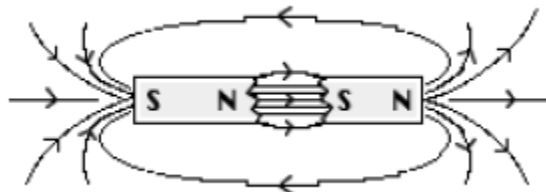
    poles?

6.   Why does the compass point to the left?
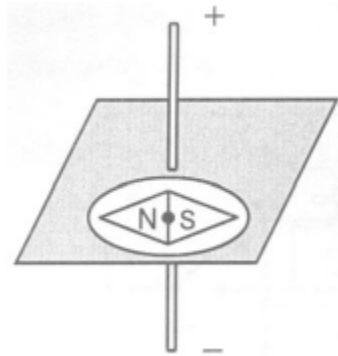
7.   Imagine a very strong current flowing through two parallel wires. The electrons in the two wires are both flowing in the same direction. Draw the magnetic field around each wire. The resulting magnetic fields will interact. Will the wires repel or attract?
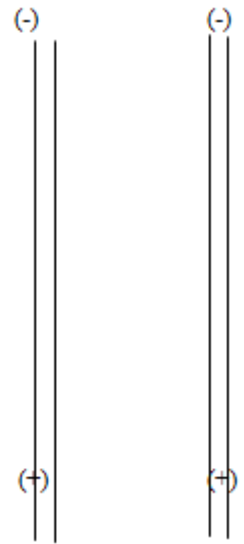
8.   A coffee maker is connected to a 120 V outlet. The resistance, R, of the heating element of the coffee maker is 20 Ω. This coffee maker works for 15 minutes.

   a) How much energy in joules is used by the heating element of the coffee maker during this period?
   b) What is the power rating of the coffee maker?
   c) How much will it cost to operate the coffee maker every year if it's used 15 minutes per day in a non leap year?

9.   A series circuit with three light bulbs has voltage drops of 1.2 V, 1.4 V and 1.4 V. The ammeter measures 0.50 A.

   a)   What is the wattage of the bulb that consumes the least energy?
   b)   How much energy is used by all three bulbs every hour they're turned on?