Name ___________________ Date ______________ Period ________

Chemical vs. Physical Properties and Changes Lab

Experiment #1:

At this station, you have a Bunsen Burner and matches.

1. At this station, both lab partners need to practice lighting and turning off the Bunsen Burner and adjusting the flame until you can do it correctly without referring to your notes.

2. Before you leave the station, make sure that the barrel is all the way down, the needle valve is closed, and the gas is turned off.

Experiment #2:

At this station, you have Alka Seltzer tablets, a graduated cylinder, a stopwatch, and water.

1. Observe the Alka Seltzer tablets and water and answer the following questions.

_________________________ 1. Name a physical property of the Alka Seltzer tablet.

_________________________ 2. Name a physical property of water.

2. Using the graduated cylinder, measure out exactly 94.0 ml of water and transfer it to the beaker provided.

_________________________ 3. Is volume an intensive or extensive physical property?

3. **Drop the Alka Seltzer tablet into the water, and using the stopwatch, record the time, in seconds, that it takes for the Alka Seltzer to completely disappear.**

_________________________ 4. Record the time, in seconds that it took for the Alka Seltzer to completely disappear.

_________________________ 5. Is the time it takes the Alka Seltzer to disappear an intensive or extensive physical property?

_________________________ 6. Is dissolving an example of a chemical or a physical change?

_________________________ 7. Is there evidence that a chemical change took place? If so, what evidence is there?

4. **When you finish this station, pour the contents of your beaker down the sink and rinse out the beaker. Be sure to leave your lab station clean, dry and organized.**

Experiment #3:

At this station, you have Cobalt II Chloride ($CoCl_2$), Sodium Phosphate (Na_3PO_4), a small test tube, an empty beaker, and a WASTE BEAKER.

1. Place the test tube in the small empty beaker. Transfer **5 DROPS** of Cobalt II Chloride solution into the test tube.

________________________40. Describe the appearance of the Cobalt II Chloride..

________________________41. Are you describing the chemical or physical characteristics of Cobalt II Chloride?

2. Now, add **5 DROPS** of sodium phosphate in the test tube.

________________________42. Describe the results. What do you see in the test tube?

________________________43. Is this evidence of a physical change or a chemical change?

________________________44. What is the term used for the production of a solid from two liquids in a reaction?

3. **When you finish this experiment, empty the contents of your test tube in the WASTE BEAKER and rinse it with water from the wash bottle. Make sure you pour the rinse water in the WASTE BEAKER as well.**

Experiment #4:

At this station, you have dry ice (CO_2), water, bubble solution and a mug.

1. Fill the mug half full of water.
2. Add a SMALL piece of dry ice. The dry ice will make bubbles in the liquid.
3. Spread a film of bubble solution around the lip of the cup.
4. Click on the video on the laptop at your station and watch the technique for Step 5.
5. Now, dip your hand in the bubble solution and then run the palm of your hand across the top of the cup, spreading a film of bubble solution over the mouth of the cup.
6. Spend a minute or two just watching what happens. Then answer the following questions:

_________________________ 8. In what physical state is the dry ice at the beginning of the experiment?

_________________________ 9. In what physical state is the dry ice at the end of the experiment?

_________________________10. Does this experiment demonstrate a physical change or a chemical change?

_________________________11. What term is used to describe the process of a substance going from a solid state to a gaseous state without becoming a liquid?

7. **When you finish the experiment, return any solid dry ice back to the ice chest, pour the liquid down the sink and rinse out the cup such that there are no subs left. Your lab station should be clean and dry before you leave it.**

Experiment #5:

At this station, you have ammonium nitrate (NH_4NO_3), tap water, Ziplock bags, a graduated cylinder and a balance.

1. Weigh out 5 grams of ammonium nitrate directly into a Ziplock plastic bag. To do this:
   a. Make sure the weights are pushed all the way to the left.
   b. Use the screw on the left hand side to Zero the balance.
   c. Place the Ziplock bag on the balance and move the weights (masses) until the arrow on the balance lines up with the zero.
   d. Now, slide the weights over 5 more grams (add 5 to the mass of the Ziplock bag). This will make the arrow go down below the zero mark.
   e. Using the spoon, add ammonium nitrate a little at a time until the arrow lines back up with the zero. You now have a 5 gram sample of ammonium nitrate. .

________________________12. Completely classify ammonium nitrate using words such as pure, mixture, element, compound, homogeneous, or heterogeneous.

________________________13. Is mass an intensive or extensive physical property?

2. Using a graduated cylinder, measure out exactly 10 mL of water.
3. Quickly, pour the water into the bag of ammonium nitrate, remove excess air and seal the bag.
4. Gently squeeze the bag to mix the solid and water.
5. Observe while holding the bag.

________________________14. What evidence do you have that a chemical reaction takes place in the bag?

________________________15. Is this reaction endothermic or exothermic?

6. **When you finish this experiment, throw your bag in the trash. Make sure you lab station is clean, dry and organized before moving to the next station.**

Experiment #6:

For this experiment, you will need a Bunsen burner, a ring stand, wire gauze, a 150 mL beaker, a thermometer, corn syrup, hot hands, and a stopwatch.

1. **CAUTION:** The beaker may be **HOT**, so do not pick it up with your hands. Use the hot hands.
2. The iron ring should be hooked on the ring stand with the Bunsen burner under it and the wire gauze on top of the ring. The ring should be positioned at a height such that the hottest part of the Bunsen burner flame should be about 2 centimeters from the bottom of the wire gauze. Check it, and if it is not at the correct height, adjust it.
3. Fill the beaker to the 50 mL mark with corn syrup and place the beaker on the wire gauze.

________________________24. In what physical state is the corn syrup?

________________________25. Is volume an intensive or extensive physical property?

4. Using the thermometer, measure the initial temperature of the corn syrup in ^{0}C. Be sure to record the temperature in the correct number of significant figures, based on the scale on the thermometer.
   Initial Temperature: ___________

5. Using the correct procedure, light the Bunsen burner and adjust it to a hot flame.
6. Start the stopwatch.

7. Heat the corn syrup until it reaches a rolling boil. When it is boiling, stop the stopwatch and measure the temperature at the boiling point.

Boiling Point Temperature: ___________

8. Turn off the Bunsen Burner and using the hot hands, remove the beaker from the ring stand. Make sure that the barrel is screwed all the way down and the needle valve is closed.

_______________________26. What is the Boiling Point temperature?

_______________________27. Is boiling point an example of an intensive or extensive physical property?

_______________________28. How much did the temperature CHANGE from the beginning of the experiment to the end?

_______________________29. How long did it take for the corn syrup to reach the boiling point?

_______________________30. Is the time it takes to boil an example of an intensive or extensive physical property?

9. When you finish this experiment, first add cool water from the water bottle a little at a time to the corn syrup to cool it off. Then, take the beaker to the sink and using a test tube brush, wash out the beaker. Dry it off and return it to the lab station. BE SURE THAT THE LAB STATION IS CLEAN, DRY, AND ORGANIZED BEFORE YOU LEAVE IT.

Experiment #7:

For this experiment, you will need a penny dated post 1982, a hydrochloric acid solution (HCl), a file, and a 50 mL beaker. CAUTION: Hydrochloric acid is corrosive. If you get any on your skin, wash your skin thoroughly with water.

1. First, label your beaker by writing your names on the beaker with a washable pen.
2. Pick out a post 1982 penny and weigh it on the electronic balance and take note of how the penny feels.

________________________65. What is the mass, in grams, of the penny?

3. Using the file, make 4 deep scores evenly distributed around the edge of the penny.
4. Add approximately 25mL of HCl to the 50 mL beaker.
5. Gently drop in the penny.
6. Observe the reaction for a minute or two. Then, move your labeled beaker with the penny in it to the back of the lab station and leave it until the end of class.
7. At the end of class, come back to the lab station and get your beaker. Go to the sink and pour out the HCl, taking care not to pour out the penny. Then, add water to the beaker and rinse the penny a couple of times to remove any excess HCl.
8. Using a paper towel, dry off the penny and then weigh it on the electronic balance.

________________________66. What is the final mass of the penny?

________________________67. By how many grams did the mass of the penny change?

________________________68. Based on your observations, was this change a physical change or a chemical change?

________________________68. Describe how the penny feels at the end of the experiment.

9. **When you are finished with the experiment, discard the penny, make sure your beaker is clean and dry and that your names have been washed off, and make sure the lab station is clean, dry, and organized.**

Experiment #8:

At this station, you have a Bunsen burner, a strip of magnesium ribbon, and tongs.

1. Using the correct procedure, light the Bunsen burner and bring the flame up to a hot flame.
2. Place an empty beaker next to the Bunsen burner.
3. Using the tongs, hold the magnesium ribbon by one end and put the other end of the ribbon in the hottest part of the flame. When the ribbon ignites, quickly move it out of the flame and over the beaker to catch anything that drops.
3. Using the correct procedures, turn OFF the Bunsen burner. Make sure the barrel is screwed all the way down and that the needle valve is closed.

Caution: DO NOT LOOK DIRECTLY AT THE REACTION ONCE IT STARTS.

________________________31. Completely classify the magnesium ribbon using words such as pure, mixture, element, compound, homogeneous, or heterogeneous.

_______________________32. What happened when the magnesium ribbon caught on fire?

_______________________33. Was the material that dropped in the beaker the same as the material you started out with?

_______________________34. Is this an example of a chemical or a physical change?

5. **When you finish, empty the contents of the beaker into the trash and make sure there are no ashes on the counter top. Make sure that the lab station is clean, dry, and organized before leaving the station.**

Experiment #9:

At this station, you have a beaker of sandy water, a 50 mL beaker, water, a funnel, filter paper, and an empty beaker.

1. First, fold a piece of filter paper in half and then in half again. You should than have what looks like a paper cup with a pointed end.
2. Open the filter paper cup and place it into the funnel. Then, set the funnel on top of the empty beaker. Using the water bottle, wet the filter paper so it will stick to the side of the funnel.
3. Using the spoon provided, stir up the sandy water solution and pour 10mL of the solution to the 50 mL beaker.
4. Gently swirl the 50 mL beaker and then **SLOWLY** transfer the sandy water to the funnel. Make sure the solution is not flowing behind the filter paper, but rather in the center of the filter paper.
5. Wait patiently until all of the liquid has drained out of the funnel.
6. Observe and answer the following questions:

________________________35. Describe the appearance of the sandy water at the beginning of the experiment.

________________________36. Completely classify the sandy water solution using words such as pure, mixture, element, compound, homogeneous, or heterogeneous.

________________________37. Describe the appearance of the liquid in the beaker after the experiment.

________________________38. What was in the filter paper?

________________________39. Is this an example of a chemical change or a physical change?

7. **When you finish the experiment, pour the filtered water down the sink, rinse out the 2 beakers, and throw the filter paper in the trash. <u>DO NOT THROW OUT THE STOCK SOLUTION OF SAND AND WATER.</u> Be sure the lab station is clean, organized, and dry.**

Experiment #10:

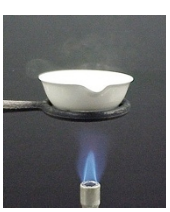
For this experiment, you will need a Bunsen burner, a ring stand, and iron ring, an evaporating dish, tongs, a beaker, a graduated cylinder, sodium chloride (NaCl), water, and insulated gloves.

1. The ring stand should be set up at the lab station with an iron ring attached and the Bunsen burner under the iron ring.
2. Using the graduated cylinder, measure out 25 mL of water and transfer it to the beaker.
1. Add 1 teaspoon of sodium chloride (salt) to the water and stir until the salt is completely dissolved.

________________________50. Completely classify the salt water solution using words such as pure, mixture, element, compound, homogeneous, or heterogeneous.

2. Transfer the salt water solution to the evaporating dish. If the evaporating dish is on the counter, use the gloves to move it to the iron ring. **CAUTION: THE EVAPORATING DISH MAY BE VERY HOT!**

5. Using the correct procedure, light the Bunsen burner and adjust the flame to be a hot flame. **NOTE: The tip of the flame should be close to the bottom of the evaporating dish but not touching it. See the picture below.**



3. Heat the salt water solution until there is no water left in the evaporating dish.

________________________51. Where did the water go?

________________________52. Is the event in Question #51 an example of a chemical or physical change?

________________________53. Now, examine the contents of the evaporating dish. What is in the dish?

________________________54. From your observations, do you conclude that salt dissolving in water is a chemical or a physical change?

7. When you finish with this experiment, turn off the Bunsen burner and while wearing the gloves move the evaporating dish to the counter. Add cool water to the evaporating dish, and using the measuring spoon, dissolve any salt in the evaporating dish in the water. You may then pour the salt water from the evaporating dish down the sink. BE SURE TO LEAVE YOUR LAB STATION CLEAN, ORGANIZED AND DRY.

Lab Questions

1. List 3 ways you might know whether or not a chemical change has occurred.

2. Chemical reactions often result in a temperature change. If the reaction gets hot, is it an endothermic or an exothermic reaction?

3. Explain why dissolving is a physical change rather than a chemical change.

4. Give the correct term used of each of the following physical changes:

   A) A solid changing to a liquid –

   B) A gas changing to a liquid –

   C) A liquid changing to a solid –

   D) A liquid changing to a gas –

   E) A solid changing directly into a gas –

5. What, in general, is being released when a substance bubbles or fizzes?

6. What is a precipitate?

For each of the following, in the 1st blank put "chemical " or "physical" and explain why in the 2nd blank.

7. Putting Alka-seltzer in water is a ______________ change because _______________________________.
8. Tarnished silver is a _______________ change because ____.
9. Defrosting meat is a _______________ change because ____.
10. Food digesting is a ________________ change because ____.
11. Lighting a match is a _______________ change because ____.
12. Breaking a window is a _____________ change because ____.
13. Rust forming on a nail is a _______________ change because ____________________________________.
14. Baking a cake is a __________________ change because _______________________________________.
15. Erosion of sandstone is a __________________ change because __________________________________.
16. Subliming of dry ice is a ____________________ change because ________________________________.

17. Identify each statement as being true or false to the left of the sentence.

a. A change in size or shape is a physical change.

b. A chemical change means a new substance with new properties was formed

c. An example of a chemical change is when water freezes.

d. When platinum is heated, then cooled to its original state, we say this is a physical change.

e. When milk turns sour, this is a physical change because a change in odor does not indicate a chemical change.

f. When magnesium is burned, ash forms. We say this is a physical change because the magnesium looks different.

g. When citric acid and baking soda mix, carbon dioxide is produced and the temperature decreases. This must be a chemical change.