Name: _	 	 	
Date:			

Chemistry Period:_____ Mr. Tsepetis

SINGLE DISPLACEMENT REACTION LAB

Pepto-Bismol is a common antacid medicine that contains **<u>bismuth subsalicylate</u>** or pink bismuth, which has the empirical chemical formula $(Bi\{C_6H_4(OH)CO_2\}_3)$.



The chemical is used as an antacid, anti-inflammatory, and bactericide, but in this project, we'll use it for science! Here's how to extract the bismuth metal from the product. Once you have it, one project you can try is growing your own bismuth crystals. **Safety:**



Materials

Here are the materials to extract the bismuth.

- **Pepto-Bismol Tablets** -Each pill contains 262 mg bismuth subsalicylate, but only about an eighth of the mass is bismuth.
- **Muriatic Acid** You can find this in a hardware store. Of course, if you have access to a chemistry lab, you can simply use **hydrochloric acid**.
- Aluminum Foil
- Coffee Filter or Filter Paper

• Mortar and Pestle - If you don't have one, find a baggie and a rolling pin or hammer.

Procedure :

- The first step is to crush and grind up the pills to form a powder. This increases the surface area so the next step, a chemical reaction, can proceed more efficiently. Take about 5 pills and work in batches to grind them up.
- 2. Prepare a solution of dilute muriatic acid. Mix one-part acid to six parts water. <u>Add the acid to the water to prevent splashing.</u> Note: <u>muriatic acid is</u> <u>the strong acid HCl</u>. It produces irritating fumes and can give you a chemical burn. It's a good plan to wear gloves and protective eyewear when you use it. Use a glass or plastic container, as the acid can attack metals (which is the point, after all.)
- 3. Dissolve the ground-up tablets in the acid solution. You can stir it with a glass rod, plastic coffee stirrer, or wooden spoon.
 - A. Observe what you see:
 - B. Write balanced Chemical Reaction:
 - $C_7H_5BiO_4 + 3 HCl C_7H_6O_3 + BiCl_3 + 2HCl + H2O_____$
 - C. What type of reaction is this? ____Single Displacement _____
 - D. Why?
- 4. Remove the solids by filtering the solution through a coffee filter or filter paper. The pink liquid is what you want to save, since it contains bismuth ions.

A.	Observe and	record what yo	u see in the f	ilter paper :
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B.	What compound(s) / element(s) is this?
	(write the name and chemical formula)

- C. Observe and record what you see in the beaker:
- D. What compound(s) / element(s) is this?(write the name and chemical formula)
- 5. Drop aluminum foil into the pink solution. A black solid will form. Allow time for the precipitate to sink to the bottom of the container.
 - A. Observe and record what you see:
 - B. What is the element of the black solid that is forming in the beaker? (write the name and chemical symbol)
 - C. Write the balanced chemical reaction that you are observing.

_BiCl3 + H2O + Al Bi +Cl2 +AlCl + H2O

- 6. Filter the liquid through a cloth or paper towel to get the bismuth metal.
- 7. Carefully scrape the black precipitate onto a glass disc and let cool overnight.
- 8. The final step is to melt the metal. Bismuth has a low melting point, so you can melt it using a torch or in a higher-melting-point pan on a gas grill or even your stove. As the metal melts, you'll see impurities pool apart. You can use a toothpick to remove them
 - A. Observe what you see:
 - B. Write Balanced Chemical Reaction you are observing:

 $_ 4Bi(s) + 3O_2(g) \rightarrow 2Bi_2O_3(s)_$

- Let your metal cool and admire your work. <u>See the beautiful iridescent</u> <u>oxidation layer?</u> You might even see crystals. Good job!
 - A. Observe what you see:

Safety and Clean Up

• When you're done, dilute the chemicals with large volumes of water before disposing of them. If you want to make absolutely sure the acid is safe, you can add a bit of baking soda to the dilute acid to neutralize it.

Pepto-Bismol Fun Fact

Interesting adverse effects from ingesting Pepto-Bismol include black tongue and black stools. This occurs when sulfur in saliva and the intestines combines with the medicine to form the insoluble black salt, bismuth sulfide. Although dramatic-looking, the effect is temporary