Name_____

Mystery Chemicals

Do not taste any of the powders.
Goggles must be worn during this investigation.
Iodine will cause a permanent stain.
Tie back hair and loose clothing around an open flame.

Background Information: Chemists are scientists who study what different chemicals are shaped like, what color they are, how they behave, and how they react with other chemicals. What color or shape a chemical has is called a **physical property**. How a chemical behaves and how it reacts with other chemicals is called a **chemical property**. Chemists use both chemical and physical properties to identify and separate different kinds of chemicals.

For some chemists and forensic scientists, the identification and analysis of unknown substances is a daily task. For example, when a law enforcement officer discovers a suspiciously concealed white powder at a crime scene, it is the chemist's job to figure out whether the substance is cocaine, heroin, or just plain old table sugar. Using scientific problem-solving skills, the unknown can be correctly identified in most cases. This is known as **qualitative analysis**.

Problem: To identify 5 unknown samples of matter by their physical and chemical properties (qualitative analysis).

Materials

5 unknown white chemicals	Iodine	Acid droppers
Spot Plate	Beaker with Water	Test tubes
Scoopulas	Eye droppers	Test tube rack
Hot Plate	Foil	

Procedure:

1. Analyze the chemical in the petri dish and record the appearance in column 2 in the observation chart.
2. Measure out 10mL of water in a small graduated cylinder.

Add this water to a test tube. Using a scoopula, add a small amount of unknown powder. Stopper and shake the test tube. Observe the solubility and record in column 3.

3. Using a scoopula, add a small amount of unknown powder to two separated wells in a spot plate.
4. Use an eyedropper to put 3 drops of acid in the first well. Observe and record observations in column 4.
5. Use a different eyedropper and put 3 drops of iodine solution (stains the skin) in the second well. Observe and record in column 5.
6. Use the foil to make a small boat. Put a small amount of unknown powder in the foil. Turn the hot plate on high (8-10). Put it on the hot plate and wait 1-2 minutes to see if a reaction occurs. Observe and record in column 6.
7. Rinse your spot plate completely and repeat steps 1-6 with each unknown powder. Wash and dry the spot plate between each use. Use a new piece of foil for each powder.

Data:

#1 POWDER	#2 Appearance (colour, crystal form, state)	#3 Solubility in Water (soluble or insoluble)	#4 Acid (bubbles/fizz or no reaction)	#5 Iodine (brown or black)	# 6 Heat (describe the reaction or no reaction)
1					
2					
3					
4					
5					

Data Analysis: Use the Properties Chart to compare your observations. Identify each unknown powder:

1. _____

2. _____

3. _____

4. _____

5. _____

Questions: (5)

1. What properties did **all of the chemicals** have in common?

_____

_____

2. How did you tell the difference between powders 1 and 2 (list minimum 2 properties to distinguish between them)?

_____

_____

3. How did you tell the difference between powders 3 and 4 (list minimum 2 properties to distinguish between them)?

_____

_____

Thinking / Inquiry: _____ /20