Myste

Name_____

Mystery Powders

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**.

Part 1

Problem: 1. To identify 5 unknown samples of matter by their physical and chemical properties (qualitative analysis).
2. To identify a mixture of the unknown powders.

Materials

5 unknown white powders	Iodine	Vinegar
Indicator solution	Water	Spoons
Toothpicks	Eye droppers	Microchemistry tray
Hand lens	Foil	Test tube clamp
Candle		

Procedure:

1. Put a small amount of unknown powder 1 in 4 different wells in the microchemistry tray.
2. Use the hand lens to observe the powder. Record your observations.
3. Use an eyedropper to put 10 drops of water in well 1. Stir the water powder mixture with a toothpick. Observe for solubility and record.

4. Use an eyedropper to put 3 drops of vinegar in a well 2. Observe and record.
5. Use a different eyedropper and put 3 drops of indicator solution in well number 3. Observe and record.
6. Use a different eyedropper and put 3 drops of iodine in well number 4. Observe and record.
7. Use the foil to make a small spoon or boat. Put a small amount of unknown powder 1 in the foil. Use the test tube clamps to hold the powder over the candle flame. Observe and record
8. Rinse your tray completely and repeat steps 1-7 with each unknown powder. Wash the tray between each use. Use a new piece of foil for each powder.

Data:

POWDER	Properties	#1 Iodine	#2 Water	#3 Vinegar	# 5 Indicator	# 6 Heat
1						
2						
3						
4						
5						

Data Analysis:
Use the Powder Properties Chart and identify each unknown powder:

1. _____
2. _____
3. _____
4. _____
5. _____

Part 2

Get an unknown mixture from your teacher. Use your problem solving skills to identify the parts of the mixture.
Important You will only get 1 sample – use it wisely.

The unknown mixture contains:

Describe the process you used to identify the parts of your mixture:

_____
_____
_____
_____
_____
_____
_____
_____

Questions:

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

_____

_____

2. Why is important to use different methods to determine what the identity of the powders?

_____

_____

3. How did you tell the difference between powders 1 and 4?

_____

_____

4. How did you tell the difference between powders 3 and 4?

_____

_____

5. How did you tell the difference between powders 1 and 2?

_____

_____

6. How were properties useful in helping to tell the difference between the powders?

_____

_____

7. Which test, in your opinion, is the most accurate for discovering the identity of the powder? Explain your answer.

_____

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