



# INTRODUCTION TO ALCHEMY

## PRE LAB DISCUSSION

Alchemy preceded modern chemistry. It began in Egypt, Persia, and Mesopotamia. There are records of alchemists in Alexandria around 300 BC. From there it spread to India, China and to Europe. Alchemists made many important discoveries and developed equipment and procedures that we still use today. They contributed to metallurgy, dyeing, glass making, and medicine. Their work advanced our knowledge of the physical world.

In the Middle Ages, court alchemists worked to *transmute* base metals into gold to provide wealth for their sponsors. They often conducted their experiments in secret and kept their records using symbols to represent chemical ingredients. As a result of this, alchemy is often thought of as mysticism, magic, or fraud.

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OBJECTIVES: Like the alchemists, our objective is to make gold from *base* metals.

CHEMICALS/EQUIPMENT: Bunsen burner, tongs, evaporating dish or beaker, ring, ring stand, penny, drain cleaner [lye-NaOH or KOH], hot dipped galvanized nails [zinc], water

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## ***PART I***

First attempt at Transmutation

## PROCEDURE:

1. Place the drain cleaner in a beaker or evaporating dish to a depth of about one inch.
2. Add several hot dipped galvanized nails.

3. Using tongs, add several clean pennies. Do not allow the pennies to overlap each other. [pennies can be cleaned using salt & vinegar]
4. Heat gently until the liquid is almost boiling. Maintain this temperature for several minutes. Do not boil unless this is being conducted under a fume hood.
5. Using tongs, remove the pennies and rinse thoroughly to remove all traces of the drain cleaner.
6. Examine the pennies and record your observations.

Observations \_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

## ***PART II***

Transmutation: Try, try again

### PROCEDURE:

1. Hold a silver penny from Part I by the edges with tongs. Place it just above the flame of a Bunsen burner. Remove it from the heat immediately when it changes color.

2. Allow the coin to cool and record your observations.

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## THINKING SCIENTIFICALLY



Hypothesis: [circle one]

A base metal was transmuted to gold.

Gold cannot be produced by this method

### Gathering data & library research

1. What are some of the physical properties of gold?

color \_\_\_\_\_ hardness \_\_\_\_\_ melting point \_\_\_\_\_

density \_\_\_\_\_ solubility \_\_\_\_\_

heat conductivity \_\_\_\_\_ electrical conductivity \_\_\_\_\_

Other unique properties \_\_\_\_\_

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2. What are the chemical properties of gold?

valance \_\_\_\_\_ reactivity \_\_\_\_\_ atomic number \_\_\_\_\_

atomic mass \_\_\_\_\_

REACTION with:

Oxygen

Acids

Bases

3. What metal or metals are used to make pennies?

\_\_\_\_\_

4. What is an alloy?

5. List at least two common alloys and tell their composition.

Alloy name \_\_\_\_\_ composition \_\_\_\_\_

\_\_\_\_\_

### Conclusions

Write an essay to defend your choice of hypothesis. You will combine the information about the known properties of gold, pennies, and alloys with your experimental observations to support your hypothesis.

You may suggest further experiments that you could or would like to do to prove your hypothesis. Do not conduct any experiments without the prior approval of your teacher.

### Extra

Read and report on some famous alchemists. The names of a few are provided below.

Jabir ibn Hayyan

Rhaes

Ko Hung

Sun Po

Hermes Trismegistus

Arnold of Villanova

Geber

Paracelsus

Bottger

Hennig Brand