

Learning Guide for Lecture 1C – Meet the Elements
Chem 1010

Review

What is an atom?

What is an element?

What is a compound?

What is a chemical reaction?

How small are atoms?

Can we take pictures of atoms?

What is a mole?

What particles is an atom made of?

What does the number of protons tell us about an atom?

What does the number of protons vs. electrons tell us about an atom?

What does the number of protons and neutrons tell us about an atom?

Introduction

Match the following pictures with what element they are.

Today we will be talking about the elements. We will answer the following questions:

1. What are the elements?
2. Which ones occur naturally, and which are artificial?
3. When were they discovered?
4. Where do the names of the elements come from?
5. What are the symbols we use for the elements?
6. Which are the most common elements?
7. What do the elements look like in their pure form?
8. How are the elements' atoms arranged in their pure form?

1. What are the elements?

There are _____ known elements.

What makes them different from each other?

What are some that are familiar to you?

What are some that you've never heard of?

Why do you think that some are familiar and others not?

2. Which ones occur naturally, and which are artificial?

Naturally occurring elements:

Artificial elements:

What's different about the ones that don't occur naturally?

Imagine that you saw a news report in which a scientist claimed to have found a new element on another planet.

What would you think about this?

3. When were the elements discovered?

Some elements were known anciently:

Some elements were discovered by the alchemists (before 1700):

_____ was first produced by boiling large amounts of urine, heating the resulting paste, and passing the vapors through water to give a white, waxy substance that glowed in the dark. The process was kept secret for some time.

The rest of the naturally occurring elements were discovered between 1700 and 1950:

prior to 1700:

1700 to 1750:

_____ compounds have been used since ancient times to color glass, glazes, and ceramics. Around 1735 Georg Brandt showed that cobalt was a new element.

1750 to 1800:

_____, _____, _____, and _____ were discovered around 1774, and there was a lively debate about their relationship to each other and to the process of combustion.

1800 to 1850:

In 1808, Humphry Davy used the newly discovered electricity to separate molten salts, isolating _____, _____, _____, _____, and _____ for the first time.

1850 to 1900:

In 1861, Robert Bunsen and Gustav Kirchhoff invented a spectroscope to look at the unique patterns of light given off by different elements. Using it they discovered _____ and _____.

Lord Rayleigh and William Ramsey discovered _____, _____, _____, and _____ as gases present in small amounts in the air.

1900 to 1950:

The last element to be found in nature was _____ in 1939. There is so little of it present that it was only detected by the radiation it gives off.

_____, which can also be found in tiny amounts in nature, was produced artificially in 1940 before it was detected in nature in 1943.

Artificial elements:

The first artificially produced element was _____. It was found as a product of a nuclear reaction in discarded parts of a cyclotron.

The most recent new element to be made has an atomic number of 117, and is being called _____ until a name is announced.