

Learning Guide for Lecture 4B – Explosions
Chem 1010

Review

What compounds can be obtained when an organic material burns?

What kind of compound do you get when the following elements burn?

phosphorus

strontium

Where does the energy of fire come from?

In order to put out a fire, what do you need to remove?

Which type of fire would result if the following things caught fire?

gasoline

paper

fireworks

coffee pot

What type of fire extinguisher should you have in your house?

Why shouldn't you use water on grease fires?

Why don't each of the following substances undergo combustion?

He

C₂Cl₆

CO₂

Introduction

Have any of you personally witnessed an explosion?

What things can you observe during an explosion?

What is the difference between a fire and an explosion?

Can you have a fire without an explosion?

Can you have an explosion without a fire?

What is the main criteria to decide if an explosion has occurred?

Do explosions happen by accident?

What kinds of things can blow up?

Can explosions be useful? What could they be used for?

Types of explosions

There are three types of explosions.

1) popcorn

Heat turns water to steam inside the kernel and pressure builds to 135 psi, 180°C.

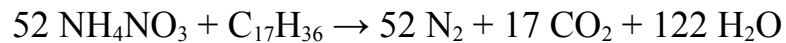
The pericarp bursts, steam carries the starch and proteins outward as a foam.

When it hits the cooler air, the foam sets, showing the shape of the explosion.

What kind of explosion is this?

What other physical explosions can you think of?

2) ANFO



What kind of explosion is this?

What makes this reaction explosive?

1)

2)

3)

What are some other examples of chemical explosives?

3) atomic bomb

How is a nuclear explosion different from a chemical explosion?

1)

2)

3)

4)

5)

6)

7)

What reaction occurred in this explosion?

What kind of reaction is this?

Very few kinds of unstable atoms undergo this type of reaction.

The two used in nuclear explosions are:

This reaction is only one of several ways that a ^{235}U atom can split up. Here is another reaction that can occur:

Over 200 different isotopes can be formed, either from the fission reaction, or from radioactive decays of the original products.

Three of the radioactive isotopes are particularly harmful to humans.

iodine-131:

strontium-90:

cesium-137:

How is a hydrogen bomb different from other kinds of nuclear explosions?

Fusion requires enormous temperatures and pressures. This is created by using a fission explosion.

These are also called thermonuclear explosions. They are even more powerful than fission explosions alone.