Smoke Detectors

There are three basic types of home some detectors

1. Ionization
2. Photo Electric
3. Dual Sensor

Ionization Detectors

- Most common in homes
- Good for detecting fast burning Open Flame fires

How do they Work?

- Ionization smoke detectors use an ionization chamber and a source of ionizing radiation to detect smoke. This type of smoke detector is more common because it is inexpensive and better at detecting the smaller amounts of smoke produced by flaming fires.
- Inside an ionization detector is a small amount (perhaps 1/5000th of a gram) of americium-241. The radioactive element americium has a half-life of 432 years and is a good source of alpha particles.
- An ionization chamber is very simple. It consists of two plates with a voltage across them, along with a radioactive source of ionizing radiation, like this:

-Battery+

Americium-241

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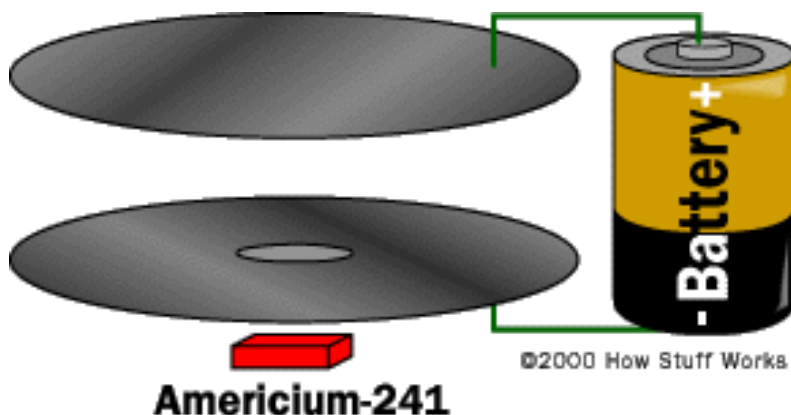
- The alpha particles generated by the americium have the following property: They **ionize** the oxygen and nitrogen atoms of the air in the chamber. To "ionize" means to "knock an electron off of." When you knock an electron off of an atom, you end up with a **free electron** (with a negative charge) and an atom missing one electron (with a positive charge). The negative electron is attracted to the plate with a positive voltage, and the positive atom is attracted to the plate with a negative voltage (opposites attract, just like with magnets). The electronics in the smoke detector sense the small amount of **electrical current** that these electrons and ions moving toward the plates represent.

- When smoke enters the ionization chamber, it disrupts this current -- the smoke particles attach to the ions and neutralize them. The smoke detector senses the drop in current between the plates and sets off the horn

Are They Safe?

- The amount of radiation in a smoke detector is extremely small. It is also predominantly **alpha radiation**. Alpha radiation cannot penetrate a sheet of paper, and it is blocked by several centimeters of air.

- The americium in the smoke detector could only pose a danger if you were to inhale it. Therefore, you do not want to be playing with the americium in a smoke detector, poking at it, or disturbing it in any way, because you don't want it to become airborne.

- You must **not** dispose in a landfill. Return to an authorized recycling center

Photoelectric Detectors

- Newer technology

- Better for detecting slow burning or smoldering types of fires.

How Do They Work?

- Photoelectric detectors work like one of those ignoring bells that goes off when you enter the store.

- When you break the light beam is sets off the bell.

- Photoelectric smoke detectors use light in a similar way.

- Inside the smoke detector there is a light and a sensor, but they are positioned at 90-degree angles to one another, like this:

Light from the light source on the shoots straight through and misses the sensor. When smoke enters the chamber, the smoke particles scatter the light and is reflected towards the sensor. The reflected beam of light hits the sensor: The sensor then sets off the horn in the smoke detector.

Normal Condition	Alarm Condition

Ⓐ Light source
Ⓑ Photo-detector

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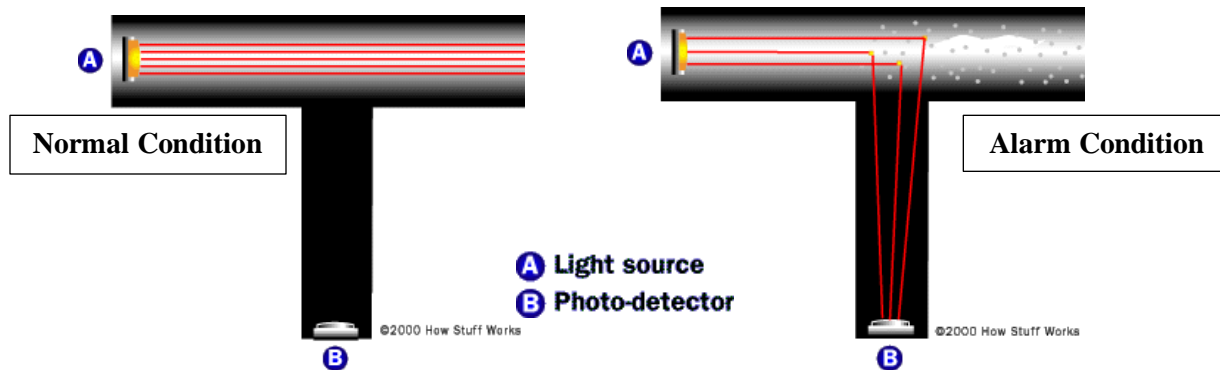
Why Have a smoke detector in your home?

- In Ohio someone's home is on fire every 30 minutes

- 73% of fire related deaths happen in homes without working smoke detectors

- It takes an average of 3 minutes to escape from a house fire at night.

- Having 1 smoke detector in your home will give you a 3-minute early warning 35% of the time, But by adding on detector on every floor, increases that to 89 % of the time

Ohio Law

Single or multi station smoke alarms <u>shall</u> be installed in <u>all</u> of the following locations in Group R-1

1. In sleeping areas

2. In every room in the path of the means of egress from the sleeping area to the door leading from the sleeping unit.

3. In each story within the sleeping unit, including basements.

Maintenance

- Vacuum your detectors one a month.

- Change batteries twice a year. (Example: on the time change)

- Test the detector once a month *(manufacture recommends once a week)*

- ***Replace every 10 years***

Installation

Install your detectors:

- *On ceiling: 6" away from wall (BEST)*

- *On wall: 6" down from the ceiling*

- *Away from air handling units*

Which one is Better?

Both give you an early warning.

- Ionization detectors: detect fast burning open flame fires.

- Photoelectric detectors: detect slow burning smoky fires

- Consider have both types in the home

OR a better solution is to install:

- Combination Detectors
  These detectors have dual sensors to cover both types of fires.