

**INTERNATIONAL JOURNAL OF UNIVERSAL PHARMACY
AND BIO SCIENCES****IMPACT FACTOR 4.018*******ICV 6.16*******Pharmaceutical Sciences****Research Article.....!!!****“LIGHT NEEDS MEDIUM TO TRAVEL”***Naziya kausar¹, A.Satish Kumar Shetty², SM Anil kumar³*

¹ Research Scholar, Department of Pharmaceutical Chemistry, National College of Pharmacy, Shimoga, - 577201 Karnataka, India.

² Professor and Head Department of Pharmaceutical chemistry, National College of Pharmacy, Shimoga, - 577201, Karnataka, India

³ Assistant professor, Department of Pharmaceutical chemistry, National College of Pharmacy, Shimoga, -577201, Karnataka, India.

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FOR CORRESPONDENCE:

Naziya kausar *

ADDRESS:

Research Scholar, Department of Pharmaceutical Chemistry, National College of Pharmacy, Shimoga, -577201 Karnataka, India.

ABSTRACT

Does Light need medium to propagate? According to general science it is NO. It is said that light can travel in Vacuum (Empty space). So light is considered as non mechanical waves and are known to be Electromagnetic waves. But Sir Christaan Huygens – a Dutch Mathematician, Astronomer, Physicist, and an inventor, claimed that light is made of waves. Back then Huygens and bunch of other physicians there are particles everywhere in the universe and the medium which consist of these particles they called it the Ether medium. They assumed that this medium is everywhere. Huygens said that the light waves are carried by the vibrations of the Ether medium. He tried to prove it by Huygens theory of light and wavefronts. They claimed that Ether medium is colorless, odorless and invisible in nature. It has high elasticity and low density. But this was disapproved by various experiments, most popularly Michelson and Morley experiment. Thus, the current research puts an effort to prove that Light needs medium to travel and there is Ether medium in outer space.

INTRODUCTION:

We've all heard that Light travels at a breakneck pace. It is, in fact, the fastest thing that exists, and it is a universal law that nothing can move faster than light. And said that light does not require a medium to travel.

There is no conclusive evidence that light requires a medium to travel until this day. However, I disagree with the assertion that light does not require a medium to travel. Light waves, according to Huygens, are carried by the Ether medium's vibrations. Huygens' theory of light and wavefronts was used to try to prove it. In nature, they claimed, Ether medium is colorless, odorless, and invisible. It is pliable and light in weight.

Thus, the current research attempts to demonstrate that light requires a medium to travel and that there is an Ether medium in outer space by performing a experiment in 3 steps:

1. Conversion of Alcohol to Ether
2. Confirmatory test for Ether sample 1 (Zeisel test for Ether)
3. Confirmatory test for Ether sample 2

Light is the connection between us and the universe. Through light we could experience distant stars and look back at the beginning of the existence itself.

But what is Light? Light is the smallest quantity of energy that can be transported. A Photon is an elementary particle without a real size, that can't be split, only created or destroyed. Light also has wave particle duality, being kind of particle and a wave at the same time. So light is part of a spectrum an elementary particle that also behaves like a wave, propelled by tow perpendicular fields travelling at the speed limit of the universe. It is said that light can travel in Vacuum. So light is considered as non mechanical waves and are known to be Electromagnetic waves. But Sir Christaan Huygens – a Dutch Mathematician, Astronomer, Physicist and an inventor, claimed that light is made of waves. Back then Huygens and bunch of other physicians there are particles everywhere in the universe and the medium which consist of these particles they called it the Ether medium. They assumed that this medium is everywhere. Huygens said that light waves are carried by the vibrations of the Ether medium. He tried to prove it by Huygens theory of light and wave fronts. They claimed that Ether medium is colorless, odorless and invisible in nature. It has high elasticity and low density. But this was disapproved by various experiments, most popularly Michelson and Morley experiment [1][2].

The Michelson and Morley experiment was a scientific experiment, it was performed to test for the presence and properties of a substance called Aether. This was thought hypothetically to fill empty

space. This experiment showed the substance did not exist. The experiment was done by Albert A. Michelson and Edward Morley in year 1887. The idea behind the Michelson and Morley experiment can be simplified to the analogue of a person swimming in a river with a current. Depending on whether or not that person is swimming with or against the current, his or her relative velocity will change. For Albert A. Michelson and Edward Morley the river is a material called “Ether” and the person swimming in the river is light. From ideas presented by physicist James Clerk Maxwell years earlier, Michelson and Morley knew that light was a wave. From the daily experiences they had some preconceived notions about waves. For example, we can observe that in order to hear sound, the sound waves must move through something. Without a material to move through, there is no sound to be heard. If this is true for sound, through Michelson and Morley, then it’s surely true for light as well. “Ether” was the name given to the hypothetical medium that surrounded all things that light propagated through. The experiment set out to measure different speeds of light depending on whether or not the light was ‘swimming’ with or against the ether’s current. The results were unexpected. Michelson and Morley observed that no matter which way the light “Swam”, it maintained a constant velocity of C. I have made an attempt to prove that light needs medium to travel and there is ether medium in space, using following concepts.

1. Atmosphere in outer space
2. Sound in outer space
3. Alcohol to Ether conversion
4. $E=mc^2$

MATERIALS AND METHODS:

Ethanol, Concentrated Sulphuric acid, Ammonia, Mercury, Acetic acid, Potassium iodide, Silver nitrate, Beakers, Test tubes, Freezer, UV spectrophotometer.

1. Atmosphere in outer space

- The Exosphere of the earth extend beyond the lowest limit that is defined as outer space. It doesn't just magically stop, it fades away losing density the farther out you get, "space is not a perfect vacuum but it is looser to one than any man made vacuum "One hydrogen atom per cubic kilometer in interstellar space is pretty vacuous
- The earth's atmosphere doesn't really stop at a certain place and then space begins. The air gets thinner as you go up from the surface and the farther from Earth you get thinner it is. It gets

thinner still if you leave our solar system and even thinner in "intergalactic space" But it is always there.

- In reality no volume of space can ever be perfectly empty. A perfect vacuum with a gaseous pressure of absolute "0" Is a Philosophical concept, that does not express in nature [3].
- Not the same as the atmosphere that surrounds that earth. The atmosphere of the earth is held down to the earth by gravity.
- In space all sorts of radiation massive particles permeate the volume of Universe, the bulk of gases in the universe is basically from the hydrogen atom. The word vacuum only implies absence of air, so there is no air in the space except there is a lot of hydrogen and a lot of micro mass particles of light
- There is no atmosphere in outer space, on the other hand there are molecules of different compounds, hydrogen atom mostly. About 1 per cubic meter, which is pretty thin, so it not a complete vacuum, but it is a close as anyone could want.
- Actually as we know there is no air in space. On our earth air is a mixture of gases mostly oxygen and nitrogen and some other gases. When you go higher and higher in the atmosphere there are less and less air molecules. At higher altitudes the air is thinner (less atom in same volume) but the relative atom of Oxygen and Nitrogen are same. This is true until you get above 100 km above the surface of earth. Above that level light gases like helium and hydrogen are most common
- Air thins as you go up in altitude because the majority of air is held close to earth surface by gravity. There is no air in space, space is almost a perfect vacuum, but gas and dust particles do float around there. The medium that fills the space in the universe around the stars and galaxies is called Interstellar medium. Many people imagine that outer space is a complete vacuum without any material because it has less matter than any vacuum artificially created by earth, but there is matter in space [4].

This region has very low densities and consists mainly of gas (99% of most of it is hydrogen and some helium) and dust.

- Interstellar dust is not like dust you might find under your bed, it is made of different substance. These dust particles are extremely small, just a fraction of micron across which happens to be approximately the wavelength of blue light wave, the particles are irregular in shape and are composed of silicates, carbon ice or iron compounds [5].

- As there is no absolute vacuum, the claim that space is empty as light still manages to travel through space should be considered false. No vacuum no claim.
- Even when the sun is shining, space looks like a black void because it has less dense atmosphere with molecules to reflect sunlight.
- Since there is atmosphere in outer space and as we know that light travels from sun to earth and other planets, we can conclude that this atmosphere aids light to travel in the space.

2. Sound

As it turns out space isn't a complete and empty void through large areas of it are the Interstellar gas and dust left behind by old stars and sometimes use to create new ones does have the potential to carry sound waves, we just aren't able to listen to them. The particles are so spread out and the resulting sound waves are of such a low frequency that they are beyond the capabilities of human's audible range.

- There are gases in a space and it's true that these gases can propagate sound waves just like earth's air allows sound to travel. The difference is that interstellar gas clouds are less dense than the atmosphere. (They have fewer atoms per cubic feet). So if a sound was travelling through a big gas cloud in space and we were out there listening only a few atoms per second could impact our ear drums and would not be able to hear the sound because our ears are not sensitive enough. May be if we had an amazingly large and sensitive microphones we could detect the sound but our human ear it would be silent.

Thanks to NASA far flung Voyager 1 spacecraft, now exploring the final frontier beyond our solar system, humanity can tune into the sounds of interstellar space [6][7].

If sound didn't travel in outer space because of as they say absence of atmosphere then they shouldn't have been able to decode sound from space.

- There can also be vibrations in matter that's not gaseous, example: the solid earth or even the sun but although sound can travel through earth it can't travel from earth to Mars because there is essentially no matter in between two planets for it to travel through so it not strictly true that no sound vibrations can travel through a space at all. But it is true that humans would not be able to hear any sound in space. The basic idea is that we would have to be extremely close to get densities high enough to hear anything. So we can't hear supernova explosions on earth. It's a little sad that space really is silent.

- Since we cannot literally hear sound in outer space because of less dense medium out there but still that sound can be decoded by Voyager1 spacecraft. If sound really had no chance to travel in space then it could have meant that it didn't exist in outer space and they could have never decoded it. We can conclude that there is atmosphere in outer space and this atmosphere aids light to travel in the space.

3. Alcohol in outer space.

There is a giant cloud of Alcohol in outer space. Discovered in 1995 near the Constellation Aquila, this cloud is 1000 times larger than the diameter of our Solar system. It contains enough Ethyl alcohol to fill 400 trillion, trillion pints of beer. To down that much alcohol, every person on earth would have to drink 300,000 pints each day for 1 billion years. The cloud is 58 quadrillion miles away. It is also a cocktail of 32 compounds, some of them are Carbon monoxide, Ammonia, Hydrogen cyanide Mercury etc. The galaxy has another intergalactic liquor cabinet in the Sagittarius B2 cloud, which holds 10 billion, billion ,billion liters of cosmic hooch. Most of it is undrinkable, though. The cloud contains mostly Methanol, the same alcohol in antifreeze and windshield washer fluid, and some Ethanol. Similarly, near the center of the Milkyway, a cloud bridge of methanol surrounds a stellar nursery. The bridge booze is 288 billion miles wide[8][9].

We conducted an experiment by using certain chemicals like Alcohol, Ammonia, Mercury, which are similar to components known to be present in the alcoholic clouds in outer space. The purpose of present experiment was to find out if there is ether in outer space and the alcoholic clouds in space are the sources of Ether in outer space.

It is known that Alcohol can be converted to Ether by a well known reaction known as "Alcohol dehydration reaction" or Zimmer's Hydrogenesis – Alcohol upon reaction with Sulphuric acid we get Ether. This principle is the basis of our experiment.

EXPERIMENTAL EVIDENCES

1. Conversion of Alcohol to Ether
2. Confirmatory test for Ether sample 1 (Zeisel test for Ether)
3. Confirmatory test for Ether sample 2

1. Conversion of Alcohol to Ether

Take 3 beakers and label them as A, B, C.

In Beaker A: Take 90ml of Anhydrous Ethanol and add it to 3 necked RB flask in an ice bath.

- Add thermometer to flask and allow the Ethanol to cool until about 5 degree celsius
- Add 80ml concentrated Sulphuric acid dropwise.
- Cool the setup at -5 to -6 degree Celsius. (We are cooling the setup to maintain similar conditions as that of outer space)

In Beaker B: Take 90ml of Anhydrous Ethanol and add it to 3 necked RB flask in an ice bath.

- Add thermometer to flask and allow the Ethanol to cool until about 5 degree Celsius
- Then take 25ml out of this Ethanol and add 0.5g Mercury + 5ml Ammonia. (We are taking appropriate quantities of chemicals required for the experiment)
- (Due to unavailability of toxic chemicals like Hydrogen Cyanide, carbon monoxide and Carbon dioxide we were unable to use them in this experiment though they are known to be present in the alcoholic clouds in outer space)
- Cool the setup at -5 to -6 degree celsius. (We are cooling the setup to maintain similar conditions as that of outer space)

In Beaker C: Take 90ml only Ethanol and cool the setup at -5 to -6 degree celsius. (We are cooling the setup to maintain similar conditions as that of outer space)

Remove the beakers from the freezer maintained at the above mentioned temperature after 48 hours. Then perform the confirmatory test for Ether on the above 3 samples.

2. Confirmatory test for Ether sample1

Zeisel test for Ether: The above samples are treated with a mixture of Acetic acid and Hydrogen iodide in a test tube. The reaction results in the cleavage of the Ether into an Alkyl halide and Alcohol. By heating this mixture, the gases are allowed to come into contact with a piece of paper, above the test tube saturated with Silver nitrate. Any Alkyl halide present in it will give a reaction with the Silver compound to give Silver iodide, which has a red or yellow color.

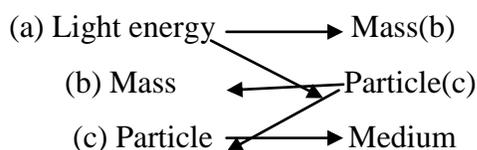
3. Confirmatory test for Ether sample (Our own confirmatory test)

UV-Visible Spectra were taken as was performed as a 2nd confirmatory test for Ether. Principle is based on the absorption of UV or Visible light by chemical compounds which results in production of distinct spectra. Spectra is based on interaction between light and matter. When the matter absorbs the light, it undergoes production of a spectrum. UV Visible absorption was measured from the sample and Ether by using Ethanol as solvent.

4. E=mc²

According to Albert Einstein's special relativity equation $E=mc^2$ Energy and Mass are interconvertible. And according to basic physics light is considered as energy (called light energy) so this energy can be converted to mass according to Albert Einstein's special relativity equation [light energy mass]. Every body which has mass is a particle [Body with mass = Particle] and every particle needs medium to travel.

Likewise if $a=b$ and $b=c$, then $a=c$



RESULTS:

Confirmatory test for Ether sample1

1) Zeisel test for Ether:

Fig1: Results from sample A

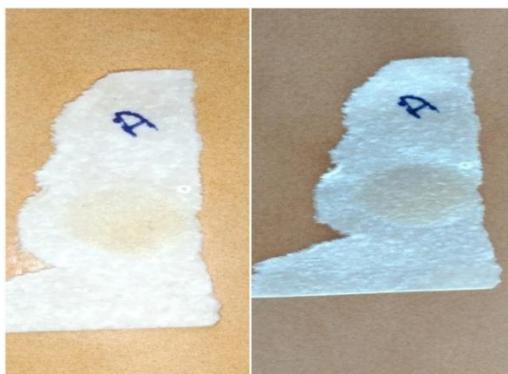


Fig 2: Results from sample B



Beaker C- No reaction. The Ethanol remained unchanged during freezing.

The samples in beaker A and B showed presence of traces of Ether which is confirmed by Zeisel test giving red color with a piece of paper, above the test tube saturated with Silver nitrate which is recorded in the above pictures.

Confirmatory test for Ether sample : UV-Visible Spectra

Fig 3 and 4: Absorption spectra of standard Ether dissolved in Ethanol (Ethanol is used as solvent)

Fig 3:

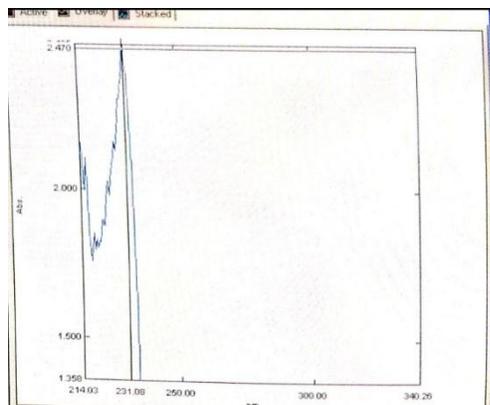


Fig 4:

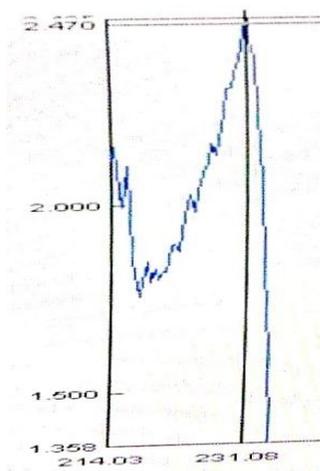


Fig 5 and 6: Absorption spectra of the sample from Beaker B dissolved in Ethanol (Ethanol is used as solvent)

Fig 5:

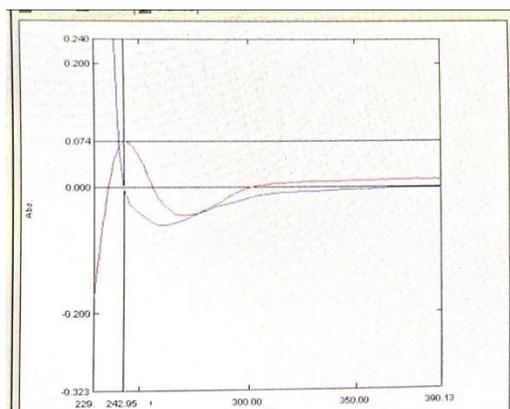


Fig 6:

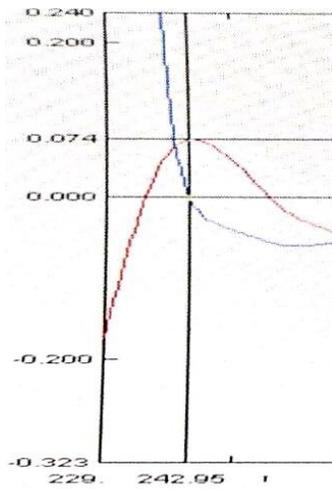


Fig 7 and 8 Absorption spectra of the sample and Ether by using Ethanol as solvent

Fig 7:

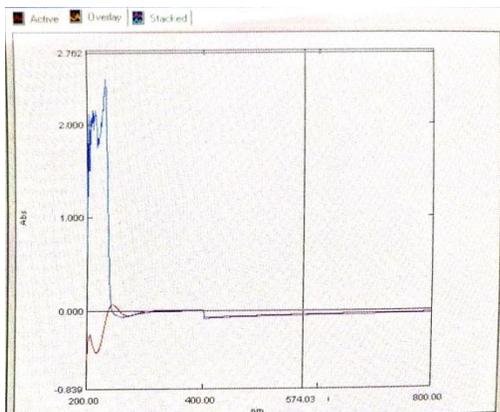
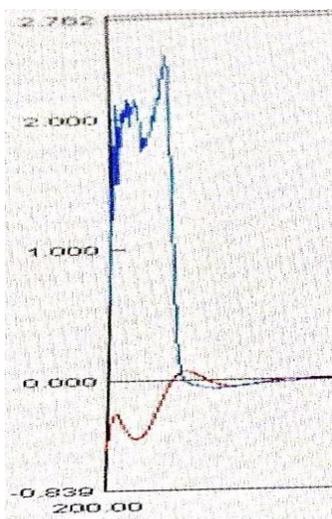


Fig 8:



From the above UV-Visible spectroscopy experiment we compared the wavelengths of standard and sample Ether where the wavelength of standard Ether 231nm and Wavelength of sample from **Beaker B** 242nm which is close to that of Standard Ether 231nm .

- Thus, we can conclude that the sample from **Beaker B** is Ether. And the atmosphere alcoholic clouds in outer space consists of alcohol and the other chemicals forms Ether. Ether having very low boiling point makes it highly Volatile in nature, spreading throughout the solar system creating a medium. And that this medium aids light to travel in the space.

DISCUSSION:

Based on all the above concepts we conclude that Light needs medium to travel. And that medium in outer space is the Ether medium.

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