Refrigeration by Using Non-Magnetic Materials Like Rubber

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***Abstract*— Refrigeration is the process of producing cold effect as by definition "Refrigeration is the process of removing heat at a low temperature level and rejecting it at a relatively higher temperature level''. The carrier substance used to carry the heat is called a refrigerant. In this work Rubber is used as a material to absorb heat. Rubber is a material that has threadlike molecules. When it is stretched, there is an increase in the entropy (dis orderness) of that system which means that all the molecules are becoming disordered. Because of the threadlike molecules, when one section starts to move vigorously, that pulls the other molecules closer to each other and the moving molecules which causes friction. In this process heat is generated. It produces some chilling effect after relaxing and can be used for cooling. In this work Thermal properties of Rubber are studied and experimental work is done on a setup consists of a tank filled with water and taking rubber material in the form of rectangular strips and allowing them to submerge in water and stretch with the help of strings which are hooked up at the ends and then pulled by the help of pulleys. Using thermometers temperature of water will measure. Results show that temperature of water is reduced. The cooling effect will be more to fluid whose specific heat is low. This work can be extended by insulating 5 sides of the tank and allow the heat to transfer in one direction only (i.e.., vertical).**

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I. Introduction

Refrigeration is the process of removing heat at a low temperature level and rejecting it at a relatively higher temperature level. The science of Refrigeration utilizes several methods of providing temperature differential. They vary from the simplicity of the spring house where cool water removes heat from warm fresh milk, to the complex machinery required for the manufacturer of ice cream or the production of considerably low temperature. In olden days, natural ice was used for Refrigeration purpose which was quite inconvenient and inadequate for large requirements. The different techniques are developed in the last hundred years and now there are numerous applications of Refrigeration in our daily life as well as in many industries. In different types of the Refrigeration systems, some physical property of mater is used for producing cold. The principles of different methods of Refrigeration will be discussed in successive paragraphs in short.

A. Ice Refrigeration System

In this method the ordinary ice is used for keeping the space at temperature below the surrounding temperature. The temperature of ice is considered to be 0 degree Celsius hence it can be used to maintain the temperatures of about 5 to 10 degree Celsius[1]. To use the ice for Refrigerating effect a closed and insulated chamber is required. On one side of the chamber ice is kept while on the other side there is a space which is to be cooled where some material to be cooled can be placed. If the temperature below 0 degree Celsius is required, then the mixture of ice and salt is used. This method of cooling is still being used for cooling the cold drinks, keeping the water chilled in thermos, etc. The given Refrigeration system is known as the Direct Refrigeration System.

Figure 1 : Ice Refrigeration

B. Air Cycle Refrigeration System

Air cycle systems can produce low temperatures for Refrigeration by subjecting the gaseous Refrigerant (air) to a sequence of processes comprising compression, followed by constant pressure cooling [1], and then expansion to the original pressure to achieve a final temperature lower than at the start of compression.

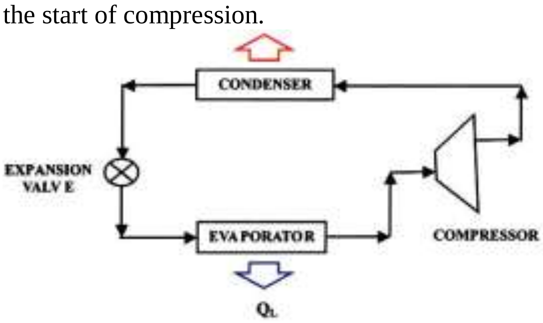


Figure 2 : Air Refrigeration Ssytem

C. Evaporative Refrigeration System

Heat is absorbed when a liquid evaporates. Evaporation of water is an example. Evaporation of moisture from the skin surface of a man helps to keep him cool. Another common application of this principle is the desert bag used to keep drinking water cool. This bag consists of a tightly woven fabric filled with drinking water the bag is not water proof. Consequently some water sweeps surface of the bag remains moist. Under desert conditions, which are usually both hot and dry, moisture on the surface of the bag evaporates rapidly [1]. A large part of heat necessary to cause this evaporation comes from the bag water. This removal of heat cools the drinking water inside the canvas keeping it at a temperature several degrees below the temperature of the surrounding air.

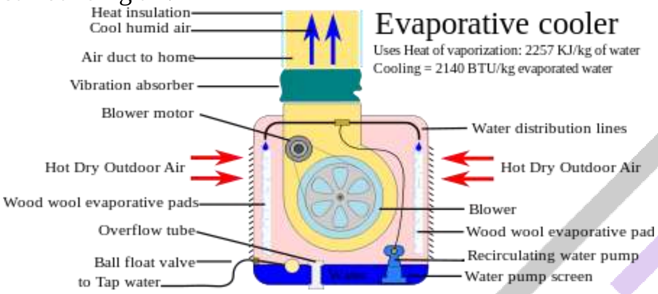


Figure 3 : Evaporative Cooling

D. Vapour Refrigeration System

In vapour Refrigeration systems, instead of air, vapours like ammonia, carbon dioxide, and sulphur dioxide are used as working fluids. The Vapour Refrigeration System works on reversed cycle which is used for steam power plants. In a vapour Refrigeration system, heat carried by the vapour in the Refrigerator is in the form of latent heat of Refrigerant so that the capacity of Refrigeration of Vapour Refrigeration System per kg of Refrigerant is far better than the Air Refrigeration System[1]. The Vapour Refrigeration System is subdivided into two types

1. Vapour Compression Refrigeration System

The Vapour Compression cycle is used in most household Refrigerators as well as in many large commercial and industrial Refrigeration systems. Figure 1.4.1 provides a schematic diagram of the components of a typical Vapor-Compression Refrigeration System.

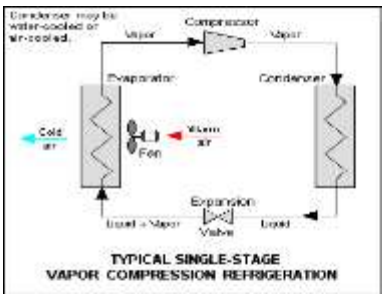


Figure 4 : Vapour Compression Refrigeration System

2. Vapour Absorption Refrigeration System

It is also used in industrial environments where plentiful waste heat overcomes its inefficiency. The Absorption Cycle is similar to the compression cycle, except for the method of raising the pressure of the refrigerant vapour. In the Absorption System, the compressor is replaced by an Absorber which dissolves the refrigerant in a suitable liquid, a liquid pump which raises the pressure and a generator which, on heat addition, drives off the refrigerant vapour from the high-pressure liquid[1]. In an Absorption Refrigerator, a suitable combination of refrigerant and absorbent is used. The most common combinations are ammonia (refrigerant) with water (absorbent), and water (refrigerant) with lithium bromide (absorbent).

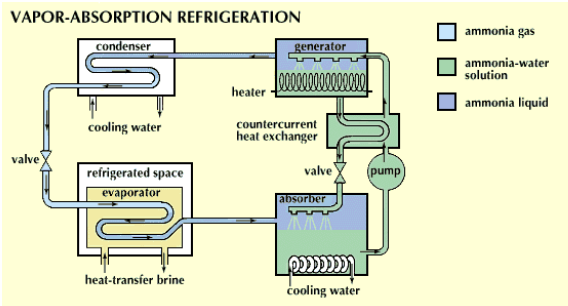


Figure 5 : Vapour Absorption System

E. Special Refrigeration System

1. Adsorption Refrigeration System

An Adsorption cycle for Refrigeration or heat pumping does not use any mechanical energy, but only heat energy. Moreover, this type of cycle basically is a four temperature discontinuous cycle[2].

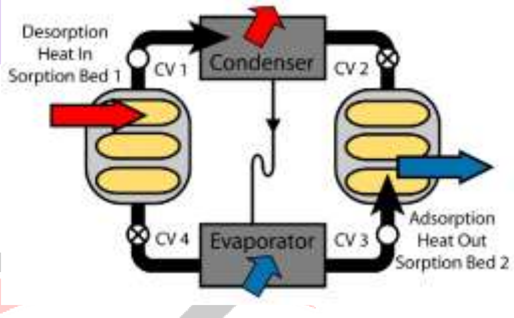
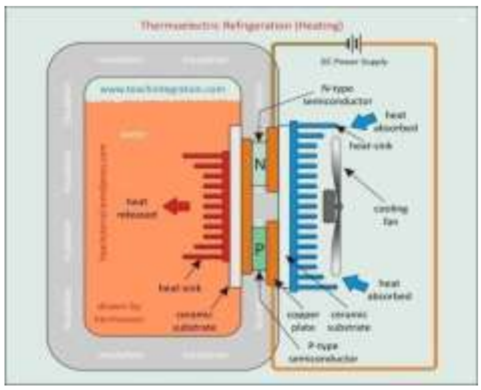


Figure 6 : Adsorption Refrigeration System

2.Thermo Electric Refrigeration System

Thermoelectric cooling devices utilize the Peltier effect, whereby the passage of a direct electric current through the junction of two dissimilar conducting materials causes the junction to either cool down (absorbing heat) or warm up



(rejecting heat), depending on the direction of the current [2].

Figure 7 : Thermo – Electric Refrigeration

F. Rubber

Natural rubber, also called India Rubber or caoutchouc, as initially produced, consists of suitable polymers of the organic compound isoprene, with minor impurities of other organic compounds plus water. Forms of poly isoprene that are useful as Natural Rubbers are classified as Elastomers. Currently, Rubber is harvested mainly in the form of the latex from certain trees. The latex is a sticky, milky colloid drawn off by making incisions into the bark and collecting the fluid in vessels in a process called "tapping". The latex then is refined into Rubber ready for commercial processing [3]. Natural Rubber is used extensively in many applications and products, either alone or in combination with other materials. In most of its useful forms, it has a large stretch ratio, high resilience, and is extremely waterproof.

G. Types of Rubber

NR Natural Rubber (cis-poly isoprene)
SBR Styrene-butadiene Rubber
BR (poly-)Butadiene Rubber
EPDM Ethylene Propylene Diene Monomer
CR Chloroprene Rubber (Neoprene)
NBR (Acrylo-Nitrile Butadiene Rubber)
NBR Hydrogenated Nitrile Butadiene Rubber (Therban)
MVQ Methyl Vinyl Silicone Rubber (Silicon)
FPM Fluoro polymer (Viton)
IIR Isobutene-Isoprene Rubber (butyl rubber)
CSM Chlorosulphonated Polyethylene (Hypalon)

In this work NR-Natural Rubber (cis-poly isoprene) is taken as the working substances

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F. Properties of Rubber

Rubber exhibits unique physical and chemocal properties. Rubber's Stress – Strain behavior exhibits the Mullins effect and the Payne effect, and is often modeled as hyper elastic. Rubber crystallizes. Owing to the presence of a double bond in each repeat unit, Natural Rubber is susceptible to vulcanization and sensitive to ozone cracking.

The two main solvents for Rubber are turpentine and naphtha (petroleum). The former has been in use since 1764 when François Fresnau made the discovery. Giovanni Fabbroni is credited with the discovery of naphtha as a rubber solvent in 1779. Because rubber does not dissolve easily, the material is finely divided by shredding prior to its immersion. An ammonia solution can be used to prevent the coagulation of raw latex while it is being transported from its collection site.

II. Preperation of Rubber

Natural Rubber is a high molecular weight polymeric substance with viscoelastic properties. Structurally it is cis 1, 4-polyisoprene. Isoprene is a diene and 1, 4 addition leaves a double bond in each of the isoprene unit in the polymer. Because of this, natural rubber shows all the reactions of an unsaturated polymer. It gives addition compounds with halogens, ozone, hydrogen chloride and several other reactants that react with olefins. An interesting reaction of Natural Rubber is its combination with sulphur. This is known as vulcanization. This reaction converts the plastic and viscous nature of raw Rubber into elastic. Vulcanized Rubber will have very high tensile strength and comparatively low elongation. Its hardness and abrasion resistance also will be high when compared to raw Rubber. Because of the unique combination of these properties, Natural Rubber finds application in the manufacture of a variety of products.

The main use of Natural Rubber is in automobiles. In developed countries nearly sixty per cent of all rubber consumed is for automobile tyres and tubes. In heavy duty tyres, the major portion of the rubber used is NR. In addition to tyres a modern automobile has more than 300 components made out of rubber [4]. Many of these are processed from NR. Uses of NR in hoses, footwear, battery boxes, foam mattresses, balloons, toys etc., are well known. In addition to this, NR now finds extensive use in soil stabilization, in vibration absorption and in road making. A variety of NR based engineering products are developed for use in these fields. The different methods of manufacturing of Rubber is mentioned below.

A. Processing the natural latex

- The initial stage of manufacturing the harvested latex usually takes place on the Rubber plantation, prior to packing and shipping. The first step in processing the latex is purification, which entails straining it to remove the other constituent elements apart from rubber and to filter out impurities such as tree sap and debris.
- The purified rubber is now collected in large vats. Combined with acetic or formic acid, the rubber particles cling together to form slabs.
- Next, the slabs are squeezed between rollers to remove excess water and pressed into bales or blocks, usually 2 or 3 square feet (.6 or .9 square meter), ready for shipping to factories. The size of the blocks depends on what the individual plantation can accommodate.

B.Mixing and Milling

- The rubber is then shipped to a rubber factory. Here, the slabs are machine cut (or chopped) into small pieces [5]. Next, many manufacturers use a Banbury Mixer, invented in 1916 by Femely H. Banbury. This machine mixes the rubber with other ingredients (sulphur) to vulcanize it, pigments to color it, and other chemicals to increase or diminish the elasticity of the resulting rubber bands. Although some companies don't add these ingredients until the next stage (milling), the Banbury machine integrates them more thoroughly, producing a more uniform product.

- Milling, the next phase of production, entails heating the rubber (a blended mass if it has been mixed, discrete pieces if it has not) and squeezing it flat in a milling machine.

C.Extrusion

After the heated, flattened Rubber leaves the milling machine, it is cut into strips. Still hot from the milling, the strips are then fed into an extruding machine which forces the Rubber out in long, hollow tubes (much as a meat grinder produces long strings of meat). Excess Rubber regularly builds up around the head of each extruding machine, and this Rubber is cut off, collected, and placed back with the rubber going into the milling machine.

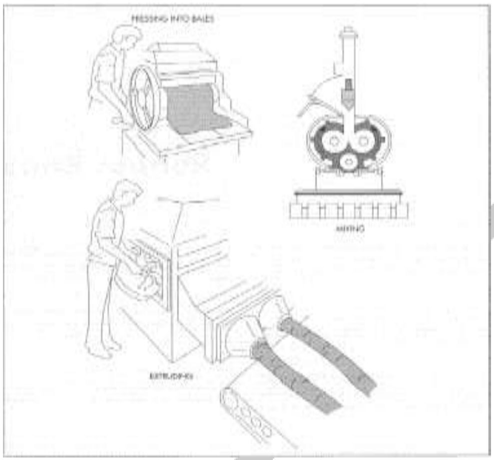

Figure 8 : Extrusion of Rubber Tubes

D. Curing

- The tubes of Rubber are then forced over aluminum poles called mandrels, which have been covered with talcum powder to keep the Rubber from sticking. Although the Rubber has already been vulcanized, it's rather brittle at this point, and needs to be "cured" before it is elastic and usable. To accomplish this, the poles are loaded onto racks that are steamed and heated in large machines

- Removed from the poles and washed to remove the talcum powder, the tubes of Rubber are fed into another machine that slices them into finished Rubber bands. Rubber bands are sold by weight, and, because they tend to clump together, only small quantities can be weighed accurately by machines. Generally, any package over 5 pounds (2.2 kilograms) can be loaded by machine but will still require manual weighing and adjusting.

E. Slicing Into Rubber Bands

As shown in the figure 9 [5] Rubber tubes are inserted into a slicer. There tubes are sliced into Rubber bands of specified thickness.

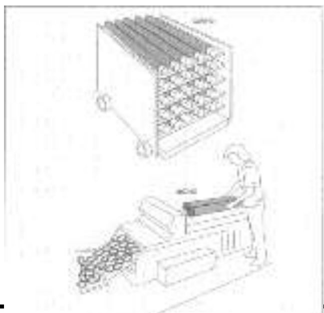

Figure 9: Slicing of Rubber tubes into rubber bands

III. EXPERMENTATION

A. Experimental Setup

In this experimentation, principle intension is to show that temperature drop is produced. Experimental Setup consists of

1. Tank
2. Rubber strips
3. Strings
4. Thermometers
5. Wooden shafts

TANK: A tank of 920 x 458 x 204 (length x breadth x height) Tank is intended to store water. It is made up of Sheet Metal (G.I) of thickness 1.5mm. Four 10mm holes are made at each side (length) of tank in order to hold shaft by any means (bolt if fixed, bearing if intended to rotate). We fill this tank with water. Water always filled below shaft level as result while stretching rubber strips are in contact with air.

RUBBER STRIPS: Rubber Strips are made in a dimension of 180 x 50 (length x breadth) and thicknesses of about 2 mm. Four holes are drilled at the four corners in order to knot the strings. In this work each rubber strip is having a mass of 50 gm.

STRINGS: A plastic string of diameter 3mm is used as string. One end of this string is knotted to rubber strip holes and the other end is allowed wound on shaft.

THERMOMETERS: Clinical thermometers of range 0°C to 100°C are used. All the localized temperature readings are taken into an average value.

WOODEN SHAFTS: Two wooden shafts of diameter 20mm are used. One shaft is fixed at one end of the tank by means of nut and bolt and nut. Through holes are made along the length of shaft. The reason is that the string will wound on it if it made to pass through the hole from one side and knotted at the other side. A lever is used for rotating shafts in order to stretch the Rubber strips. Wooden shafts are placed at the extreme ends of the tank. Rubber strips are elongated by strings by means of lever shaft mechanism. Thermometers are placed a various positions in order measure temperature at that point and average of these values taken as sample value.

B. Operation[5]

The experimentation needs a mechanism to stretch the rubber strips up to certain limit and then release. In this work, the operation is to stretch the rubber strips is two shafts on which number of pulleys are seated, are placed at the opposite ends of the tank. Strings are made pass over it, by the help of dead weights if tension is created in that strings it may develop as a stretching force and stretches the rubber strips.

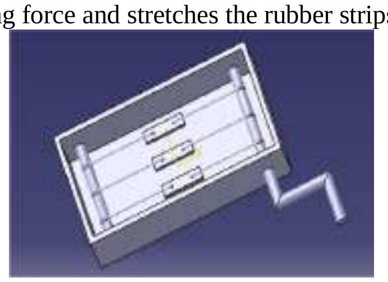

Figure 10. Model of the experiment

C .Working

Initially adjust the string length as more as possible. Because, when at release stage the Rubber Strips are fully immersed in water as a result the cooling effect from rubber can easily be transferred to water.

Water always filled below shaft level as result, while stretching, The Rubber strips are in contact with air. The heat generated will be removed by outer surface air natural convection. Stretching the Rubber in air environment gives us good results in temperature drop.

Now, at one end shaft is fixed and at other end is made flexible to rotate by a lever. Rubber strips are immersed in water. When the lever starts rotating, the strings start wounding over the shaft as a result strips are going to be stretched. Rotate the shaft till Rubber strips are raised to the tangential to shaft, at this stage the Rubber strips are in contact with air because the water level is below shaft level, here the Rubber strips are intended to elongate and dissipate the heat generated within them to air. Now Rubber strips are immersed in water and release the lever so that Rubber regains its original length. It cools the medium.

D. Experimental Procedure

Make the experimental set up ready for experiment. Knot strips with strings and shaft couple shaft with lever.

1. Fill the tank with required quantity water. Water level should be less than shaft level.
2. Rotate the lever; as a result, elongation occurs in the rubber in the air medium.
3. Release the Rubber strips and keep them in water.
4. Measure the temperature by the help of thermometers for every 2 minutes of time.
5. Tabulate the values and take average value.
6. Plot graph for time and temperature drop.

Assume that Rubber strips are stretched within the Elastic limit of Natural Rubber.

Figure 11 : Actual Model of experimental Setup

There are four parameters to be considered in this work and they are Mass of Rubber, Initial Temperature of Water, and Quantity of Water taken n the tank for cooling and elongation of Rubber. Varying these four parameters temperature drop is going to be found.

The following tests were carried out

- Temperature drop with respect to time
- Temperature with respect to elongation of the rubber
- Temperature drop with respect to initial water temperature
- Temperature drop with respect to quantity of rubber

Temperature drop with respect to quantity of water

E. Experimentation

Experiment conducted in 3 litre water of initial temperature of 48°C over a period of half an hour using 600 gm of Rubber made into four strips each 150gm.

- Initially fill the tank with 3 litres of water.
- Hook up the strings with Rubber strips.
- Repeat the experiment for several times.
- Measure temperature values after every time interval.
- Tabulate average value of temperatures.
- Plot graph between time of operation and temperature.

Assume that Rubber strips are stretched within the Elastic limit of Natural Rubber.

Table 1 : Temperature Drop

TIME in minutes	T_1 (in °C)	T_2 (in °C)	T_3 (in °C)	T_4 (in °C)	T_5 (in °C)	T_6 (in °C)	T (in °C)
0	48	48	48	48	48	48	48
2	46	47	47	47	47	47	46.833
4	45	45	45	46	46	46	45.5
6	45	44	43	44	42	44	43.667
8	43	41	42	45	41	43	42.5
10	42	39	39	43	41	42	41
12	41	38	37	40	40	41	39.5
14	40	36	36	39	38	40	38.16667
16	38	35	35	38	38	39	37.1667
18	37	35	36	38	37	39	37
20	35	34	35	37	37	38	36
22	34	33	34	36	35	36	34.667
24	31	32	32	36	32	35	33
26	30	31	30	35	32	34	32
28	30	30	30	34	30	33	31.1667
30	30	30	30	32	30	33	30.833

F. Effect of mass of Rubber on temperature Drop

In this test mass of rubber is the varying parameter. Test is performed by increasing and decreasing mass of the rubber we used in the previous experiment. Respective temperature values are compared and analyzed. Taking all the other conditions same as basic experiment. The steps performed are as follows.

- Fill the tank with 3 litres of water initially.
- In this test varying parameter is Mass of Rubber.
- Repeat the experimentation different Mass of Rubber.
- Measure temperature values after every time interval.
- Tabulate average value of temperatures.
- Plot graph between time of operation and temperature.

Assume that Rubber strips are stretched within the Elastic limit of Natural Rubber.

Table 2 : Effect of Mass of Rubber on temperature drop

TIME (in minutes)	T_1 (in °C) (m=400 gm)	T_2 (in °C) (m=600 gm)	T_3 in °C) 800 gm)
0	48	48	48
2	46.9	46.833	47
4	45.8	45.5	45
6	44.2	43.667	43
8	43.1	42.5	42
10	42	41	39
12	41.05	39.5	37
14	40.8	38.16667	36
16	39.58	37.1667	35
18	38.2	37	36
20	38.9	36	35
22	37.5	34.667	34
24	36.8	33	32
26	36	32	30
28	35.3	31.1667	30
30	34	30.833	30

G Effect of Initial Temperature on Temperature Drop

In this test Initial Temperature of Water is the varying parameter. Test is performed by taking the water temperature as 60°C, 50°C, 40°C, 30°C and 25°C. Respective temperature drop values at every time interval are compared and analyzed. Taking all the other conditions same as basic experiment.

- Initially fill the tank with 3 litres of water.
- In this test varying parameter is water initial temperature.
- Repeat experiment for different initial temperatures.
- Measure temperature values after every time interval.
- Tabulate average value of temperatures.
- Plot graph between time of operation and temperature.

Assume that Rubber strips are stretched within the Elastic limit of Natural Rubber.

Table 3 : Effect of initial Temperature on Temperature Drop

Time in minutes	T_1 (in °C)	T_2 (in °C)	T_3 (in °C)	T_4 (in °C)	T_5 (in °C)
0	60	48	40	30	25
2	57	46.833	38.866	29.5	25
4	54.5	45.1667	37.74	29	25
6	51.66	43.5	37.1667	28.667	25
8	49.166	41.667	36.316	28.33	25
10	47.1667	40.888	35.116	28.1667	25
12	46.33	40.66	34.316	27	25
14	44.5	40.1667	33.516	27	25
16	42.5	38.08	32.066	27	25
18	40.833	38.1667	30.866	27	25
20	40	37.2	30.5	27	25
22	39.6	36.5	30.76	27	25
24	38.2	35.9	30.88	27	25.4
26	37.6	35.4	31	27	25.6
28	36.9	34.4	30.44	27	25.8
30	36.3	33.9	30.667	27	26

H. Effect of Quantity of Water on Temperature Drop

In this test Quantity of Water is the varying parameter. Test is performed on different Quantities of Water of about 3 litres, 4 litres and 5 litres. Respective temperature values are tabulated and Temperature drop is found. Taking all the other conditions same as Previous Experiment.

- Initially fill the tank with 3 litres of water.
- In this test varying parameter is Quantity of water.
- Repeat the experiment for 3 litres, 4 litres&5litres of Water respectively.
- Measure temperature values after every time interval.
- Tabulate average value of temperatures.
- Plot graph between time of operation and temperature.

Assume that Rubber strips are stretched within the Elastic limit of Natural Rubber.

Table 4 : Effect of Quantity of water on Temperature Drop

Time (in minutes)	T_1 (in °C) (5 litres)	T_2 (in °C) (4 litres)	T_3 (in °C) (3 litres)
0	48	48	48
2	48	48	46.3
4	47	47	45.667
6	47	46	43.5
8	47	46	41.66
10	46	45	40.1667
12	46	44	38.6
14	45	44	37.2
16	45	43	36.4
18	44	42	35.6
20	44	42	34.2
22	43	41	33
24	42	40	32.4
26	41	39	31.6
28	40	38	31
30	40	37	30.8

I. Effect of Elongation on temperature

Elongation is the major factor to be considered. As the rubber stretched more heat dissipated will be more at the same time it absorbs more energy when released. It effects directly on the temperature drop of the water.

In this test rubber strip is subjected to different elongation conditions are respective temperature drops calculated.

- Initially fill the tank with 3 litres of water.
- In this test varying parameter is Elongation.
- Repeat the experiment for different Elongation conditions.
- Measure temperature values after every time interval.
- Tabulate average value of temperatures.
- Plot graph between time of operation and temperature.

Assume that Rubber strips are stretched within the Elastic limit of Natural Rubber.

Table 5 : Effect of Elongation on Temperature Drop

Time (in minutes)	°C (@elongation = 2L)	°C (@ elongation =2.5L)	°C (@ elongation = 3L)
0	48	48	48
2	47.12	47.5	46.33
4	46.45	46.1265	45.5
6	45.32	45.3254	43.667
8	44.45	44.2236	42.5
10	43.56	41.5254	41
12	42.68	40.112	39.5
14	42.02	39	38.1667
16	41.45	38.426	37.1667
18	40.986	37.789	37
20	40.23	37.236	36
22	39.687	36.698	34.667
24	38.0123	36.23	33
26	37.645	35.4	32
28	37.325	34.32	31.1667
30	36.145	33.658	30.833

IV. Results and Discussions

Based on the experiments so far conducted graphs are plotted. Time of operation is taken along X-axis in minutes and Temperature drop is taken on Y-axis. A temperature drop of 17.167°C is produced in 30 minutes.

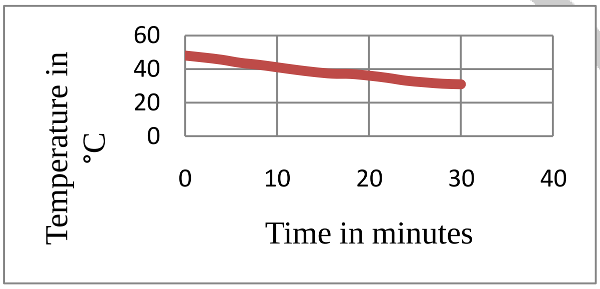

Figure 12 : Temperature Vs Time

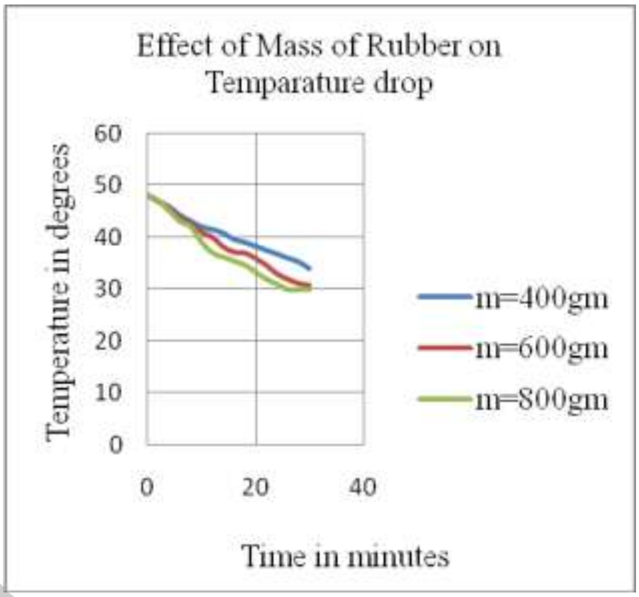

Figure 13 : Temperature vs Time

The variation in temperature is shown in the graphs. Top line represents temperature drop when 400grams of rubber is used. Second line represents when 600grams of rubber is used and third line for 800 grams of rubber. Temperature drops of 14°C, 17.167°C &18°C are when 400 gm, 600 gm and 800gm of Rubber used respectively. Cooling effect produced is more when 800grams of Rubber is used.

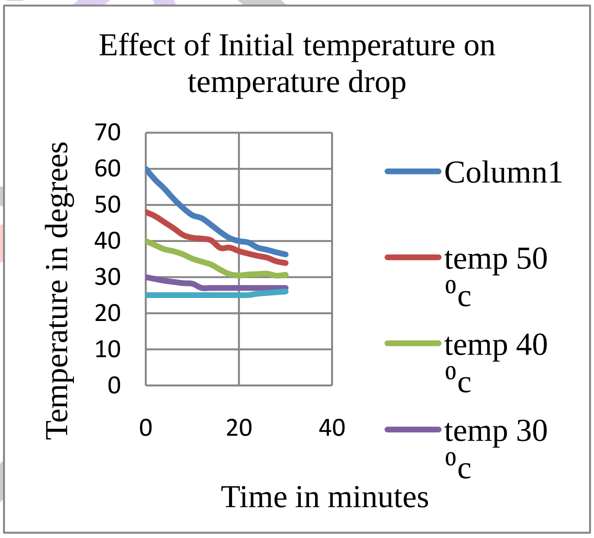

Figure 14 : Temperature Vs Time

In the above graph the curves will represent the temperature drop in water due to experiment. Based upon respective initial water temperature curves are plotted. After 30 minutes of operation a temperature drops of 23.7°C, 14.1°C, 9.333°C and 3°C are produced when initial temperature is of 60°C, 48°C, 40°C&30°C respectively. From the experiment it is clearly observed that temperature drop is decreased as the initial temperature decreases.

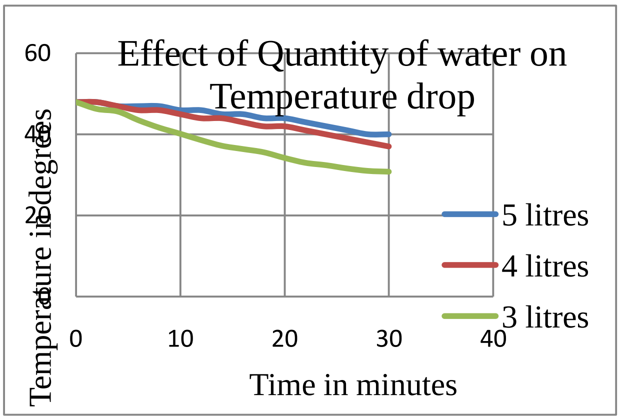

Figure 15 : Temperature vs Time

Varying the Quantity of water the test is conducted. Variation in the temperature is plotted/It is clearly observed that as the water Quantity is increases the temperature drop decreases.

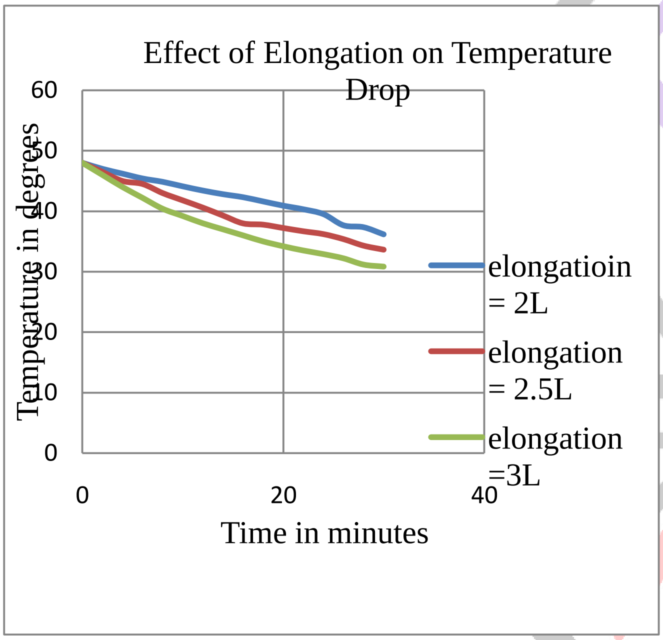

Figure 16 : Temperature Vs Time

Respective Temperature drops are plotted for respective elongation. From the results it is observed that Elongation shows a proportionate effect on temperature drop. Temperature drops of 17.167°C, 14.342°C and 11.855°C are produced when elongated to 2L, 2.5L and 3L times respectively.

V. Conclusion

The main objective of this work is to produce the cold by Rubber. Following conclusions are made from the investigation. Temperature drop produced in the water is measured by conducting different experiments by varying the different parameters like quantity of water, elongation of rubber, mass of rubber and initial temperature of water.

1. This type of cooling system may find its application in heat exchangers.
2. In this experiment, 3 litres of water at a initial temperature of 60°C is reduced to 38°C in half an hour and elongated to three times of original length.
3. As the Rubber strips are elongated more it has proportionate effect on temperature of water present in the tank.
4. For a constant Quantity of Water, as mass of Rubber increased temperature drop also increases.
5. More the Initial Temperature more will be the Temperature drop.

For certain Mass of Rubber, Quantity of water related inversely proportional with Temperature drop.

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