PERFORMANCE OF DIFFERENT NANO REFRIGERANT ON REFRIGERATION: A REVIEW

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Abstract — In present scenario, as a result of advances of technology in various engineering fields, The refrigeration structures occupy a dominant function to fulfill the human restfulness and a non-stop have a look at of it has already achieved and nevertheless studies is preserve on by way of pupils and researchers for the betterment of the operational behavior of systems. Here, an attempt has been produced within the route of improvement of performance of that structures. In the existing dissertation work an experimental investigation is made for look at the performance of home refrigeration system which acts on (Hydrocarbon+ CuO) Nano refrigerants. To behavior the experiment all required setup is evolved in line with norms of country wide standards of India, and carried out to feature beneath differing situations.

Keywords— Cupric oxide nanoparticles, Nano refrigerant, hydrocarbon, thermal conductivity, cooling capacity, energy consumption, COP

I INTRODUCTION

Refrigeration structures speak to the exclusive bodily components that make up the full refrigeration unit. The special tiers inside the refrigeration cycle are handed through in those physical systems. These structures embody an evaporator, a condenser, a compressor and a spread valve. The evaporator is the distance that desires to be cooled via the refrigerant; the compressor compresses the refrigerant from the low stress of the evaporator to the strain at the condenser. The heat won through the refrigerant is rejected at the condenser and the excessive pressure refrigerant is accelerated into the low pressure evaporator with the aid of the enlargement valve. This is a totally preferred example of the numerous devices in a refrigeration device. The refrigeration systems range in line with the purpose and the form of refrigerant used. They are the approach through which we're able to simply carry out the refrigeration way.

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II Refrigeration Processes

A refrigeration process suggests the trade of thermodynamic homes of the refrigerant and the power switch among the refrigerant and the environment. The following refrigeration strategies arise at some stage in the operation of a vapor compression refrigerating device.

- Evaporation- In this process, the refrigerant evaporates at a lower temperature than that of its

surroundings, absorbing its latent heat of vaporization.

- Superheating - Saturated refrigerant vapor is typically superheated to ensure that liquid refrigerant does now not flow into the compressor.
- Compression - Refrigerant is compressed to a better stress and temperature for condensation.
- Condensation - Gaseous refrigerant is condensed to liquid form through being desuperheated, then condensed, and finally sub cooled, moving its latent warmness of condensation to a coolant.
- Throttling and enlargement - The better-strain liquid refrigerant is throttled to the decrease evaporating pressure and is prepared for evaporation.The following refrigeration procedures arise for the duration of the operation of an air or gasoline expansion refrigeration machine:
- Compression - Air or gasoline is compressed to a higher stress and temperature.
- Heat release - Heat is released to the surroundings at consistent strain that allows you to reduce the temperature of the air or gasoline.
- Throttling and expansion - Air or gasoline is throttled and extended in order that its temperature is reduced.
- Heat absorption - Heat is absorbed from the environment due to the decrease air or fuel temperature

III Thermodynamic Properties of Refrigerants

- **Critical Temperature and Pressure -** The vital temperature of the refrigerant must be as high as possible above the condensing temperature in an effort to have a greater warmness switch at a steady temperature. If this isn't always sorted, then we are able to have excessive electricity intake via the refrigeration gadget. The crucial pressure ought to be slight and tremendous. A very high pressure will make the gadget heavy and cumbersome while in case of very low pressures, there is a opportunity of air leaking into the refrigerating machine.
- **Specific Heat -** The unique heat of the liquid ought to be as small as feasible. This ensures that the irreversibilities associated with throttling are small and there may be greater subcooling of the liquid. On the alternative hand, the particular warmness of vapor ought to be high to have less superheating of the vapor.
- **Enthalpy of Vaporization -** This ought to be as huge as feasible to limit the place underneath superheat and the location reduction due to throttling. Also, the higher cost of enthalpy of vaporization lowers the specified drift fee in keeping with ton of refrigeration..
- **Conductivity -** The conductivity of the refrigerant ought to be as high as feasible in order that the scale of the evaporator and condenser is attainable. From this standpoint, ammonia has a better conductivity than that of R12 or R22 and is greater appropriate than the latter. But, ammonia is poisonous and this doesn't allow its use in home refrigeration systems**.**
- **Evaporator and Condenser Pressure -** Both the evaporator and condenser pressures want to be above atmospheric pressure otherwise there may be a opportunity of air leaking into the machine. Presence of air appreciably reduces the capacity of the refrigeration machine. Also, due to presence of moisture in air, acids or different corrosive compounds can also shape and this could affect the tubing of the refrigeration gadget.
- **Compression Ratio -** The compression ratio wishes to be as small as possible in any other case the leakage of refrigerant takes place throughout the piston. Also, the volumetric efficiency is affected.

- **Freezing Point -** It must be as little as viable or else there can be a possibility of blockage of passages throughout drift of fluid through evaporator.

- **Volume of Refrigerant Handled Per Ton of Refrigeration** - This have to be as small as possible as a way to have a small length of the compressor. The kind of compressor is decided by this cost. For refrigerants like R12, R500, R22 and so on., a reciprocating compressor is appropriate. For others like R11 and water, a centrifugal compressor is needed to deal with the massive quantity**.**

- **Coefficient of Performance -** The Coefficient of performance or COP has an immediate bearing at the running fee of the refrigeration device. Higher the significance of COP, decrease will be the jogging value. Since, the COP of any refrigeration gadget is restricted by the Carnot COP, or big operating pressures a multi-level refrigeration device have to be employed. CO2 has a completely low COP. Hence, it isn't always suitable for use as a refrigerant.

- **Density -** The density of the refrigerant ought to be as large as feasible. In reciprocating compressors, the stress rise is performed with the aid of squeezing the entrapped fluid within the piston-cylinder meeting. Hence, density makes a decision the scale of the cylinder. Again in centrifugal compressors stress upward push is related to the density of the vapor. A excessive cost of density consequences in high stress upward push.

- **Compression Temperature** - Whenever a refrigerant gets compressed, there is a upward thrust within the temperature of the refrigerant resulting inside the heating of the cylinder walls of the compressor. This necessitates outside cooling of the cylinder walls to prevent volumetric and fabric losses. Refrigerants having lowest compression temperatures are hence higher than others.1.2 Nano fluids

IV Nano fluids Properties

Nanofluids alike ordinary fluids, have severa houses which provide an explanation for its behavior as an instance length of particle, form of particle, fabric, thermal conductivity and lots of others. And special parameter that is maximum critical problem is the stableness of particles in the base fluid. Scientist are constantly looking many areas from in which the regular countenance of the materials is probably observed out and as a result it may be feasible to make mainly thermal conductive nanoparticles. In view of excessive ground to quantity percent of nanoparticles constitute them stable suspension in base fluid. Since thermal conductivity of nanoparticles is preeminent over base fluids, consequently ordinary combination thermal conductivity will boom. As use of Nano particles may be very tiny in length, it tranquilly subtle in base fluids. After that it serves as a suspended molecule of base fluid. It aids to beaten the difficulties collectively with corrosion, clogging, sedimentation and so forth. Another problem that is too crucial is viscosity of Nano fluid. In base fluid, if gathering of nanoparticles accesses from a fixed fee (about5%) then viscosity will increase which limits its performance. In this country, It can not be relevant for particular use.

.V Advantage of Nanofluids

Particle size is the principal bodily parameter in nanofluids, when you consider that it may be used to attune the nanofluid thermal properties as well as the suspension balance of nanoparticles. Hence, nanofluids can able to waft freely via mini or micro channels with the dispersion of nanoparticles. The nano suspensions display high thermal conductivity which is particularly because of stronger convection between the nanoparticles and base liquid surfaces. Another capability gain is that the nanoparticles have decrease dimensions in order that the dispersed nanoparticles appears to be like a base fluid molecule in suspension.

- The advantages of suspending nanoparticles in base fluids:
- The surface area and heat capacity of the fluid are increased.

- The effective thermal conductivity of the fluid is enhanced.
- The collision and interaction among particles, the surface of flow passage and base fluids are intensified.
- Reduction of particle clogging rather than conventional slurries.

The combination of these factors makes nanofluids highly preferable for designing heat transfer fluids.

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