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REFRIGERATION PROCESS

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3 Claims. (Cl. 62—178)

This invention relates to the field of refrigeration. More particularly, it relates to an improvement in refrigeration processes involving the use of chlorinated hydrocarbons such as methyl chloride, CH_3Cl and methylene chloride, CH_2Cl_2, as refrigerants.

When using the chlorinated hydrocarbons as refrigerants in various household and industrial refrigerating apparatus there is frequently observed an objectionable phenomenon known as "copper plating". This is observed very frequently in connection with refrigerating systems, particularly those of the compression-expansion type, wherein there is employed as the refrigerant the widely utilized chlorinated hydrocarbon refrigerant, methyl chloride. In fact, in heavy duty refrigeration installations, where the choice of a refrigerant for a proposed system is being considered it sometimes happens that methyl chloride is looked upon less favorably than some of the other refrigerants, such as sulphur dioxide and ammonia, because methyl chloride is subject to copper plating to a substantial degree whereas the other refrigerants specified are but little subject to this objectionable phenomenon. To date attempts to prevent copper plating in installations wherein methyl chloride is utilized as the refrigerant have generally proven only partly successful.

By copper plating is meant the removal of copper from one part of the refrigeration system and its deposit in another portion of the system. Usually copper is removed from elements such as the copper tubing and deposited on the parts of the system which are formed of some metal other than copper or its alloys such as the steel parts of the system. Generally the deposit of copper occurs on moving parts such as steel pistons or steel valves and the plating of copper thereon occasionally interferes seriously with their continued operation. In some instances failures of the system have occurred as a result of the deposit of copper by plating on moving parts such as pistons, centrifugal compressors, valves, etc.

In some way the plating of copper seems to be associated with the oil used as a lubricant for lubricating the moving parts of the system. Were it possible to operate a compressor-expansion refrigerating system without any lubricant whatever it seems that the objectional phenomenon of copper plating would not occur. But since all moving parts must be lubricated the refrigeration industry in the past has generally regarded copper plating, especially when using the chlorinated hydrocarbons as refrigerants, as a necessary evil.

I have now found that the degree of copper plating can be greatly reduced and in most instances entirely eliminated by the inclusion of certain agents in the oil used to lubricate the moving parts of the refrigeration system. My invention is especially useful in instances wherein methyl chloride is utilized as the refrigerant. In the past substantial amounts of copper plating have occurred with this refrigerant, as distinguished from other refrigerants such as ammonia and sulphur dioxide where the extent of copper plating is usually much less. Surprisingly enough, I have observed that in installations employing methyl chloride as the refrigerant, the addition of the novel agent to the lubricating oil brings about a marked improvement in results and practically, if not entirely, eliminates objectionable copper plating.

I have observed that if an oxidation inhibitor such as triphenyl guanidine is added to the oil or other lubricant used for lubricating the moving parts such as compressors and valves in refrigeration systems employing methyl chloride as the refrigerant, the copper plating is reduced to a substantial extent. In fact, in most cases, the addition of triphenyl guanidine entirely eliminates all copper plating. In any event, the amount of copper plating is reduced to such an extent that it no longer forms a barrier to the acceptance of methyl chloride as a refrigerant in heavy duty refrigeration systems, a type of system wherein methyl chloride was sometimes displaced by other refrigerants less subject to plating.

It should be understood that the system should be purged of free oxygen and freed to as great an extent as possible from moisture by drying as in the present approved practice. When utilizing a high grade mineral oil containing approximately 0.1% of triphenyl guanidine, best results are obtained and, in most instances, objectionable copper plating is practically eliminated. Lesser amounts of triphenyl guanidine such as amounts equivalent to 0.05% will also be effective, although my preferred amount is 0.1%. Amounts as high as 1% may also be used. All percentages given are by weight based on the weight of the lubricating oil used to lubricate the system, to which the triphenyl guanidine is added.

My invention is not to be restricted to definite numerical amounts of triphenyl guanidine, however, as the amount may be varied to some extent

without departing from the scope of my invention as defined by the appended claims.

I claim:

1. In a method of refrigeration wherein objectionable copper plating in the refrigeration system is inhibited which comprises condensing methyl chloride refrigerant and then evaporating said methyl chloride, the step which comprises compressing said methyl chloride in the presence of a mineral oil containing triphenyl guanidine.

2. In a method of refrigeration wherein objectionable copper plating in the refrigeration system is avoided which comprises condensing methyl chloride refrigerant and then evaporating said methyl chloride, the step which comprises compressing said methyl chloride in the presence of a mineral oil containing from 0.05 to 1% of triphenyl guanidine.

3. In a process of refrigeration wherein objectionable copper plating in the refrigeration system is avoided which comprises condensing methyl chloride refrigerant and then evaporating said methyl chloride, the step which comprises compressing said methyl chloride in the presence of a mineral oil containing substantially 0.1% of triphenyl guanidine.

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