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STUDY OF CORROSION DUE TO SOIL NON-GOVERNANCE AND ENVIRONMENTAL FACTORS THAT COULD BRING DOWN THE QUALITY OF SURFACE OF GHATAM.

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ABSTRACT: Study of the various components and clay composition in the making of ghatam , correlation of the different types of corrosion that could occur and effect the pitch and tone of the percussion instrument –resulting in less symphony and harmony in music were analysed.

Key Words: Baking, Soil-Governance, Clay Composition, Rectifier, Temperature Control,Various Environmental Factors And Corrosion.

INTRODUCTION :

The clay pot , ghatam also known as NOOT, MATKI, GUMMAT, [3]has always been a powerful metaphor in Indian philosophy and has emerging trends in the field of music of different sounds while playing it. Every instrument becomes musical only on proper firing and carves out its own path and develops its own unique playing practices with different fingering techniques and patterns.[5]

FIG 1

It can get damaged in the firing process while getting baked due to variations in the control of temperatures.When clay and iron is going to be mixed in suitable proportions ,[2]according to the principles of soil science ,the sound produced by mixing clay with metals ,will influence and enable human beings to enjoy good music by listening of rhythmic notes coming from it.usc, as one of the performing arts, requires

Law of octaves made the study of elements in the periodic table, interesting and simpler. In similar manner, the different notes in carnatic music demands the variation of thala and to produce them rthymically the surface properties are to be well maintained. If the above concept is taken care,then seven swaras can create more wonders in the field of music. But corrosion science can produce the reverse effect disrupting the resonance in sounds of music.

DEFINITION OF TERMS :

CORROSION:

Corrosion is derived from latin word-corrosus/corrodere which means –the act of gnawing.It is generally defined as a process in which a solid especially, a metal is eaten away and changed by chemical action due to the presence of water by an electrolytic process.

Corrosion science mainly deals with study of surface properties of materials when it comes in contact with various means of corrosive environment. It need not be confined and restricted only to metals.

There are different ways of defining corrosion:

a state of deterioration in metals caused by oxidation., a state of chemical action on the surface of metal; a state of electrochemical attack on the surface of metal, tarnishing of metal surface; depletion in the quality surface properties; a means of structural modification of surface due to the formation of various coloured compounds; reverse process of metallurgical extraction ;loss of resistance to environmental factors ;a means of creating distress to human beings; a vital process affecting national economy, quantitative and qualitative loss of metallic surface, process affecting national economy, an environmental hazard, a process that narrows down the safety zone of citizens.

GOVERNING ASPECTS :

Since there is minimum proportion of metals and an alloy of copper added along with clay there could be the possibility of mild corrosion.(a rare phenomenon).[7]It could also occur due to the presence of other impurities in soil – excess presence of acidic or basic impurities in soil.

Earth refers to soil and soil texture plays a vital role in its corrosion. [1]There are many laboratories which test the soil samples, its acidity, basicity before making them into the clayey pots as it is the main resource for making and deciding factor for sounds.
The clay is mixed with suitable proportions of metals [4]and baked in an oven at a suitable temperature for optimum hour durations Temperature in the kiln has to be controlled ,otherwise the instrument is prone to break easily.

The below figure shows the depiction of kiln and the temperature control panel with silicon controlled rectifier(SCR) power control. [10]
The thermocouple will sense the kilns temperature and flow of electricity during the process of firing and thus provide more uniform temperature from top to bottom of kiln.

The security professionals who manufacture them advocates the sustainable and responsible usages of the soils to ensure safety and security to the instrument while playing it with force.This instrument is significant and formidable in making amazing and spectacular sound rhythms with resonance and gives different pitch on the application of different quantities of plasticine ,clay and water on the inner surface of it.

FIG 2

FACTORS AFFECTING THE QUALITY OF MAKING GHATAMS –

Manamadurai,Banrutti, Chennai and Bangalore are some of the well known places of manufacture of this percussion instrument.[4]The special tonal quality differs from place to place governed by soil governance. It is a versatile and all weather friendly instrument , so the surface should be completely resistant . But,it has indispensible metallic components,prone to corrosion. [6]If the pH of the soil is too acidic or basic it affects the sustainability and durability as it is one of the parameter to ascertain quality.[1]

TYPES OF CORROSION THAT COULD OCCUR WHEN GHATAM IS SUBJECTED TO EXPOSURE OF ENVIRONMENTAL FACTORS-

i)Chloride stress corrosion cracking
ii)Pitting corrosion
iii)Fretting corrosion
iv)Intergranular corrosion
v)Filiform corrosion

Various conditions that could be susceptible to make the instrument give less rhythmic sound could be as follows:
Since it contains metals in sizeable and minimum proportions, the following types of corrosion[11] may occur-likely to occur subjective to environmental conditions.

The instrument when played with lot of external pressure and sweat coming out from palms and fingers can prone the instrument to stress corrosion.[5]Here the stress is external pressure and the corrosive environment is sodium chloride.(medium affecting as secondary factor) ,and the cracking will begin along the grain boundary where mild cracks can develop and result in stress corrosion cracking.Occasionally ,we have seen males keeping their shirt buttons off just to get away with excess sweat.
Chloride Stress corrosion cracking (CSCC)could cause the brittle failure of a metal by cracking under tensile stress in a corrosive environment.Thus,sweat should not be made to get accumulated on the surface.

Fig3

If the instrument comes in contact with stagnant or low velocity fluids for longer time, [9]metal loss can be experienced on the surface resulting in structural weakness thereby resulting in Pitting corrosion.

It is one of the most destructive, accelerated form of corrosion.Just after the usage,it should be well wrapped so as not to have dust collected on its surface.If dust ,oil or water falls on the surface,that specific area will become anodic and rust formation may take place at a faster rate affecting the sound.If the instrument undergoes repeated wearing or vibrations continuously for prolonged duration, Fretting corrosion may occur on its subsurface.

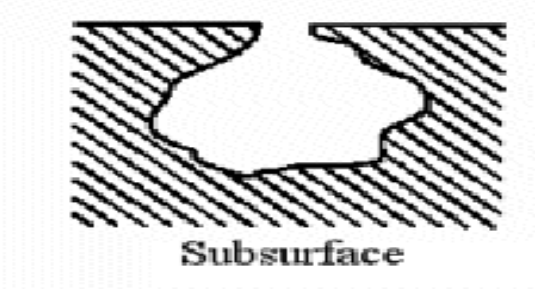

Fig 4

Corrosion may also occur on its subsurface. If impurities are there in the metal- clay composition it could easily attack the grain boundary surface then inter granular corrosion could take place.[8]

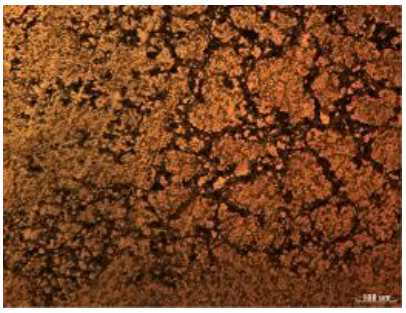

Fig 5

If the instrument gets breached with water , filiform corrosion could take place.

Fig 6

CONCLUSIONS:

Principles of environmental conditions and soil governance could be studied and governed to have its long durability without the loss of structural modifications of its surface thus making the instrument impart music more pleasing and the rhythmic sounds thus minimizing the factors causing corrosion.To be precise , the instrument should be duly covered so that dust does not get accumulated on its surface and the outer surface is not aqueous maintained with any amount of sodium chloride.

Thus due care and governing principles if well maintained only , it could spread harmony in music.

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