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Anticorrosive Performances Of Natural Additives Extracted From Organic Compounds Based Hybrid Epoxy Coating On Steel

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Abstract

Corrosion is the nature process. Due to corrosion many steel materials losses day by day. There are various method to avoid corrosion in steel by using coating. In our work we do epoxy coating on steel by spray coating. Epoxy coating widely apply on steel structures due to their higher adhesion strength and epoxy coating have corrosion resistant properties. In existing epoxy coating done in inorganic compounds are used. We do epoxy coating by using organic compounds such as orange peel, neem leaf, and cashew nut. Taking extracts from organic compounds filter by using muslin cloth and corrosion testing is done which is salt spray corrosion test and water absorption test. There is no corrosion inhibitory in the coated steel. Compare to other methods epoxy coating give better performances.

Key words: Steel, epoxy coating, spray coating, corrosion inhibition

Introduction

Corrosion process is one of the natural process on metals. Due to corrosion many materials losses in day by day. Electro chemical processing is one type corrosion process, in which a current leaves the structures at the anode site, passes through an electrolytes, and remodels to the structure in the cathode site area that corrosion is important in economically, safety, and the conservation of resources. Corrosion is major problem in all over the area where we use steels, metals. For example Vehicles parts, industrial equipment, grill gate, steel pipe lines, concrete, screw nut bolts, etc. Concrete wall damage due to bar corrosion. The experimental research has been focused on the improvement of corrosion green inhibitors for metals and alloys. Most important investigations is the development of green corrosion inhibitors. The green corrosion inhibitors from plant extract liquids, which are the most widely used and investigated due to renewable, biodegradable and inexpensive cost to safe for environment and human being. The use of natural derived extracts as green corrosion inhibitors showed such as environmentally friendly, inexpensive and renewable. Eucalyptus trees are forestry that grow with little nutrition in many parts of the world.

So, our experiments is to inhibitory the corrosion, already there are many method to inhibitory the corrosion like painting, coating and using natural additives extracted from plants like mango leaf, tamarind, data palm seed, lemon, capsicum etc. In our experiments we use nature compounds CSNL (Cashew Nut Shell Liquid), Neem leaf, orange peel by hybrid epoxy coating on steel to inhibitory the corrosion. The further development of prospects in this different field are created and associated with the world wide challenges of clean energy and manufacturing.

2. Components And Description

The components which are used in our project should be selected cautiously and cost effectively. These components should have the property to reduce the corrosion and save the life of steel and ensure safety and reliability. Extract of Neem leaf, orange peel, Cashew nut, Muslin cloth, Spray gun, Epoxy Resin with Hardener, Cobalt naphthalene, Cashew Nut Shell Liquid (CSNL), HCL (To clean the surface), Weight machine (Used to calculate the weight of steel).

2.1 Extraction organic solution

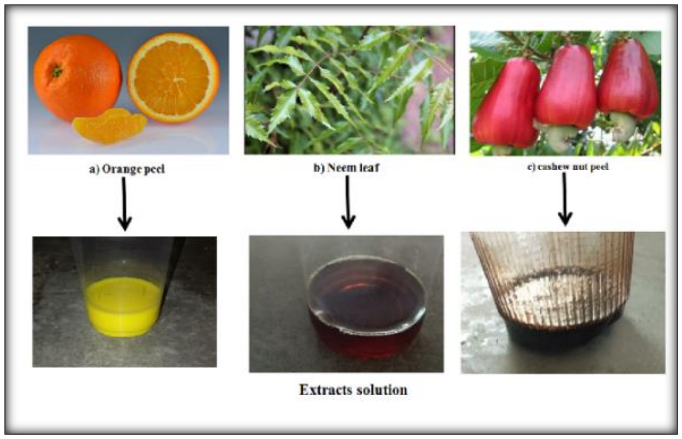


Figure 1 Extract solution

Take orange peel, neem leaf, cashew nut peel grind separately and filter the extract by using muslin cloth. One of the benefits of fabric filters is that they have a very high efficiency when it comes to collecting gas and dust particles. Since they have fabrics interwoven to small sizes, collecting unwanted material is quite easy for them since they get trapped in the filters.

2.2 Cashew Nut Shell Liquid (CSNL)

CNLS oil means oil extracted from Cashew nut outer shell part. The shell which contain pericarp fluids have dark reddish brown viscous liquid which is called CNSL liquid. These raw material of oil often considered as the better and cheaper materials for production of unsaturated phenols. These oil which have so many applications in polymer based inductries such as friction lining materials for automobile brakes, coating pigments of paints and varnishes, laminated composite resins, rubber network compounding resins, cashew based cements and polyurethane coating based polymers and intermediates for chemical industry. Cashew nut shell liquid offers scope and mush opportunities for improvement of tailor made polymers.

2.3 Epoxy Resin with Hardener

Figure 3 Epoxy Resin with Hardener

Epoxy resin polymers are used in the production of surface adhesives, paint pigments, primer coating and sealers and other home appliance products. These resins which helps to give good durable properties, coating for high glass outdoor application, sealer for flooring and coating application in industries.

The applications that can benefit from epoxy powder coating for steel involve various wet applications such as: Water valves, Surface protection, Waste treatment, Transportation, Other metal coatings. Epoxy powder coatings provide a protective layer on the surface that guards against external forces. Epoxies are

excellent at repelling water and moisture. It offers strong surfaces that create a hard bond during the application and curing process.

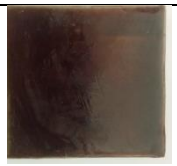
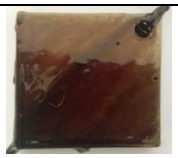
2.4 Substrate preparation

The substrate must be dry, stable and free of anything which would hinder bonding, such as dust, loose particles, grease, rust or any kind of corrosion. Depending on the nature of the substrate, it should be prepaired by brushing, rubbing down, sand blasting, etc. and then thoroughly cleaned from dust.

3. Methodology

- Taking extract: from neem leaf, orange peel and cashew nut
- Preparation of solution: filter the extract using muslin cloth.
- Coating method: spray coating it is no thickness variation, Easy coating compared to other coating.
- Solution Mixing: 78% epoxy resin, 17% polyamide curing agent, 5% of organic compound

Table 1.Shows that organic green inhibitors of Coated steel

CSNL COATING	ORANGE COATING	NEEM COATING
		

4. Corrosion Testing And Results

4.1 Salt Spray Corrosion Test

The salt spray test may be a standardized and common corrosion test methodology, accustomed check corrosion resistance of materials and surface coating.Usually, the materials to be tested are aluminiferous (although stone, ceramics, and polymers might also be tested) and finished with a surface coating that is meant to supply a degree of corrosion protection to the underlying metal. Salt spray testing is common as a result of it's comparatively cheap, quick, well standardized, and fairly repeatable. though there could also be a weak correlation between the period in salt spray check and also the expected lifetime of a coating in sure coatings like hot-dip galvanized steel, this check has gained worldwide quality thanks to low price and fast results.

Table 2: Salt spray testing result for all samples

SALT SPRAY TEST AS PER ASTM B117-18			
S.NO	**PARAMETERS**	**NEED**	**OBTAINED RESULTS**
1	Ph solution value	6.5 to 7.2	6.70 – 6.94
2	Air pressure value	12 to 18 psi	14 – 16 psi
3	Concentration of sodium chloride percentage	5% +/-1	5.1 – 5.2 %
4	Chamber temp	35+/-2º C	35.3 – 36.6º C
5	Chamber of solution per hour	1 – 2 ml	1.2 – 1.5 ml

4.2 Water absorption test

For the water absorption experiment test process, the specimens are dried in an oven for a specified time and temperature and so placed in a desiccator to cool down at once upon cooling the specimens are weighed. The fabric is then emerged in water at prearranged conditions, typically 23°C for twenty-four hours or till equilibrium. Water absorption is employed to work out the number of water absorbed below nominative conditions. Factors moving water absorption include: form of plastic, additives used, temperature and length of

exposure. The information sheds light-weight on the performance of the materials in water or wet environments. We have a tendency to done check in traditional water, water and ocean water.

Table 3 Testing result for water absorption test

S.NO	DAY	SAMPLE 1	SAMPLE 2	SAMPLE 3
		NORMAL WATER WEIGHT (gm)	DISTILLED WATER WEIGHT (gm)	SEA WATER WEIGHT (gm)
1.	1	300	306	294
2.	2	302	308	294
3.	3	302	310	294
4.	4	302	310	294
5.	5	302	310	294
6.	6	302	310	294
7.	7	302	310	294

5. Conclusion

Based on the testing 24 hours salt spray corrosion test and 7 days water absorption test result obtained as

- In salt spray corrosion test of sample 1,2,3 there is no corrosion inhibitory in coated steel
- In water absorption test for 7 days in normal water after one day two gram of weight increase and becomes constants, In distilled water after one day two grams increase and becomes constants, and In sea water there is no weight changes.

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