Corrosion Inhibition of Nickel in HCl Solution by Some Indole Derivatives

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Abstract

Some indole derivatives are investigated as corrosion inhibitors for nickel in 0.5 M HCl solution using potentiodynamic polarization and electrochemical impedance spectroscopy (EIS) techniques. A significant decrease in the corrosion rate of nickel was observed in the presence of investigated indole derivatives. Potentiodynamic polarization curves revealed that these inhibitors acted as mixed-type inhibitors, affecting both cathodic and anodic corrosion processes. The adsorption of the inhibitors on nickel surface in 0.5 M HCl was found to follow Frumkin adsorption isotherm. Thermodynamic adsorption parameters (K-ads, Delta G degrees(ads)) of investigated inhibitors were calculated from the linear form of Frumkin adsorption isotherm. Activation parameters of the corrosion process were calculated and discussed. EIS was used to investigate the mechanism of corrosion inhibition. Correlation between the inhibition efficiency and the structure of these inhibitors are presented.

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References:

1-[Title: [not available .

.Author(s): Abdallah, M.; El-Etre, A.Y

Source: Portugaliae Electrochimica Acta Volume: 21 Pages: 315-326 Published: 2003

2-[Title: [not available

.Author(s): Abdallah, M.; Alkaranee, S.O.; Abdel Fattah, A.A

Source: ZSastita Materijala Volume: 50 Pages: 205-212 Published: 2009

3-Title: THE EFFECT OF AMINO-ACIDS ON THE CORROSION OF NICKEL IN H2SO4

Author(s): AKSUT, AA; BILGIC, S

Source: CORROSION SCIENCE Volume: 33 Issue: 3 Pages: 379-387 DOI: 10.1016/0010-938X(92)90067-D Abstract Number: A1992-08-8160B-004 Published: MAR 1992

4-Title: Hydrophobic-tailed bicycloisoxazolidines: A comparative study of the newly synthesized compounds on the inhibition of mild steel corrosion in hydrochloric and sulfuric acid media

.Author(s): Ali, S. A.; Al-Muallem, H. A.; Saeed, M. T.; et al

Source: CORROSION SCIENCE Volume: 50 Issue: 3 Pages: 664-675 DOI: 10.1016/j.corsci.2007.10.010 Published: MAR 2008

5-Title: Corrosion inhibition of brass in presence of terdentate ligands in chloride solution

.Author(s): Asan, A; Kabasakaloglu, M; Isiklan, M; et al

Source: CORROSION SCIENCE Volume: 47 Issue: 6 Pages: 1534-1544 DOI: 10.1016/j.corsci.2004.07.031 Abstract Number: A2005-23-8160B-029 Published: JUN 2005

6-Title: Anodic passivation of nickel by benzotriazole and benzimidazole

Author(s): Bajpai, K; Singh, G

Source: BULLETIN OF ELECTROCHEMISTRY Volume: 16 Issue: 6 Pages: 241-244 Published: JUN 2000

7-[Title: [not available

.Author(s): Balashova, N.A.; Gorokova, N.T.; Kulesnova, M.I.; et al; Libin, S.A

Source: D.C.Soobsch Volume: 3 Pages: 264 Published: 1976

8-[Title: [not available

.Author(s): Barkalatsova, L.A.; Pshenicknikov, A.G

Source: Electrochem. Volume: 12 Pages: 42 Published: 1976

9-Title: AC-IMPEDANCE MEASUREMENTS ON ALUMINUM BARRIER TYPE OXIDE-FILMS

.Author(s): BESSONE, J; MAYER, C; JUTTNER, K; et al

Source: ELECTROCHIMICA ACTA Volume: 28 Issue: 2 Pages: 171-175 DOI: 10.1016/0013-4686(83)85105-6 Abstract Number: A1983-052247; B1983-029878 Published: 1983

10[Title: [not available

.Author(s): Breushke, H.; Weller, F.; Ebert, K.H

Source: Werk.U.Korros. Volume: 27 Pages: 664 Published: 1974

11-[Title: [not available

.Author(s): Caprani, A.; Epelboin, I.; Morel, Ph.; et al; Takenouti, H

Conference: Proceedings of th 4th European Sym. On Corrosion Inhibitors Location: Ferrara, ،Italy

Source: P 4 EUR S CORR INH F Volume: 571 Published: 1975

12-[Title: [not available

.Author(s): Da Costa, S.I.; Agostinho, S.M.L

Source: J.Electroanal.Chem. Volume: 196 Issue: 1 Pages: 51 Published: 1990

13[Title: [not available

.Author(s): Elewady, G.Y.; El-Askalany, A.; Molok, A.F

Source: Port.Electrochim.Acta Volume: 26 Issue: 6 Pages: 503-516 Published: 2008

14-[Title: [not available

.Author(s): Epelboin, I.; Keddam, M.; Takenouti, H

Source: J. Appl. Electrochem. Volume: 27 Pages: 1 Published: 1972

15-Title: DYNAMIC CURRENT-DENSITY AND CAPACITY MEASUREMENTS IN DETERMINATION OF ELECTROCHEMICAL ADSORPTION REACTIONS ON NICKEL ELECTRODE

Author(s): RATZERSC.HJ; FELLER, HG

Source: ELECTROCHIMICA ACTA Volume: 18 Issue: 2 Pages: 175-183 DOI: 10.1016/0013-4686(73)80009-X Published: 1973

16-[Title: [not available

.Author(s): Feller, H.G.; Ratzer Scheibe, H.G

Source: Electrochim.Acta Volume: 17 Pages: 17 Published: 1972

17-[Title: [not available

.Author(s): Feller, H.G.; Kesten, M.; Krupski, J

Source: Proc.Int.Congr.Corros. Volume: 515 Pages: 155 Published: 1974

18-[Title: [not available

.Author(s): Feller, H.G.; Kesten, M.; Ratzer Scheibe, H.G

Conference: Proc.5th Int.Comgr.Metal Corrosion

Source: P 5 INT COMGR MET CO Volume: 149 Published: 1974

19-Title: Evaluation of the inhibitor effect of L-ascorbic acid on the corrosion of mild steel

.Author(s): Ferreira, ES; Giacomelli, C; Giacomelli, FC; et al

Source: MATERIALS CHEMISTRY AND PHYSICS Volume: 83 Issue: 1 Pages: 129-134 DOI: 10.1016/j.matchemphys.2003.09.020 Published: JAN 15 2004

20-Title: Azorhodanine derivatives as inhibitors for acidic corrosion of nickel

Author(s): Fouda, AEAS; Al-Sarawy, AA; Omar, TM

Source: ANNALI DI CHIMICA Volume: 95 Issue: 1-2 Pages: 53-62 DOI: 10.1002/adic.200590007 Published: JAN-FEB 2005

21-[Title: [not available

.Author(s): Fouda, A.S.; Shawagfeh, S.T

Source: Bull.Soc.Chim.Fr. Volume: 127 Pages: 30 Published: 1990

22-Title: THE ROLE OF SOME THIOSEMICARBAZIDE DERIVATIVES IN THE CORROSION INHIBITION OF ALUMINUM IN HYDROCHLORIC-ACID

.Author(s): FOUDA, AS; MOUSSA, MN; TAHA, FI; et al

Source: CORROSION SCIENCE Volume: 26 Issue: 9 Pages: 719-726 DOI: 10.1016/0010-(938X(86)90035-1 Abstract Number: A1987-003487 Published: 1986

23-Title: Some quinazoline derivatives as corrosion inhibitors for copper in HNO3 solution

.Author(s): Fouda, A. S.; Abdallah, M.; El-Dahab, R. A

Source: DESALINATION AND WATER TREATMENT Volume: 22 Issue: 1-3 Pages: 340-348 DOI: 10.5004/dwt.2010.1182 Published: OCT 2010

24-[Title: [not available

.Author(s): Fouda, A.S.; Gadow, H. E.; El-Shafei, A. A

Source: KorroziosFigyelo Volume: 43 Issue: 3 Pages: 95 Published: 2003

25-[Title: [not available

.Author(s): Fouda, A.S.; Elewady, G. Y.; Shalabi, K

Source: Mansoura J. Chem. Volume: 35 Issue: 2 Pages: 35 Published: 2008

26[Title: [not available

.Author(s): Fouda, A.S.; El-Shafei, A. A.; Gadow, H. E

Source: Port. Electrochim.Acta Volume: 20 Pages: 13 Published: 2002

27-Title: Inhibition of acid corrosion of nickel by acetylenic alcohols

Author(s): Frignani, A; Monticelli, C; Trabanelli, G

Source: BRITISH CORROSION JOURNAL Volume: 33 Issue: 1 Pages: 71-75 Abstract Number: A1999-02-8160B-031 Published: 1998

29-Title: SCHIFF-BASES AS CORROSION-INHIBITORS FOR ALUMINUM IN HYDROCHLORIC-ACID SOLUTION

Author(s): GOMMA, GK; WAHDAN, MH

Source: MATERIALS CHEMISTRY AND PHYSICS Volume: 39 Issue: 3 Pages: 209-213 DOI: 10.1016/0254-0584(94)01436-K Abstract Number: A1995-07-8160B-002 Published: JAN 15 1995

29- [Title: [not available

.Author(s): Gomma, G.K

Source: Mater.Chem.Phys. Volume: 55 Pages: 243 Published: 1998

30-[Title: [not available

.Author(s): Graz, I.; Galzer, B

Source: Corros.Sci. Volume: 14 Pages: 253 Published: 1974

31-Title: The effect of halide ions on nickel corrosion in perchloric acid solutions

Author(s): Hinnov, Sixten; Tamm, Jueri

Source: PROCEEDINGS OF THE ESTONIAN ACADEMY OF SCIENCES Volume: 60 Issue: 3 Pages: 184-192 DOI: 10.3176/proc.2011.3.07 Published: 2011

32-Title: DISSOLUTION OF NICKEL IN PRESENCE OF HYDROGEN-SULFIDE AND ITS CONSEQUENCES ON MECHANISM OF PIT NUCLEATION

Author(s): KESTEN, M

Source: CORROSION Volume: 32 Issue: 3 Pages: 94-98 Published: 1976

33-Title: ACID CORROSION INHIBITION OF NICKEL BY 2-(TRIPHENOSPHORANYLIDENE) SUCCINIC ANHYDRIDE

.Author(s): KHAMIS, E; BELLUCCI, F; LATANISION, RM; et al

Source: CORROSION Volume: 47 Issue: 9 Pages: 677-686 Abstract Number: A1992-21-8160B-023 Published: SEP 1991

34-Title: THE CORROSION INHIBITION OF COPPER BY BENZIMIDAZOLE

Author(s): LEWIS, G

Source: CORROSION SCIENCE Volume: 22 Issue: 6 Pages: 579-584 DOI: 10.1016/0010-938X(82)90056-7 Published: 1982

35-[Title: [not available

.Author(s): Liand, X.H.; Deng, S.D

Source: Corros.Sci. Volume: 509 Pages: 420 Published: 2008

36-Title: Inhibition of acidic corrosion of pure aluminum by some organic compounds

Author(s): Maayta, AK; Al-Rawashdeh, NAF

Source: CORROSION SCIENCE Volume: 46 Issue: 5 Pages: 1129-1140 DOI: 10.1016/j.corsci.2003.09.009 Abstract Number: A2004-21-8160B-006 Published: MAY 2004

37-Title: STUDIES ON THE EFFECTS OF DICYANDIAMIDE ON THE ACID CORROSION OF SOME ALUMINUM-ALLOYS

Author(s): MAITRA, A; BHATTACHARYYA, K

Source: JOURNAL OF THE INDIAN CHEMICAL SOCIETY Volume: 56 Issue: 12 Pages: 1202-1203 Published: 1979

38-[Title: [not available

.Author(s): McMCafferty, E.; Hackerman, N

Source: J.Electrochem.Soc. Volume: 119 Pages: 146 Published: 1972

39-[Title: [not available

.Author(s): Mikhailova, E.I.; Iofa, Z.A

Source: Ind J. Chem. Volume: 12 Pages: 664 Published: 1974

40-Title: Synergistic inhibition between tween 60 and NaCl on the corrosion of cold rolled steel in 0.5M sulfuric acid

Author(s): Mu, GN; Li, XM; Liu, GH

Source: CORROSION SCIENCE Volume: 47 Issue: 8 Pages: 1932-1952 DOI: 10.1016/j.corsci.2004.09.020 Published: AUG 2005

41-Title: THE EFFECT OF MOLECULAR-STRUCTURE ON HYDROGEN PERMEATION AND THE CORROSION INHIBITION OF MILD-STEEL IN ACIDIC SOLUTIONS

Author(s): MURALIDHARAN, S; QURAISHI, MA; IYER, SVK

Source: CORROSION SCIENCE Volume: 37 Issue: 11 Pages: 1739-1750 DOI: 10.1016/0010-938X(95)00068-U Abstract Number: A1996-02-8160B-005 Published: NOV 1995

42-Title: POLYAMINO-BENZOQUINONE POLYMERS - A NEW CLASS OF CORROSION-INHIBITORS FOR MILD-STEEL

.Author(s): MURALIDHARAN, S; PHANI, KLN; PITCHUMANI, S; et al

Source: JOURNAL OF THE ELECTROCHEMICAL SOCIETY Volume: 142 Issue: 5 Pages: 1478-1483 DOI: 10.1149/1.2048599 Published: MAY 1995

43-[Title: [not available

.Author(s): Noor, E.A.; Al-Moubaraki, A.H

Source: Corros.Sci. Volume: 51 Pages: 868 Published: 2009

44-[Title: [not available

.Author(s): Paskossy, T

Source: J. Electroanal. Chem. Volume: 364 Pages: 111 Published: 1994

45-[Title: [not available

.Author(s): Petit, M.C.; Jouanneau, A

Conference: Proc. 5th Int.Comgr.Metal Corrosion

Source: P 5 INT COMGR MET CO Volume: 237 Published: 1974

46-Title: BETA-PHENYLETHYLAMINE AS AN INHIBITOR FOR CORROSION OF MILD-STEEL IN ACIDIC SOLUTIONS

Author(s): RENGAMANI, S; VASUDEVAN, T; IYER, SV

Source: INDIAN JOURNAL OF TECHNOLOGY Volume: 31 Issue: 7 Pages: 519-524 Published: JUL 1993

47-Title: RELATION BETWEEN THE ADSORPTION AND PROTECTIVE PROPERTIES OF INHIBITORS OF ACID CORROSION IN METALS

Author(s): RESHETNIKOV, SM

Source: PROTECTION OF METALS Volume: 14 Issue: 5 Pages: 491-493 Published: 1978

48-Title: SURFACE-ANALYSIS IN CORROSION INHIBITION MECHANISMS .

Author(s): SASTRI, VS; PACKWOOD, RH

Source: WERKSTOFFE UND KORROSION-MATERIALS AND CORROSION Volume: 38 Issue: 2 Pages: 77-82 Abstract Number: A1987-119454 Published: FEB 1987

49 [Title: [not available .

.Author(s): Schmit, G

Source: Br. Corros. J. Volume: 19 Issue: 4 Pages: 465 Published: 1984

50-[Title: [not available

.Author(s): Schweinsberg, D.; George, G.; Nanayakkara, A.; et al; Steiner, D

Source: Corros.Sci. Volume: 28 Pages: 55 Published: 1988

51-[Title: [not available .

.Author(s): Snyder, K

Source: Chem. Struct. React. Volume: 2 Pages: 120 Published: 1966

52-[Title: [not available

.Author(s): Soliman, M.S

Source: THESIS ALEX U EGYPT Published: 1995

Publisher: Alex. Univ., Egypt

53-[Title: [not available

.Author(s): Soruskhim, I.L.; Tedoradze, G.A.; Kaurova, G.I.; et al; Raxmerova, T.I

Source: Electrokhim. Volume: 12 Pages: 442 Published: 1976

54-Title: ELECTROCHEMICAL POLARIZATION .1. A THEORETICAL ANALYSIS OF THE SHAPE OF POLARIZATION CURVES

Author(s): STERN, M; GEARY, AL

Source: JOURNAL OF THE ELECTROCHEMICAL SOCIETY Volume: 104 Issue: 1 Pages: 56-63 DOI: 10.1149/1.2428496 Published: 1957

55-Title: The effect of 1-(2-pyridylazo)-2-naphthol on the corrosion of cold rolled steel in acid media - Part 2: Inhibitive action in 0.5 M sulfuric acid

.Author(s): Tang, LB; Li, XM; Li, L; et al

Source: MATERIALS CHEMISTRY AND PHYSICS Volume: 97 Issue: 2-3 Pages: 301-307 DOI: 10.1016/j.matchemphys.2005.08.014 Published: JUN 10 2006

56-[Title: [not available

.Author(s): Tebbji, K.; Faska, N.; Tounsi, A.; et al; Ouddad, H.; Benkaddour, M.; Hammouti, B

Source: Mater.Chem.Phys. Volume: 106 Pages: 2144 Published: 2007

57-[Title: [not available

.Editor(s): Tennent, R.M

Source: Science Data Book Pages: 56 Published: 1978

Publisher: Oliver & Boyd, Edinburgh

58-[Title: [not available

.Author(s): Tsuru, T.; Haruyama, S.; Gijutsu, B

Source: Journal of the Japanese Society of Corrosion Engineering Volume: 27 Pages: 573-581 Published: 1978

59-Title: Adsorption and corrosion inhibitive properties of some organic molecules on iron electrode in sulfuric acid

Author(s): Vracar, LM; Drazic, DM

Source: CORROSION SCIENCE Volume: 44 Issue: 8 Pages: 1669-1680 Article Number: PII S0010-938X(01)00166-4 DOI: 10.1016/S0010-938X(01)00166-4 Published: AUG 2002

60-Title: Corrosion inhibition of pure nickel by some phosphonium compounds in acid medium

Author(s): Walia, M; Singh, G

Source: SURFACE ENGINEERING Volume: 21 Issue: 3 Pages: 176-179 DOI: 10.1179/174329405X49976 Published: JUN 2005

Antibacterial drugs as environmentally-friendly corrosion inhibitors for carbon steel in acid medium

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Abstract

The effect of cefazolin (CZ) and cefotaxime (CT) as corrosion inhibitors for carbon steel in 0.5 M H2SO4 solution was investigated by use of potentiodynamic polarization, electrochemical impedance spectroscopy (EIS), electrochemical frequency modulation (EFM), and scanning electron microscopy (SEM). CZ and CT acted as mixed-type inhibitors. Inhibition increased with increasing inhibitor concentration and decreased with increasing temperature. Adsorption of the inhibitors obeyed the Langmuir adsorption isotherm. SEM confirmed inhibition by the inhibitors. Inhibition by 5 x 10(-4) M CZ and 7 x 10(-4) M CT approached 99.6 % and 90.9 %, respectively. The EIS and EFM results were in good agreement with the potentiodynamic data.

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IDS Number: 104QB

ISSN: 0922-6168

References:

1-Title: Aminopyrimidine derivatives as inhibitors for corrosion of 1018 carbon steel in nitric acid solution

Author(s): Abdallah, M.; Helal, E. A.; Fouda, A. S.

Source: CORROSION SCIENCE Volume: 48 Issue: 7 Pages: 1639-1654 DOI: 10.1016/j.corsci.2005.06.020 Published: JUL 2006

2 - Title: Inhibitive action of some plant extracts on the corrosion of steel in acidic media

Author(s): Abdel-Gaber, A. M.; Abd-El-Nabey, B. A.; Sidahmed, I. M.; et al.

Source: CORROSION SCIENCE Volume: 48 Issue: 9 Pages: 2765-2779 DOI: 10.1016/j.corsci.2005.09.017 Published: SEP 2006

.3 Title: 4-aminoantipyrine as an inhibitor of mild steel corrosion in HCl solution

Author(s): Abd El-Rehim, SSA; Ibrahim, MAM; Khaled, KF

Source: JOURNAL OF APPLIED ELECTROCHEMISTRY Volume: 29 Issue: 5 Pages: 593-599 Published: MAY 1999

.4 Title: Thiosemicarbazide as an inhibitor for the acid corrosion of iron

Author(s): Abo El-Khair, M.B.; Abdel Hamed, I.A.

Source: Corros. Sci. Volume: 16 Pages: 163 Published: 1976

.5 Title: Mebendazole: New and efficient corrosion inhibitor for mild steel in acid medium

Author(s): Ahamad, Ishtiaque; Quraishi, M. A.

Source: CORROSION SCIENCE Volume: 52 Issue: 2 Pages: 651-656 DOI: 10.1016/j.corsci.2009.10.012 Published: FEB 2010

.6 Title: Corrosion and hydrogen permeation inhibition for mild steel in HCl by isomers of organic compounds

Author(s): Babu, BR; Holze, R

Source: BRITISH CORROSION JOURNAL Volume: 35 Issue: 3 Pages: 204-209 Published: 2000

.7 Title: Corrosion control of Cu-Ni alloys in neutral chloride solutions by amino acids

Author(s): Badawy, WA; Ismail, KM; Fathi, AM

Source: ELECTROCHIMICA ACTA Volume: 51 Issue: 20 Pages: 4182-4189 DOI: 10.1016/j.electacta.2005.11.037 Published: MAY 25 2006

.8 Title: The substituted 1,3,4-oxadiazoles: a new class of corrosion inhibitors of mild steel in acidic media

Author(s): Bentiss, F; Traisnel, M; Lagrenee, M

Source: CORROSION SCIENCE Volume: 42 Issue: 1 Pages: 127-146 DOI: 10.1016/S0010-938X(99)00049-9 Published: JAN 2000

.9 Title: Electrochemical frequency modulation: A new electrochemical technique for online corrosion monitoring

Author(s): Bosch, RW; Hubrecht, J; Bogaerts, WF; et al.

Source: CORROSION Volume: 57 Issue: 1 Pages: 60-70 Abstract Number: A2001-11-8280-006 Published: JAN 2001

.10 Title: Instantaneous corrosion rate measurement with small-amplitude potential intermodulation techniques

Author(s): Bosch, RW; Bogaerts, WF

Source: CORROSION Volume: 52 Issue: 3 Pages: 204-212 Abstract Number: A1996-12-8280-001 Published: MAR 1996

.11 Title: Occupational risk and toxicology evaluations of industrial water conditioning

Author(s): Broussard, G; Bramanti, O; Marchese, FM

Source: OCCUPATIONAL MEDICINE-OXFORD Volume: 47 Issue: 6 Pages: 337-340 DOI: 10.1093/occmed/47.6.337 Published: AUG 1997

.12 Title: The phase-shift method for determining Langmuir adsorption isotherms of over-potentially deposited hydrogen for the cathodic H-2 evolution reaction at poly-Re/aqueous electrolyte interfaces

Author(s): Chun, JH; Jeon, SK; Ra, KH; et al.

Source: INTERNATIONAL JOURNAL OF HYDROGEN ENERGY Volume: 30 Issue: 5 Pages: 485-499 DOI: 10.1016/j.ijhydene.2004.04.012 Abstract Number: A2005-19-8640K-009 Published: APR 2005

.13 Title: Investigation of Piperanine as HCl Ecofriendly Corrosion Inhibitors for C38 Steel

Author(s): Dahmani, M.; Al-Deyab, S. S.; Et-Touhami, A.; et al.

Source: INTERNATIONAL JOURNAL OF ELECTROCHEMICAL SCIENCE Volume: 7 Issue: 3 Pages: 2513-2522 Published: MAR 2012

.14 Title: Caffeic acid as a green corrosion inhibitor for mild steel

Author(s): de Souza, F. S.; Spinelli, A.

Source: CORROSION SCIENCE Volume: 51 Issue: 3 Pages: 642-649 DOI: 10.1016/j.corsci.2008.12.013 Published: MAR 2009

.15 Title: Experimental and theoretical studies of thiazoles as corrosion inhibitors for mild steel in sulphuric acid solution

Author(s): Doner, Ali; Solmaz, Ramazan; Ozcan, Muzaffer; et al.

Source: CORROSION SCIENCE Volume: 53 Issue: 9 Pages: 2902-2913 DOI: 10.1016/j.corsci.2011.05.027 Published: SEP 2011

.16 Title: Inhibitive Properties, Thermodynamic Characterization and Quantum Chemical Studies of Secnidazole on Mild Steel Corrosion in Acidic Medium

Author(s): Ebenso, Eno E.; Obot, Ime B.

Source: INTERNATIONAL JOURNAL OF ELECTROCHEMICAL SCIENCE Volume: 5 Issue: 12 Pages: 2012-2035 Published: DEC 2010

.17 Title: [not available[

Author(s): Ebenso, E.E.; Eddy, N.O.; Odiongenyi, A.O.

Source: Portugaliae Electrochimica Acta Volume: 27 Issue: 1 Pages: 13-22 Published: 2009

.18 Title: Inhibition of the corrosion of carbon steel in acidic medium by penicillin V potassium

Author(s): Eddy, N.O.; Odoemelam, S.A.

Source: Adv. Nat. Appl. Sci. Volume: 2 Pages: 225 Published: 2008

.19 Title: Fluoroquinolones as Corrosion Inhibitors for Mild Steel in Acidic Medium; Experimental and Theoretical Studies

Author(s): Eddy, Nnabuk O.; Stoyanov, Stanislav R.; Ebenso, Eno E.

Source: INTERNATIONAL JOURNAL OF ELECTROCHEMICAL SCIENCE Volume: 5 Issue: 8 Pages: 1127-1150 Published: AUG 2010

.20 Title: Adsorption, synergistic inhibitive effect and quantum chemical studies of ampicillin (AMP) and halides for the corrosion of mild steel in H2SO4

Author(s): Eddy, Nnabuk O.; Ebenso, Eno E.; Ibok, Udo J.

Source: JOURNAL OF APPLIED ELECTROCHEMISTRY Volume: 40 Issue: 2 Pages: 445-456 DOI: 10.1007/s10800-009-0015-z Published: FEB 2010

.21 Title: Quantum chemical study of the inhibition of the corrosion of mild steel in H2SO4 by some antibiotics

Author(s): Eddy, Nnabuk O.; Ibok, Udo J.; Ebenso, Eno E.; et al.

Source: JOURNAL OF MOLECULAR MODELING Volume: 15 Issue: 9 Pages: 1085-1092 DOI: 10.1007/s00894-009-0472-7 Published: SEP 2009

.22 Title: Inhibition of the corrosion of mild steel in H2SO4 by penicillin G

Author(s): Eddy, N. O.; Odoemelam, S. A.; Ekwumemgbo, P.

Source: SCIENTIFIC RESEARCH AND ESSAYS Volume: 4 Issue: 1 Pages: 33-38 Publishe: JAN 2009

.23 Title: Inhibitive and adsorptive properties of orphenadrine for the corrosion of mild steel in H<inf>2</inf>SO<inf>4</inf <

Author(s): Ekop, A.S.; Eddy, N.O.

Source: Aust. J. Basic Appl. Sci. Volume: 2 Pages: 1258 Published: 2008

.24 Title: EFFECT OF TEMPERATURE AND INHIBITORS ON THE CORROSION OF ALUMINUM IN 2NHCL SOLUTION - A KINETIC-STUDY

Author(s): ELAWADY, YA; AHMED, AI

Source: INDIAN JOURNAL OF CHEMISTRY SECTION A-INORGANIC BIO-INORGANIC PHYSICAL THEORETICAL & ANALYTICAL CHEMISTRY Volume: 24 Issue: 7 Pages: 601-602 Published: 1985

.25 Title: [not available[

Author(s): Enick, O.V.

Source: Do pharmaceutically active compounds have an ecological impact Published: 2006

Publisher: Simon Fraser University, Burnaby

.26 Title: Structure, characterization and inhibition activity of new metal-organic framework

Author(s): Etaiw, Safaa El-din H.; Fouda, Abd El-Aziz S.; Abdou, Safaa N.; et al.

Source: CORROSION SCIENCE Volume: 53 Issue: 11 Pages: 3657-3665 DOI: 10.1016/j.corsci.2011.07.007 Published: NOV 2011

.27 Title: INHIBITION OF CARBON STEEL CORROSION BY SOME CYANOACETOHYDRAZIDE DERIVATIVES IN HCl SOLUTION

Author(s): Fouda, A. S.; Abdallah, M.; Attia, A.

Source: CHEMICAL ENGINEERING COMMUNICATIONS Volume: 197 Issue: 8 Pages: 1091-1108 Article Number: PII 919147000 DOI: 10.1080/00986440903412944 Published: 2010

.28 Title: THE ROLE OF SOME THIOSEMICARBAZIDE DERIVATIVES IN THE CORROSION INHIBITION OF ALUMINUM IN HYDROCHLORIC-ACID

Author(s): FOUDA, AS; MOUSSA, MN; TAHA, FI; et al.

Source: CORROSION SCIENCE Volume: 26 Issue: 9 Pages: 719-726 DOI: 10.1016/0010-938X(86)90035-1 Abstract Number: A1987-003487 Published: 1986

.29 Title: Pyrazolone derivatives as corrosion inhibitors for C-steel in hydrochloric acid solution

Author(s): Fouda, A. S.; Al-Sarawy, A. A.; El-Katori, E. E.

Source: DESALINATION Volume: 201 Issue: 1-3 Pages: 1-13 DOI: 10.1016/j.desal.2006.03.519 Published: NOV 30 2006

.30 Title: Antibacterial drugs as inhibitors for the corrosion of stainless steel type 304 in HCl solution

Author(s): Fouda, A. S.; Mostafa, H. A.; El-Abbasy, H. M.

Source: JOURNAL OF APPLIED ELECTROCHEMISTRY Volume: 40 Issue: 1 Pages: 163-173 DOI: 10.1007/s10800-009-9992-1 Published: JAN 2010

31.Title: IMPEDANCE STUDIES OF THE OXIDE LAYER ON ZIRCALOY AFTER PREVIOUS OXIDATION IN WATER-VAPOR AT 400-DEGREES-C

Author(s): GOHR, H; SCHALLER, J; SCHILLER, CA

Source: ELECTROCHIMICA ACTA Volume: 38 Issue: 14 Pages: 1961-1964 DOI: 10.1016/0013-4686(93)80323-R Published: OCT 1993

32 . Title: EFFECTS OF ANIONS ON CORROSION INHIBITION BY ORGANIC COMPOUNDS

Author(s): HACKERMA.N; SNAVELY, ES; PAYNE, JS

Source: JOURNAL OF THE ELECTROCHEMICAL SOCIETY Volume: 113 Issue: 7 Pages: 677-& DOI: 10.1149/1.2424089 Published: 1966

33 Title: Natural products in drug discovery

Author(s): Harvey, Alan L.

Source: DRUG DISCOVERY TODAY Volume: 13 Issue: 19-20 Pages: 894-901 DOI: 10.1016/j.drudis.2008.07.004 Published: OCT 2008

.34 Title: Experimental and theoretical study for corrosion inhibition of mild steel 1 M HCl solution by some new diaminopropanenitrile compounds

Author(s): Herrag, L.; Bouklah, M.; Patel, N. S.; et al.

Source: RESEARCH ON CHEMICAL INTERMEDIATES Volume: 38 Issue: 7 Pages: 1669-1690 DOI: 10.1007/s11164-012-0493-1 Published: SEP 2012

.35 Title: Technical note: Concerning the conversion of the constant phase element parameter Y-0 into a capacitance

Author(s): Hsu, CH; Mansfeld, F

Source: CORROSION Volume: 57 Issue: 9 Pages: 747-748 Published: SEP 2001

.36 Title: THE EFFECT OF TEMPERATURE ON THE ACIDIC DISSOLUTION OF STEEL IN THE PRESENCE OF INHIBITORS

Author(s): KHAMIS, E

Source: CORROSION Volume: 46 Issue: 6 Pages: 476-484 Abstract Number: A1991-038097 Published: JUN 1990

.37 Title: Electrochemical impedance and X-ray photoelectron spectroscopic studies of the inhibition of mild steel corrosion in acids by cyclohexylamine

Author(s): Li, P; Lin, JY; Tan, KL; et al.

Source: ELECTROCHIMICA ACTA Volume: 42 Issue: 4 Pages: 605-615 DOI: 10.1016/S0013-4686(96)00205-8 Published: 1997

.38 Title: Some new triazole derivatives as inhibitors for mild steel corrosion in acidic medium

Author(s): Li, Wei-hua; He, Qiao; Zhang, Sheng-tao; et al.

Source: JOURNAL OF APPLIED ELECTROCHEMISTRY Volume: 38 Issue: 3 Pages: 289-295 DOI: 10.1007/s10800-007-9437-7 Published: MAR 2008

.39 Title: Berberine as a natural source inhibitor for mild steel in 1 M H2SO4

Author(s): Li, Y; Zhao, P; Liang, Q; et al.

Source: APPLIED SURFACE SCIENCE Volume: 252 Issue: 5 Pages: 1245-1253 DOI: 10.1016/j.apsusc.2005.02.094 Published: DEC 15 2005

.40 Title: The influence of steel microstructure on CO2 corrosion. EIS studies on the inhibition efficiency of benzimidazole

Author(s): Lopez, DA; Simison, SN; de Sanchez, SR

Source: ELECTROCHIMICA ACTA Volume: 48 Issue: 7 Pages: 845-854 Article Number: PII S0013-4686(02)00776-4 DOI: 10.1016/S0013-4686(02)00776-4 Published: FEB 20 2003

.41 Title: Corrosion inhibition of carbon steel in hydrochloric acid by furan derivatives

Author(s): Machnikova, E.; Whitmire, Kenton H.; Hackerman, N.

Source: ELECTROCHIMICA ACTA Volume: 53 Issue: 20 Pages: 6024-6032 DOI: 10.1016/j.electacta.2008.03.021 Published: AUG 20 2008

.42 Title: Inhibition of phosphoric acid corrosion of zinc by organic onium compounds and their adsorption characteristics

Author(s): Morad, MS

Source: JOURNAL OF APPLIED ELECTROCHEMISTRY Volume: 29 Issue: 5 Pages: 619-626 DOI: 10.1023/A:1026445521937 Published: MAY 1999

.43 Title: Tryptamine as a green iron corrosion inhibitor in 0.5 M deaerated sulphuric acid

Author(s): Moretti, G; Guidi, F; Grion, G

Source: CORROSION SCIENCE Volume: 46 Issue: 2 Pages: 387-403 DOI: 10.1016/S0010-938X(03)00150-1 Abstract Number: A2004-13-8160B-087 Published: FEB 2004

.44 Title: COVERAGE OF IRON SURFACE BY ORGANIC COMPOUNDS AND ANIONS IN ACID SOLUTIONS

Author(s): MURAKAWA, T; NAGAURA, S; HACKERMA.N

Source: CORROSION SCIENCE Volume: 7 Issue: 2 Pages: 79-& DOI: 10.1016/S0010-938X(67)80105-7 Published: 1967

.45 Title: Natural products as sources of new drugs over the last 25 years

Author(s): Newman, David J.; Cragg, Gordon M.

Source: JOURNAL OF NATURAL PRODUCTS Volume: 70 Issue: 3 Pages: 461-477 DOI: 10.1021/np068054v Published: MAR 2007

.46 Title: Natural products as sources of new drugs over the period 1981-2002

Author(s): Newman, DJ; Cragg, GM; Snader, KM

Source: JOURNAL OF NATURAL PRODUCTS Volume: 66 Issue: 7 Pages: 1022-1037 DOI: 10.1021/np030096l Published: JUL 2003

.47 Title: [not available[

Author(s): Obot, I.B

Source: Portugaliae Electrochim. Acta Volume: 27 Issue: 5 Pages: 539 Published: 2009

.48 Title: Corrosion inhibition of aluminium in acidic and alkaline media by Sansevieria trifasciata extract

Author(s): Oguzie, E. E.

Source: CORROSION SCIENCE Volume: 49 Issue: 3 Pages: 1527-1539 DOI: 10.1016/j.corsci.2006.08.009 Published: MAR 2007

.49 Title: Electrochemical and XPS studies of decylamides of alpha-amino acids adsorption on carbon steel in acidic environment

Author(s): Olivares, O; Likhanova, NV; Gomez, B; et al.

Source: APPLIED SURFACE SCIENCE Volume: 252 Issue: 8 Pages: 2894-2909 DOI: 10.1016/j.apsusc.2005.04.040 Published: FEB 15 2006

.50 Title: AC and DC study of the temperature effect on mild steel corrosion in acid media in the presence of benzimidazole derivatives

Author(s): Popova, A; Sokolova, E; Raicheva, S; et al.

Source: CORROSION SCIENCE Volume: 45 Issue: 1 Pages: 33-58 Article Number: PII S0010-938X(02)00072-0 DOI: 10.1016/S0010-938X(02)00072-0 Published: JAN 2003

.51 Title: Risperidone as a corrosion inhibitor for mild steel in acid media

Author(s): Prabhu, R. A.; Shanbhag, A. V.; Venkatesha, T. V.

Source: BULLETIN OF ELECTROCHEMISTRY Volume: 22 Issue: 5 Pages: 225-233 Published: MAY 2006

.52 Title: Influence of tramadol [2-[(dimethylamino)methyl]-1-(3-methoxyphenyl) cyclohexanol hydrate] on corrosion inhibition of mild steel in acidic media

Author(s): Prabhu, R. A.; Shanbhag, A. V.; Venkatesha, T. V.

Source: JOURNAL OF APPLIED ELECTROCHEMISTRY Volume: 37 Issue: 4 Pages: 491-497 DOI: 10.1007/s10800-006-9280-2 Published: APR 2007

.53 Title: [not available[

Author(s): Putilova, I.N.; Balizin, S.A.; Baranmik, V.P.

Source: Metallic Corrosion Inhibitors Published: 1960

Publisher: Pergmann Press, London

.54 Title: Natural products as corrosion inhibitor for metals in corrosive media - A review

Author(s): Raja, Pandian Bothi; Sethuraman, Mathur Gopalakrishnan

Source: MATERIALS LETTERS Volume: 62 Issue: 1 Pages: 113-116 DOI: 10.1016/j.matlet.2007.04.079 Published: JAN 15 2008

.55 Title: [not available[

Author(s): Revie, R. W.

Source: UHLIGS CORROSION HDB Published: 2000

Publisher: Wiley, New York

.56 Title: Critique of inhibitor evaluation by polarization measurement

Author(s): Roy, S.C.; Roy, S.K.; Sircar, S.C.

Source: Br. Corro. J Volume: 32 Pages: 102-104 Published: 1988

.57 Title: THE PROTECTIVE ACTION OF EPOXY-RESINS AND CURING AGENTS - INHIBITIVE EFFECTS ON THE AQUEOUS ACID CORROSION OF IRON AND STEEL

Author(s): SCHWEINSBERG, DP; GEORGE, GA; NANAYAKKARA, AK; et al.

Source: CORROSION SCIENCE Volume: 28 Issue: 1 Pages: 33-42 Abstract Number: A1988-045244 Published: 1988

.58 Title: Corrosion Inhibition and Adsorption Properties of N-Phenylhydrazine-1,2-Dicarbothioamide on Mild Steel in Hydrochloric Acid

Author(s): Shukla, Sudhish Kumar; Singh, Ashish Kumar; Quraishi, M. A.

Source: INTERNATIONAL JOURNAL OF ELECTROCHEMICAL SCIENCE Volume: 6 Issue: 11 Pages: 5779-5791 Published: NOV 2011

.59 Title: Cefalexin drug: A new and efficient corrosion inhibitor for mild steel in hydrochloric acid solution

Author(s): Shukla, Sudhish Kumar; Quraishi, M. A.

Source: MATERIALS CHEMISTRY AND PHYSICS Volume: 120 Issue: 1 Pages: 142-147 DOI: 10.1016/j.matchemphys.2009.10.037 Published: MAR 15 2010

.60 Title: [not available[

Author(s): Stoynov, Z.B.; Grafov, B.M.; Savova-Stoynova, B.; et al; Elkin, V.V.
Source: Electrochemical Impedance Published: 1991
Publisher: Nauka, Moscow

Role of some pyrazol-5-one derivatives as corrosion inhibitors for 316L stainless steel in 1 M HCl

Fouda, AS (Fouda, A. S.)[1]; El-Ewady, GY (El-Ewady, G. Y.)[1]; Fathy, S (Fathy, S.)[1]

Abstract:
The effect of novel, pyrazolone derivatives, namely, (Z)-3-methyl-4-(2-m-tolylhydrazono)-1H-pyrazol-5(4H)-compound A, (Z)-4-(2-(3-methoxyphenyl)hydrazono)-3-methyl-1H-pyrazol-5(4H)-compound B, and (Z)-3-methyl-4-(2-(3-nitrophenyl) hydrazono)-1H-pyrazol-5 (4H)-compound C as corrosion inhibitors of 316L stainless steel (SS) in 1M HCl has been investigated by using weight loss, potentiodynamic polarization, electrochemical impedance spectroscopy (EIS), and electrical frequency modulation (EFM) techniques. Polarization data clearly indicated that the pyrazol-5-one derivatives behave as mixed type inhibitors. The effect of temperature on corrosion inhibition has been studied and the thermodynamic activation and adsorption parameters were calculated and discussed. EIS was used to investigate the mechanism of corrosion inhibition. EFM can be used as a rapid and nondestructive technique for corrosion rate measurements without prior knowledge of Tafel constants. The adsorption of compounds on 316L SS was found to obey Temkin adsorption isotherm.
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Author Keywords: 316L SS; HCl; EFM; EIS; Pyrazol-5-one derivatives

KeyWords Plus: MILD-STEEL; ACID-MEDIA; SPECTROSCOPY; TRIAZOLES

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Research Areas: Engineering; Water Resources

IDS Number: 097RO

References:

1. Title: Assessment of EFM as a new nondestructive technique for monitoring the corrosion inhibition of low chromium alloy steel in 0.5 M HCl by tyrosine

Author(s): Amin, Mohammed A.; Abd El Rehim, Sayed S.; El-Naggar, M. M.; et al.

Source: JOURNAL OF MATERIALS SCIENCE Volume: 44 Issue: 23 Pages: 6258-6272 DOI: 10.1007/s10853-009-3856-2 Published: DEC 2009

2. Title: [not available]

Author(s): Atia; Saleh, M.M.

Source: J. Appl. Electrochem. Volume: 33 Issue: 2 Pages: 171-177 Published: 2003

3. Title: The secondary passive film for type 304 stainless steel in 0.5 M H2SO4

Author(s): Atrens, A; Baroux, B; Mantel, M

Source: JOURNAL OF THE ELECTROCHEMICAL SOCIETY Volume: 144 Issue: 11 Pages: 3697-3704 DOI: 10.1149/1.1838078 Abstract Number: A1998-02-8160B-040 Published: NOV 1997

4. Title: Electrochemical frequency modulation: A new electrochemical technique for online corrosion monitoring

Author(s): Bosch, RW; Hubrecht, J; Bogaerts, WF; et al.

Source: CORROSION Volume: 57 Issue: 1 Pages: 60-70 Abstract Number: A2001-11-8280-006 Published: JAN 2001

5. Title: DOUBLE-LAYER CAPACITANCE OF IRON AND CORROSION INHIBITION WITH POLYMETHYLENE DIAMINES

Author(s): MCCAFFER.E; HACKERMA.N

Source: JOURNAL OF THE ELECTROCHEMICAL SOCIETY Volume: 119 Issue: 2 Pages: 146-& DOI: 10.1149/1.2404150 Published: 1972

6. Title: [not available]

Author(s): Dillon, C.D.

Source: Performance Volume: 33 Pages: 62-64 Published: 1994

7. Title: THEORY OF ORGANIC CORROSION INHIBITORS - ADSORPTION AND LINEAR FREE ENERGY RELATIONSHIPS

Author(s): DONAHUE, FM; NOBE, K

Source: JOURNAL OF THE ELECTROCHEMICAL SOCIETY Volume: 112 Issue: 9 Pages: 886-& DOI: 10.1149/1.2423723 Published: 1965

8. Title: Studies on the effect of a newly synthesized Schiff base compound from phenazone and vanillin on the corrosion of steel in 2 M HCI

Author(s): Emeregul, K.C.; Hayvali, M.

Source: Corros. Sci. Volume: 48 Pages: 797-812 Published: 2006

9. Title: [not available]

Author(s): Fadda; Zaki, M.E.A.; Samir, Kh.; et al; Amsr, F.A.

Source: Khim. Geterotsiki Soedin Volume: 9 Pages: 1413-1419 Published: 2003

10. Title: [not available]

Author(s): Fouda, A.S.; Elewady, G.Y.; El-Askalani, A.; et al; Shalaby, K.

Source: Zastita Materijala Volume: 51 Issue: 4 Pages: 205-219 Published: 2010

11. Title: [not available]

Author(s): Huilong, W.; Jiashen, Z.; Jing, L.

Source: Anti-Corros. Meth. Mater Volume: 9 Issue: 2 Pages: 127-132 Published: 2002

12. Title: [not available]

Author(s): Jones, D.A.

Source: Principles and Prevention of Corrosion Published: 1983

Publisher: Prentice Hall, Upper Saddle River, NJ

13. Title: Acid corrosion inhibition of nickel by 2-(triphenosphoranylidene) succinic anhydride

Author(s): Kamis, E.; Bellucci, F.; Latanision, R.M.; et al; El-Ashry, E.S.H.

Source: Corrosion Volume: 47 Pages: 677-686 Published: 1991

14. Title: Cr(VI) and Ce(III) inhibition of oxygen reduction on copper

Author(s): Kendig, M; Jeanjaquet, S

Source: JOURNAL OF THE ELECTROCHEMICAL SOCIETY Volume: 149 Issue: 2 Pages: B47-B51 DOI: 10.1149/1.1430717 Abstract Number: A2002-06-8160B-009 Published: FEB 2002

15. Title: Molecular simulation, quantum chemical calculations and electrochemical studies for inhibition of mild steel by triazoles

Author(s): Khaled, K. F.

Source: ELECTROCHIMICA ACTA Volume: 53 Issue: 9 Pages: 3484-3492 DOI: 10.1016/j.electacta.2007.12.030 Published: MAR 20 2008

16. Title: New synthesized guanidine derivative as a green corrosion inhibitor for mild steel in acidic solutions

Author(s): Khaled, K. F.

Source: INTERNATIONAL JOURNAL OF ELECTROCHEMICAL SCIENCE Volume: 3 Issue: 4 Pages: 462-475 Published: APR 2008

17. Title: Enhanced corrosion resistance of mild steel in normal sulfuric acid medium by 2,5-bis(n-thienyl)-1,3,4-thiadiazoles: Electrochemical, X-ray photoelectron spectroscopy and theoretical studies

Author(s): Lebrini, M.; Lagrenee, A.; Traisnel, A.; et al.

Source: APPLIED SURFACE SCIENCE Volume: 253 Issue: 23 Pages: 9267-9276 DOI: 10.1016/j.apsusc.2007.05.062 Published: SEP 30 2007

18. Title: ELECTROCHEMICAL IMPEDANCE SPECTROSCOPY (EIS) AS A NEW TOOL FOR INVESTIGATING METHODS OF CORROSION PROTECTION

Author(s): MANSFELD, F

Source: ELECTROCHIMICA ACTA Volume: 35 Issue: 10 Pages: 1533-1544 DOI: 10.1016/0013-4686(90)80007-B Published: OCT 1990

19. Title: RECORDING AND ANALYSIS OF AC IMPEDANCE DATA FOR CORROSION STUDIES .2. EXPERIMENTAL APPROACH AND RESULTS

Author(s): MANSFELD, F; KENDIG, MW; TSAI, S

Source: CORROSION Volume: 38 Issue: 11 Pages: 570-580 Abstract Number: A1983-019469 Published: 1982

20. Title: A nonlinear kinetic model introduced for the corrosion inhibitive properties of some organic inhibitors

Author(s): Martinez, S; Metikos-Hukovic, M

Source: JOURNAL OF APPLIED ELECTROCHEMISTRY Volume: 33 Issue: 12 Pages: 1137-1142 DOI: 10.1023/B:JACH.0000003851.82985.5e Abstract Number: A2004-16-8160B-039 Published: DEC 2003

21. Title: Effect of metallic cations on corrosion inhibition of an anionic surfactant for mild steel

Author(s): Mu, GN; Zhao, TP; Liu, M; et al.

Source: CORROSION Volume: 52 Issue: 11 Pages: 853-856 Published: NOV 1996

22. Title: [not available]

Author(s): O'MBockris, I.; Swinkles, D.A.

Source: J. Electrochem. Soc. Volume: 111 Pages: 736-742 Published: 1964

Times Cited: 1 (from All Databases)

23. Title: Studies on the inhibitive effect of Occimum viridis extract on the acid corrosion of mild steel

Author(s): Oguzie, Emeka E.

Source: MATERIALS CHEMISTRY AND PHYSICS Volume: 99 Issue: 2-3 Pages: 441-446 DOI: 10.1016/j.matchemphys.2005.11.018 Published: OCT 10 2006

24. Title: AC and DC study of the temperature effect on mild steel corrosion in acid media in the presence of benzimidazole derivatives

Author(s): Popova, A; Sokolova, E; Raicheva, S; et al.

Source: CORROSION SCIENCE Volume: 45 Issue: 1 Pages: 33-58 Article Number: PII S0010-938X(02)00072-0 DOI: 10.1016/S0010-938X(02)00072-0 Published: JAN 2003

25. Title: [not available]

Author(s): Said, M.T.; Ali, S.A.; Rahman, S.U.

Source: Anti-Corros. Meth. Mater. Volume: 50 Issue: 3 Pages: 201-207 Published: 2003

26. Title: [not available]

Author(s): Shin, H.; Mansfeld, H.

Source: Corros. Sci. Volume: 29 Pages: 1235-1246 Published: 1989

27. Title: Inhibitive effect of diethylcarbamazine on the corrosion of mild steel in hydrochloric acid

Author(s): Singh, Ashish Kumar; Quraishi, M. A.

Source: CORROSION SCIENCE Volume: 52 Issue: 4 Pages: 1529-1535 DOI: 10.1016/j.corsci.2009.12.011 Published: APR 2010

28. Title: The effect of triazoles and surfactants on the corrosion inhibition of carbon steel in acid solution

Author(s): Tamilselvi, S; Rajeswari, S

Source: ANTI-CORROSION METHODS AND MATERIALS Volume: 50 Issue: 3 Pages: 223-231 DOI: 10.1108/00035590310471804 Published: 2003

29. Title: [not available]

Author(s): Tawfik, H.

Source: Evaluation of the inhibition role for some organic compounds in controlling the corrosion of some alloys used in water circuits of steem power plants Published: 2008

Publisher: Ain Shams University, Egypt

30. Title: [not available]

Author(s): Wang, W.P.; Casta, D.; Marcus, P.

Source: J. Electrochem. Soc. Volume: 141 Pages: 2669-2671 Published: 1994

31. Title: A PITTING MECHANISM FOR PASSIVE 304 STAINLESS-STEEL IN SULFURIC-ACID MEDIA CONTAINING CHLORIDE-IONS

Author(s): ZHANG, PQ; WU, JX; ZHANG, WQ; et al.

Source: CORROSION SCIENCE Volume: 34 Issue: 8 Pages: 1343-& DOI: 10.1016/0010-938X(93)90091-T Abstract Number: A1993-20-8160B-012 Published: AUG 1993

Corrosion Inhibition of Carbon Steel in 0.5 M HCl Solution Using Cationic Surfactants

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Abd El-Aziz, HK (Abd El-Aziz, H. K.)[1];
Ahmed, AM (Ahmed, A. M.)[2]

Abstract

The corrosion inhibition effect of cationic surfactants, namely: cetyl trimethyl ammonium bromide: CTAB and dodecyl trimethyl ammonium chloride: DTAC, have been used as corrosion inhibitors for C-steel in 0.5 M HCl. The inhibition efficiencies of the tested surfactants were depended on the hydrophobic chain length and the used doses of the surfactants. The results showed that the order of inhibition efficiency is CTAB > DTAC. Polarization measurements showed these surfactants are acting as mixed inhibitors for both anodic and cathodic reactions. Adsorption of these surfactants was found to follow the Langmuir's adsorption isotherm. Mixed physical and chemical adsorption mechanism is proposed. The density function theory (DFT) was used to study the structural properties of the surfactants. Inhibition efficiency values obtained from weight loss, potentiodynamic polarization, electrochemical impedance spectroscopy (IES) and electrochemical frequency modulation (EFM) are consistent.

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Research Areas: Electrochemistry

Refrences:

1-Title: Corrosion inhibition of aluminum by 1,1(lauryl amido)propyl ammonium chloride in HCl solution

Author(s): Abd El Rehim, SS; Hassan, HH; Amin, MA

Source: MATERIALS CHEMISTRY AND PHYSICS Volume: 70 Issue: 1 Pages: 64-72 DOI: 10.1016/S0254-0584(00)00468-5 Published: APR 2 2001

2. Title: Reactivity of polyester aliphatic amine surfactants as corrosion inhibitors for carbon steel in formation water (deep well water)

Author(s): Alsabagh, AM; Migahed, MA; Awad, HS

Source: CORROSION SCIENCE Volume: 48 Issue: 4 Pages: 813-828 DOI: 10.1016/j.corsci.2005.04.009 Published: APR 2006

3. Title: [not available]

Author(s): Amin, A.A.

Source: <IT>J Appl Electrochem</IT> Volume: 36 Pages: 215 Published: 2006

4. Title: [not available]

Author(s): Andreev, N.N.; Kuznetsov, Y.I.

Source: paper No. 214 Published: 1996

Publisher: Corrosion (NACE) International, Houston

5. Title: Electrochemical effect of cationic gemini surfactant and halide salts on corrosion inhibition of low carbon steel in acid medium

Author(s): Asefi, Dourna; Arami, Mokhtar; Mahmoodi, Niyaz Mohammad

Source: CORROSION SCIENCE Volume: 52 Issue: 3 Pages: 794-800 DOI: 10.1016/j.corsci.2009.10.039 Published: MAR 2010

6. Title: Copper corrosion inhibition by triphenylmethane derivatives in sulphuric acid media

Author(s): Bastidas, JM; Pinilla, P; Cano, E; et al.

Source: CORROSION SCIENCE Volume: 45 Issue: 2 Pages: 427-449 Article Number: PII S0010-938X(02)00123-3 DOI: 10.1016/S0010-938X(02)00123-3 Published: FEB 2003

7. Title: Substitutional inhibition mechanism of mild steel hydrochloric acid corrosion by hexylamine and dodecylamine

Author(s): Bastidas, JM; Polo, JL; Cano, E

Source: JOURNAL OF APPLIED ELECTROCHEMISTRY Volume: 30 Issue: 10 Pages: 1173-1177 DOI: 10.1023/A:1004036430497 Published: OCT 2000

8. Title: Tributylamine as corrosion inhibitor for mild steel in hydrochloric acid

Author(s): Bastidas, JM; Polo, JL; Cano, E; et al.

Source: JOURNAL OF MATERIALS SCIENCE Volume: 35 Issue: 11 Pages: 2637-2642 DOI: 10.1023/A:1004773903987 Published: JUN 2000

9. Title: [not available]

Author(s): Biabarac, M.; Branzoi, F.; Branzoi, V.

Source: <IT>Mater. Chem. Phys.</IT> Volume: 65 Pages: 294 Published: 2000

10. Title: [not available]

Author(s): Blakset, T.J.; Queen, D.; Ridd, B.

Source: Corrosion, NACE, Paper No (78) Published: 1998

11. Title: The behaviour of copper anodes in aqueous thiourea-containing sulphuric acid solutions. Open circuit potentials and electrochemical kinetics

Author(s): Bolzan, AE; Wakenge, IB; Piatti, RCV; et al.

Source: JOURNAL OF ELECTROANALYTICAL CHEMISTRY Volume: 501 Issue: 1-2 Pages: 241-252 DOI: 10.1016/S0022-0728(00)00535-0 Published: MAR 23 2001

12. Title: Electrochemical frequency modulation: A new electrochemical technique for online corrosion monitoring

Author(s): Bosch, RW; Hubrecht, J; Bogaerts, WF; et al.

Source: CORROSION Volume: 57 Issue: 1 Pages: 60-70 Abstract Number: A2001-11-8280-006 Published: JAN 2001

13. Title: [not available]

Author(s): Branzoi, V.; Golgovici, F.; Branzoi, F.

Source: Mater. Chem. and Phys. Volume: 78 Pages: 122 Published: 2002

14. Title: [not available]

Author(s): Buchheit, R. G.; Shoesmith, D. W.; Kelly, R. G.; et al; Scully, J. R.

Source: Electrochemical Techniques in Corrosion Science and Engineering Pages: 148 Published: 2002

Publisher: Marcel Dekker, Inc., New York

15. Title: [not available]

Author(s): Cao, C. N.

Source: Corrosion Electrochemistery Mechanism Pages: 325 Published: 2004

Publisher: Chemical Industrial Engineering Press, Beijing

16. Title: From molecules to solids with the DMol(3) approach

Author(s): Delley, B

Source: JOURNAL OF CHEMICAL PHYSICS Volume: 113 Issue: 18 Pages: 7756-7764 Article Number: PII [S0021-9606(00)30342-7] DOI: 10.1063/1.1316015 Abstract Number: A2000-23-7115M-002 Published: NOV 8 2000

17. Title: AN ALL-ELECTRON NUMERICAL-METHOD FOR SOLVING THE LOCAL DENSITY FUNCTIONAL FOR POLYATOMIC-MOLECULES

Author(s): DELLEY, B

Source: JOURNAL OF CHEMICAL PHYSICS Volume: 92 Issue: 1 Pages: 508-517 DOI: 10.1063/1.458452 Abstract Number: A1990-052052 Published: JAN 1 1990

18. Title: THEORY OF ORGANIC CORROSION INHIBITORS - ADSORPTION AND LINEAR FREE ENERGY RELATIONSHIPS

Author(s): DONAHUE, FM; NOBE, K

Source: JOURNAL OF THE ELECTROCHEMICAL SOCIETY Volume: 112 Issue: 9 Pages: 886-& DOI: 10.1149/1.2423723 Published: 1965

19. Title: Pitting inhibition of stainless steel by surfactants: an electrochemical and surface chemical approach

Author(s): Wei, ZQ; Duby, P; Somasundaran, P

Source: JOURNAL OF COLLOID AND INTERFACE SCIENCE Volume: 259 Issue: 1 Pages: 97-102 DOI: 10.1016/S0021-9797(03)00025-0 Published: MAR 1 2003

20. Title: [not available]

Author(s): Miller, C.A.; Qutubuddin, S.

Editor(s): Eick, H.F.; Parfitt, C.D.

Source: SURFACTANT SCI SERIE Volume: 21 Pages: 166 Published: 1987

Publisher: Markel Dekker Inc, New York, Basel

21. Title: [not available]

Author(s): El Rehim, S.S. Abd; Hassan, H.H.; Amin, M.A.

Source: Mater. Chem. Phys. Volume: 78 Pages: 337-348 Published: 2003

22. Title: Synthesis of some cationic gemini surfactants and their inhibitive effect on iron corrosion in hydrochloric acid medium

Author(s): El Achouri, M; Infante, MR; Izquierdo, F; et al.

Source: CORROSION SCIENCE Volume: 43 Issue: 1 Pages: 19-35 DOI: 10.1016/S0010-938X(00)00063-9 Published: JAN 2001

23. Title: SOME SURFACTANTS IN THE SERIES OF 2-(ALKYLDIMETHYLAMMONIO) ALKANOL BROMIDES AS INHIBITORS OF THE CORROSION OF IRON IN ACID CHLORIDE SOLUTION

Author(s): ELACHOURI, M; HAJJI, MS; KERTIT, S; et al.

Source: CORROSION SCIENCE Volume: 37 Issue: 3 Pages: 381-389 DOI: 10.1016/0010-938X(94)00134-R Published: MAR 1995

24. Title: Corrosion inhibition of iron in 1 M HCl by some gemini surfactants in the series of alkanediyl-alpha,omega-bis-(dimethyl tetradecyl ammonium bromide)

Author(s): El Achouri, M; Kertit, S; Gouttaya, HM; et al.

Source: PROGRESS IN ORGANIC COATINGS Volume: 43 Issue: 4 Pages: 267-273 Article Number: PII S0300-9440(01)00208-9 DOI: 10.1016/S0300-9440(01)00208-9 Published: DEC 2001

25. Title: [not available]

Author(s): El-Ziady, M.A.; Soror, T.Y.

Source: <IT>Mater. Chem. Phys.</IT> Volume: 77 Pages: 702 Published: 2002

26. Title: Adsorption of alkyltrimethylammonium bromides on negatively charged alumina

Author(s): Fan, AX; Somasundaran, P; Turro, NJ

Source: LANGMUIR Volume: 13 Issue: 3 Pages: 506-510 DOI: 10.1021/la9607215 Published: FEB 5 1997

27. Title: A effect of sodium dodecylsulfate on the corrosion of copper in sulphuric acid media

Author(s): Fuchs-Godec, R; Dolecek, V

Source: COLLOIDS AND SURFACES A-PHYSICOCHEMICAL AND ENGINEERING ASPECTS Volume: 244 Issue: 1-3 Pages: 73-76 DOI: 10.1016/j.colsurfa.2004.05.015 Published: SEP 6 2004

28. Title: The adsorption of surfactants at solid/water interfaces

Author(s): Fuerstenau, DW.

Editor(s): Hair, ML.

Source: The chemistry of biosurfaces Pages: 143 Published: 1971

Publisher: Marcel Dekker, New York

29. Title: [not available]

Author(s): Grepy, G.; Mehaute, A. H.

Source: <IT>Solid State Ionics</IT> Volume: 9-10 Pages: 17 Published: 1983

30. Title: TIME-RESOLVED IMPEDANCE SPECTROSCOPY OF MILD-STEEL IN CONCENTRATED HYDROCHLORIC-ACID

Author(s): GROWCOCK, FB; JASINSKI, RJ

Source: JOURNAL OF THE ELECTROCHEMICAL SOCIETY Volume: 136 Issue: 8 Pages: 2310-2314 DOI: 10.1149/1.2097847 Published: AUG 1989

31. Title: Effects of SDS and some alcohols on the inhibition efficiency of corrosion for nickel

Author(s): Guo, R; Liu, TQ; Wei, X

Source: COLLOIDS AND SURFACES A-PHYSICOCHEMICAL AND ENGINEERING ASPECTS Volume: 209 Issue: 1 Pages: 37-45 Article Number: PII S0927-7757(02)00032-8 DOI: 10.1016/S0927-7757(02)00032-8 Published: SEP 4 2002

32. Title: EFFECT OF N-ALKYLBETAINES ON THE CORROSION OF IRON IN 1-M HCI SOLUTION

Author(s): HAJJAJI, N; RICO, I; SRHIRI, A; et al.

Source: CORROSION Volume: 49 Issue: 4 Pages: 326-334 Abstract Number: A1994-11-8160B-042 Published: APR 1993

33. Title: New cationic surfactant as corrosion inhibitor for mild steel in hydrochloric acid solutions

Author(s): Hamid, ZA; Soror, TY; El-Dahan, HA; et al.

Source: ANTI-CORROSION METHODS AND MATERIALS Volume: 45 Issue: 5 Pages: 306-+ DOI: 10.1108/00035599810234605 Published: 1998

34. Title: A novel Schiff base-based cationic gemini surfactants: Synthesis and effect on corrosion inhibition of carbon steel in hydrochloric acid solution

Author(s): Hegazy, M. A.

Source: CORROSION SCIENCE Volume: 51 Issue: 11 Pages: 2610-2618 DOI: 10.1016/j.corsci.2009.06.046 Published: NOV 2009

35. Title: Technical note: Concerning the conversion of the constant phase element parameter Y-0 into a capacitance

Author(s): Hsu, CH; Mansfeld, F

Source: CORROSION Volume: 57 Issue: 9 Pages: 747-748 Published: SEP 2001

36. Title: The inhibition of benzimidazole derivatives on corrosion of iron in 1 M HCl solutions

Author(s): Khaled, KF

Source: ELECTROCHIMICA ACTA Volume: 48 Issue: 17 Pages: 2493-2503 DOI: 10.1016/S0013-4686(03)00291-3 Published: JUL 15 2003

37. Title: ACID CORROSION INHIBITION OF NICKEL BY 2-(TRIPHENOSPHORANYLIDENE) SUCCINIC ANHYDRIDE

Author(s): KHAMIS, E; BELLUCCI, F; LATANISION, RM; et al.

Source: CORROSION Volume: 47 Issue: 9 Pages: 677-686 Abstract Number: A1992-21-8160B-023 Published: SEP 1991

38. Title: ADSORPTION OF CATIONIC AND ANIONIC SURFACTANTS ON CHARGED METAL-OXIDE SURFACES

Author(s): KOOPAL, LK; LEE, EM; BOHMER, MR

Source: JOURNAL OF COLLOID AND INTERFACE SCIENCE Volume: 170 Issue: 1 Pages: 85-97 DOI: 10.1006/jcis.1995.1075 Published: MAR 1 1995

39. Title: Enhanced corrosion resistance of mild steel in normal sulfuric acid medium by 2,5-bis(n-thienyl)-1,3,4-thiadiazoles: Electrochemical, X-ray photoelectron spectroscopy and theoretical studies

Author(s): Lebrini, M.; Lagrenee, A.; Traisnel, A.; et al.

Source: APPLIED SURFACE SCIENCE Volume: 253 Issue: 23 Pages: 9267-9276 DOI: 10.1016/j.apsusc.2007.05.062 Published: SEP 30 2007

40. Title: Inhibitors performance in CO2 corrosion EIS studies on the interaction between their molecular structure and steel microstructure

Author(s): Lopez, DA; Simison, SN; de Sanchez, SR

Conference: 54th Annual Meeting of the International-Society-of-Electrochemistry Location: Sao Pedro, BRAZIL Date: AUG 31-SEP 05, 2003

Sponsor(s): Int Soc Electrochem

Source: CORROSION SCIENCE Volume: 47 Issue: 3 Pages: 735-755 DOI: 10.1016/j.corsci.2004.07.010 Abstract Number: A2005-21-8160B-051 Published: MAR 2005

41. Title: Inhibition of mild steel corrosion by sodium dodecyl benzene sulfonate and sodium oleate in acidic solutions

Author(s): Luo, H; Guan, YC; Han, KN

Source: CORROSION Volume: 54 Issue: 8 Pages: 619-627 Abstract Number: A1998-22-8160B-040 Published: AUG 1998

42. Title: Impedance spectroscopic study of corrosion inhibition of copper by surfactants in the acidic solutions

Author(s): Ma, HY; Chen, SH; Yin, BS; et al.

Source: CORROSION SCIENCE Volume: 45 Issue: 5 Pages: 867-882 Article Number: PII S0010-938X(02)00175-0 DOI: 10.1016/S0010-938X(02)00175-0 Published: MAY 2003

43. Title: Inhibition effect of some surface active agents on dissolution of copper in nitric acid

Author(s): Maayta, AK; Bitar, MB; Al-Abdallah, MM

Source: BRITISH CORROSION JOURNAL Volume: 36 Issue: 2 Pages: 133-135 DOI: 10.1179/000705901101501569 Published: 2001

44. Title: Inhibition of acidic corrosion of pure aluminum by some organic compounds

Author(s): Maayta, AK; Al-Rawashdeh, NAF

Source: CORROSION SCIENCE Volume: 46 Issue: 5 Pages: 1129-1140 DOI: 10.1016/j.corsci.2003.09.009 Abstract Number: A2004-21-8160B-006 Published: MAY 2004

45. Title: Corrosion study of PVD coatings and conductive polymer deposited on mild steel 14 Part I: Polypyrrole

Author(s): Machnikova, E.; Puderova, M.; Bazzaoui, M.; et al.

Source: SURFACE & COATINGS TECHNOLOGY Volume: 202 Issue: 8 Pages: 1543-1550 DOI: 10.1016/j.surfcoat.2007.07.006 Published: JAN 15 2008

46. Title: [not available]

Author(s): Madzarac, M.; Gazivoda, A.; Stipnisek-Lisac, E.

Source: <IT>Electrochim. Acta</IT> Volume: 47 Pages: 4189-4194 Published: 2002

47. Title: Electrochemical investigation of the corrosion behaviour of mild steel in 2 M HCl solution in presence of 1-dodecyl-4-methoxy pyridinium bromide

Author(s): Migahed, MA

Source: MATERIALS CHEMISTRY AND PHYSICS Volume: 93 Issue: 1 Pages: 48-53 DOI: 10.1016/j.matchemphys.2005.02.003 Published: SEP 15 2005

48. Title: Corrosion inhibition of mild steel in 1 M sulfuric acid solution using anionic surfactant

Author(s): Migahed, MA; Azzam, EMS; Al-Sabagh, AM

Source: MATERIALS CHEMISTRY AND PHYSICS Volume: 85 Issue: 2-3 Pages: 273-279 DOI: 10.1016/j.matchemphys.2003.12.027 Abstract Number: A2004-21-8160B-051 Published: JUN 15 2004

49. Title: ELECTRONIC POPULATION ANALYSIS ON LCAO-MO MOLECULAR WAVE FUNCTIONS .1.

Author(s): MULLIKEN, RS

Source: JOURNAL OF CHEMICAL PHYSICS Volume: 23 Issue: 10 Pages: 1833-1840 DOI: 10.1063/1.1740588 Abstract Number: A1956-01450 Published: 1955

50. Title: Electrochemical and XPS studies of decylamides of alpha-amino acids adsorption on carbon steel in acidic environment

Author(s): Olivares, O; Likhanova, NV; Gomez, B; et al.

Source: APPLIED SURFACE SCIENCE Volume: 252 Issue: 8 Pages: 2894-2909 DOI: 10.1016/j.apsusc.2005.04.040 Published: FEB 15 2006

51. Title: [not available]

Author(s): Onuchukwu, A.I.; Onuoha, G.N.; Oguzie, E.E.

Source: <IT>Mater. Chem. Phys.</IT> Volume: 89 Pages: 305 Published: 2004

52. Title: Corrosion inhibition of benzyl triethanol ammonium chloride and its ethoxylate on steel in sulphuric acid solution

Author(s): Osman, MM; Omar, AMA; AlSabagh, AM

Source: MATERIALS CHEMISTRY AND PHYSICS Volume: 50 Issue: 3 Pages: 271-274 DOI: 10.1016/S0254-0584(97)01941-X Abstract Number: A1998-01-8160B-047 Published: OCT 15 1997

53. Title: ABSOLUTE HARDNESS - COMPANION PARAMETER TO ABSOLUTE ELECTRONEGATIVITY

Author(s): PARR, RG; PEARSON, RG

Source: JOURNAL OF THE AMERICAN CHEMICAL SOCIETY Volume: 105 Issue: 26 Pages: 7512-7516 DOI: 10.1021/ja00364a005 Abstract Number: A1984-059659 Published: 1983

54. Title: ELECTRONEGATIVITY - DENSITY FUNCTIONAL VIEWPOINT

Author(s): PARR, RG; DONNELLY, RA; LEVY, M; et al.

Source: JOURNAL OF CHEMICAL PHYSICS Volume: 68 Issue: 8 Pages: 3801-3807 DOI: 10.1063/1.436185 Abstract Number: A1978-066485 Published: 1978

55. Title: ABSOLUTE ELECTRONEGATIVITY AND HARDNESS - APPLICATION TO INORGANIC-CHEMISTRY

Author(s): PEARSON, RG

Source: INORGANIC CHEMISTRY Volume: 27 Issue: 4 Pages: 734-740 DOI: 10.1021/ic00277a030 Published: FEB 24 1988

56. Title: HARD AND SOFT ACIDS AND BASES

Author(s): PEARSON, RG

Source: JOURNAL OF THE AMERICAN CHEMICAL SOCIETY Volume: 85 Issue: 22 Pages: 3533-& DOI: 10.1021/ja00905a001 Published: 1963

57. Title: AC and DC study of the temperature effect on mild steel corrosion in acid media in the presence of benzimidazole derivatives

Author(s): Popova, A; Sokolova, E; Raicheva, S; et al.

Source: CORROSION SCIENCE Volume: 45 Issue: 1 Pages: 33-58 Article Number: PII S0010-938X(02)00072-0 DOI: 10.1016/S0010-938X(02)00072-0 Published: JAN 2003

58. Title: Synergistic effect between cationic gemini surfactant and chloride ion for the corrosion inhibition of steel in sulphuric acid

Author(s): Qiu, Ling-Guang; Wu, Yun; Wang, Yi-Min; et al.

Source: CORROSION SCIENCE Volume: 50 Issue: 2 Pages: 576-582 DOI: 10.1016/j.corsci.2007.07.010 Published: FEB 2008

59. Title: The adsorption and corrosion inhibition of some cationic gemini surfactants on carbon steel surface in hydrochloric acid

Author(s): Qiu, LG; Xie, AH; Shen, YH

Source: CORROSION SCIENCE Volume: 47 Issue: 1 Pages: 273-278 DOI: 10.1016/j.corsci.2004.05.009 Published: JAN 2005

60. Title: [not available]

Author(s): Quraishi, M.A.; Singh, A.K.

Source: <IT>Corros. Sci.</IT> Volume: 52 Pages: 1378 Published: 2010

61. Title: THE INFLUENCE OF SURFACE-ROUGHNESS ON THE IMPEDANCE DATA FOR IRON ELECTRODES IN ACID-SOLUTIONS

Author(s): RAMMELT, U; REINHARD, G

Source: CORROSION SCIENCE Volume: 27 Issue: 4 Pages: 373-382 DOI: 10.1016/0010-938X(87)90079-5 Abstract Number: A1987-086401 Published: 1987

62. Title: The inhibition effects of some cyclic nitrogen compounds on the corrosion of the steel in NaCl mediums

Author(s): Sahin, M; Bilgic, S; Yilmaz, H

Source: APPLIED SURFACE SCIENCE Volume: 195 Issue: 1-4 Pages: 1-7 Article Number: PII S0169-4332(01)00783-8 DOI: 10.1016/S0169-4332(01)00783-8 Abstract Number: A2002-23-8160B-038 Published: JUL 15 2002

63. Title: Effects of structure of the ionic head of cationic surfactant on its inhibition of acid corrosion of mild steel

Author(s): Saleh, Mahmoud M.; Atia, Asem A.

Source: JOURNAL OF APPLIED ELECTROCHEMISTRY Volume: 36 Issue: 8 Pages: 899-905 DOI: 10.1007/s10800-006-9147-6 Published: AUG 2006

64. Title: Molecular orbital theoretical studies of some organic corrosion inhibitors

Author(s): Sastri, VS; Perumareddi, JR

Source: CORROSION Volume: 53 Issue: 8 Pages: 617-622 Published: AUG 1997

65. Title: Surfactants in process engineering, New York, particulate/solution/gas systems

Author(s): Shah, D.O.; Wasan, D.T.; Ginn, M.

Source: AIChE Symposium Series Volume: 71 Pages: 124 Published: 1975

66. Title: [not available]

Editor(s): Somasundaran, P; Grieves, RB.

Source: Advances in interfacial phenomena Published: 1988

Publisher: Marcel Dekker

67. Title: [not available]

Author(s): Tomson, M.B.; Oddo, J.E.

Source: <IT>J. Pet. Tech.</IT> Pages: 1583 Published: 1982

68. Title: ADSORPTION OF ORGANIC-SUBSTANCES AT ELECTRODES - RECENT ADVANCES

Author(s): TRASATTI, S

Conference: 5TH INTERNATIONAL FISCHER SYMP ON ADSORBATES, INTERMEDIATES AND INHIBITORS Location: UNIV KARLSRUHE, KARLSRUHE, GERMANY Date: JUN 16-20, 1991

Sponsor(s): DEUT FORSCHUNGSGEMEINSCH; STATE BADEN WURTTEMBERG; BADISCHE LANDESBAUSPARKASSE KARLSRUHE; GIULINI; SCHLUMBERGER TECHNOL MUNCHEN

Source: ELECTROCHIMICA ACTA Volume: 37 Issue: 12 Pages: 2137-2144 DOI: 10.1016/0013-4686(92)85104-S Published: SEP 1992

69. Title: Effect of sodium dodecylsulfate on copper corrosion in sulfuric acid media in the absence and presence of benzotriazole

Author(s): Villamil, RFV; Corio, P; Rubim, JC; et al.

Source: JOURNAL OF ELECTROANALYTICAL CHEMISTRY Volume: 472 Issue: 2 Pages: 112-119 DOI: 10.1016/S0022-0728(99)00267-3 Published: AUG 30 1999

70. Title: A cationic gemini-surfactant as effective inhibitor for mild steel in HCl solutions

Author(s): Wang, Xiumei; Yang, Huaiyu; Wang, Fuhui

Source: CORROSION SCIENCE Volume: 52 Issue: 4 Pages: 1268-1276 DOI: 10.1016/j.corsci.2009.12.018 Published: APR 2010

71. Title: Corrosion inhibition of iron in 20% hydrochloric acid by 1,4/1,6-bis(alpha-octylpyridinium)butane/hexane dibromide

Author(s): Yao, Shan-Zhuo; Jiang, Xiao-Hui; Zhou, Li-Mei; et al.

Source: MATERIALS CHEMISTRY AND PHYSICS Volume: 104 Issue: 2-3 Pages: 301-305 DOI: 10.1016/j.matchemphys.2007.03.018 Published: AUG 15 2007

72. Title: Undecyl substitution in imidazole and its action on corrosion inhibition of copper in aerated acidic chloride media

Author(s): Zhang, Da-quan; Gao, Li-xin; Zhou, Guo-ding; et al.

Source: JOURNAL OF APPLIED ELECTROCHEMISTRY Volume: 38 Issue: 1 Pages: 71-76 DOI: 10.1007/s10800-007-9401-6 Published: JAN 2008

73. Title: The adsorption and corrosion inhibition of anion surfactants on aluminium surface in hydrochloric acid

Author(s): Zhao, TP; Mu, GN

Source: CORROSION SCIENCE Volume: 41 Issue: 10 Pages: 1937-1944 DOI: 10.1016/S0010-938X(99)00029-3 Published: OCT 1999

74. Title: THE INFLUENCE OF THE CHROMIUM CONTENT ON THE INHIBITIVE EFFICIENCY OF SOME ORGANIC-COMPOUNDS

Author(s): ZUCCHI, F; TRABANELLI, G; BRUNORO, G

Source: CORROSION SCIENCE Volume: 33 Issue: 7 Pages: 1135-1139 DOI: 10.1016/0010-938X(92)90167-2 Abstract Number: A1992-17-8160B-005 Published: JUL 1992

75. Title: [not available]

Author(s): [Anonymous].

Source: Gamry Echem Analyst Manual Published: 2003

76. Title: [not available]

Author(s): [Anonymous].

Source: VoltMaster 4 Manual Published: 2000

Curcumin Derivatives as Green Corrosion Inhibitors for alpha-Brass in Nitric Acid Solution

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Abstract

1,7-Bis-(4-hydroxy-3-methoxy-phenyl)-hepta-1,6-diene-4-arylazo-3,5-dione I-V have been investigated as corrosion inhibitors for alpha-brass in 2 M nitric acid solution using weight-loss and galvanostatic polarization techniques. The efficiency of the inhibitors increases with the increase in the inhibitor concentration but decreases with a rise in temperature. The conjoint effect of the curcumin derivatives and KSCN has also been studied. The apparent activation energy (E (a)*) and other thermodynamic parameters for the corrosion process have also been calculated. The galvanostatic polarization data indicated that the inhibitors were of mixed-type, but the cathode is more polarized than the anode. The slopes of the cathodic and anodic Tafel lines (b (c) and b (a)) are maintained approximately equal for various inhibitor concentrations. However, the value of the Tafel slopes increases together as inhibitor concentration increases. The adsorption of these compounds on alpha-brass surface has been found to obey the Frumkin's adsorption isotherm. The mechanism of inhibition was discussed in the light of the chemical structure of the undertaken inhibitors.

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Research Areas: Materials Science

References:

1. Title: INHIBITION OF THE CORROSION OF IRON BY OXYGEN AND NITROGEN-CONTAINING COMPOUNDS

Author(s): ALNEAMI, KK; MOHAMED, AK; KENAWY, IM; et al.

Source: MONATSHEFTE FUR CHEMIE Volume: 126 Issue: 4 Pages: 369-376 DOI: 10.1007/BF00813198 Published: APR 1995

2. Title: ADSORPTION OF IODIDE IONS ON POLARIZED IRON

Author(s): AMMAR, I; DARWISH, S; ETMAN, M

Source: ELECTROCHIMICA ACTA Volume: 12 Issue: 5 Pages: 485-& DOI: 10.1016/0013-4686(67)80018-5 Published: 1967

3. Title: THE SYNERGISTIC EFFECT OF ANIONS AND THE AMMONIUM CATION ON THE INHIBITION OF IRON CORROSION IN ACID-SOLUTION

Author(s): ARAMAKI, K; HAGIWARA, M; NISHIHARA, H

Source: CORROSION SCIENCE Volume: 27 Issue: 5 Pages: 487-497 DOI: 10.1016/0010-938X(87)90092-8 Abstract Number: A1987-093148 Published: 1987

4. Title: Corrosion inhibition of mild steel by some schiff base compounds in hydrochloric acid

Author(s): Ashassi-Sorkhabi, H; Shaabani, B; Seifzadeh, D

Source: APPLIED SURFACE SCIENCE Volume: 239 Issue: 2 Pages: 154-164 DOI: 10.1016/j.apsusc.2004.05.143 Abstract Number: A2005-14-8160B-047 Published: JAN 15 2005

5. Title: Effect of some pyrimidinic Shciff bases on the corrosion of mild steel in hydrochloric acid solution

Author(s): Ashassi-Sorkhabi, H; Shaabani, B; Seifzadeh, D

Source: ELECTROCHIMICA ACTA Volume: 50 Issue: 16-17 Pages: 3446-3452 DOI: 10.1016/j.electacta.2004.12.019 Published: MAY 30 2005

6. Title: Evaluation of a new copper(II)-curcumin complex as superoxide dismutase mimic and its free radical reactions

Author(s): Barik, A; Mishra, B; Shen, L; et al.

Source: FREE RADICAL BIOLOGY AND MEDICINE Volume: 39 Issue: 6 Pages: 811-822 DOI: 10.1016/j.freeradbiomed.2005.05.005 Published: SEP 15 2005

7. Title: The inhibition of mild steel corrosion in hydrochloric acid media by two Schiff base compounds

Author(s): Behpour, M.; Ghoreishi, S. M.; Gandomi-Niasar, A.; et al.

Source: JOURNAL OF MATERIALS SCIENCE Volume: 44 Issue: 10 Pages: 2444-2453 DOI: 10.1007/s10853-009-3309-y Published: MAY 2009

8. Title: Effect of Iodide Ions on the Synergistic Inhibition of the Corrosion of Manganese-14 Steel in Acidic Media

Author(s): Cahskan, N.; Bilgic, S.

Source: Appl. Surf. Sci. Volume: 153 Pages: 128-133 Published: 2000

9. Title: Corrosion inhibition of mild steel by plant extract in dilute HCl medium

Author(s): Chauhan, L. R.; Gunasekaran, G.

Source: CORROSION SCIENCE Volume: 49 Issue: 3 Pages: 1143-1161 DOI: 10.1016/j.corsci.2006.08.012 Published: MAR 2007

10. Title: Curcumin induces apoptosis in human breast cancer cells through p53-dependent Bax induction

Author(s): Choudhuri, T; Pal, S; Agwarwal, ML; et al.

Source: FEBS LETTERS Volume: 512 Issue: 1-3 Pages: 334-340 Article Number: PII S0014-5793(02)02292-5 DOI: 10.1016/S0014-5793(02)02292-5 Published: FEB 13 2002

11. Title: Effect of methyl red and halide ions on the corrosion of aluminum in H2SO4 center dot Part 2

Author(s): Ebenso, EE

Source: BULLETIN OF ELECTROCHEMISTRY Volume: 20 Issue: 12 Pages: 551-559 Published: DEC 2004

12. Title: Inhibition of copper corrosion by self-assembled films of new Schiff bases and their modification with alkanethiols in aqueous medium

Author(s): Ehteshamzade, M; Shahrabi, T; Hosseini, MG

Source: APPLIED SURFACE SCIENCE Volume: 252 Issue: 8 Pages: 2949-2959 DOI: 10.1016/j.apsusc.2005.05.003 Published: FEB 15 2006

13. Title: Innovation in acid pickling treatments of copper by characterizations of a new series of Schiff bases as corrosion inhibitors

Author(s): Ehteshamzadeh, Maryam; Shahrabi, Taghi; Hosseini, Mirghasem

Source: ANTI-CORROSION METHODS AND MATERIALS Volume: 53 Issue: 5 Pages: 296-302 DOI: 10.1108/00035590610692572 Published: 2006

14. Title: The effect of sulphide ions on the corrosion inhibition of copper in acidic chloride solutions

Author(s): El Warraky, AA

Source: ANTI-CORROSION METHODS AND MATERIALS Volume: 50 Issue: 1 Pages: 40-46 DOI: 10.1108/00035590310456289 Published: 2003

15. Title: Synthesis and evaluation of curcumin analogues as cytotoxic agents

Author(s): Fadda, Ahmed A.; Badria, Farid A.; El-Attar, Khaled M.

Source: MEDICINAL CHEMISTRY RESEARCH Volume: 19 Issue: 5 Pages: 413-430 DOI: 10.1007/s00044-009-9199-3 Published: JUN 2010

16. Title: The effect of some phthalimide derivatives on the corrosion behaviour of copper in nitric acid

Author(s): Fouda, AS; Abd El-Aal, A; Kandil, AB

Source: ANTI-CORROSION METHODS AND MATERIALS Volume: 52 Issue: 2 Pages: 96-101 DOI: 10.1108/00035590510584807 Published: 2005

17. Title: Surface Tension Curves of the Higher Fatty Acids and the Equation of Condition of the Surface Layer

Author(s): Frumkin, N.

Source: J. Phys. Chem. Volume: 116 Pages: 466-484 Published: 1925

18. Title: TEMPERATURE-COEFFICIENT OF CORROSION INHIBITION OF STEEL BY ADENINE

Author(s): GOMMA, GK; WAHDAN, MH

Source: BULLETIN OF THE CHEMICAL SOCIETY OF JAPAN Volume: 67 Issue: 10 Pages: 2621-2626 DOI: 10.1246/bcsj.67.2621 Published: OCT 1994

19. Title: Corrosion Rates from Impedance Measurements: An Introduction

Author(s): Haladky, K.; Collow, L.; Dawson, J.

Source: Br. Corros. J. Volume: 15 Pages: 20-25 Published: 1980

20. Title: The Inhibition of the Dissolution of Iron in Sulfuric Acid by Halide Ions

Author(s): Jestonek, M.; Szklarska-Smialowska, Z.

Source: Corros. Sci. Volume: 23 Pages: 183-187 Published: 1983

21. Title: Synergistic action of vinyl triphenyl phosphonium bromide with various anions on corrosion of steel

Author(s): Khamis, E; El-Ashry, ESH; Ibrahim, AK

Source: BRITISH CORROSION JOURNAL Volume: 35 Issue: 2 Pages: 150-154 DOI: 10.1179/000705900101501191 Abstract Number: A2001-03-8160B-065 Published: 2000

22. Title: 2-mercapto-1-methylimidazole as corrosion inhibitor for copper in hydrochloric acid

Author(s): Larabi, L.; Benali, O.; Mekelleche, S. M.; et al.

Source: APPLIED SURFACE SCIENCE Volume: 253 Issue: 3 Pages: 1371-1378 DOI: 10.1016/j.apsusc.2006.02.013 Published: NOV 30 2006

23. Title: Inhibition of copper corrosion with Schiff base derived from 3-methoxysalicylaldehyde and O-phenyldiamine in chloride media

Author(s): Li, SL; Ma, HY; Lei, SB; et al.

Source: CORROSION Volume: 54 Issue: 12 Pages: 947-954 Published: DEC 1998

24. Title: Inhibition of copper corrosion by several Schiff bases in aerated halide solutions

Author(s): Ma, H; Chen, S; Niu, L; et al.

Source: JOURNAL OF APPLIED ELECTROCHEMISTRY Volume: 32 Issue: 1 Pages: 65-72 DOI: 10.1023/A:1014242112512 Published: JAN 2002

25. Title: Multiple biological activities of curcumin: A short review

Author(s): Maheshwari, RK; Singh, AK; Gaddipati, J; et al.

Conference: Workshop on Natureceuticals, Nutraceuticals, Herbal Botanicals, and Psychoactives - Drug Discovery and Drug-Drug Interactions Location: Baltimore, MD Date: NOV 05-07, 2004

Sponsor(s): Natl Inst Drug Abuse; Amer Assoc Pharmaceut Sci

Source: LIFE SCIENCES Volume: 78 Issue: 18 Pages: 2081-2087 DOI: 10.1016/j.lfs.2005.12.007 Published: MAR 27 2006

26. Title: A spectroelectrochemical study of the inhibition of the electrode process on copper by 2-mercaptobenzothiazole in ethanolic solutions

Author(s): Marconato, JC; Bulhoes, LO; Temperini, ML

Source: ELECTROCHIMICA ACTA Volume: 43 Issue: 7 Pages: 771-780 DOI: 10.1016/S0013-4686(97)00204-1 Published: 1998

27. Title: Effect of cysteine on the anodic dissolution of copper in sulfuric acid medium

Author(s): Matos, JB; Pereira, LP; Agostinho, SML; et al.

Source: JOURNAL OF ELECTROANALYTICAL CHEMISTRY Volume: 570 Issue: 1 Pages: 91-94 DOI: 10.1016/j.jelechem.2004.03.020 Published: AUG 15 2004

28. Title: Tryptamine as a green iron corrosion inhibitor in 0.5 M deaerated sulphuric acid

Author(s): Moretti, G; Guidi, F; Grion, G

Source: CORROSION SCIENCE Volume: 46 Issue: 2 Pages: 387-403 DOI: 10.1016/S0010-938X(03)00150-1 Abstract Number: A2004-13-8160B-087 Published: FEB 2004

29. Title: Tryptophan as copper corrosion inhibitor in 0.5 M aerated sulfuric acid

Author(s): Moretti, G; Guidi, F

Source: CORROSION SCIENCE Volume: 44 Issue: 9 Pages: 1995-2011 Article Number: PII S0010-938X(02)00020-3 DOI: 10.1016/S0010-938X(02)00020-3 Published: SEP 2002

30. Title: Organic sulphur-containing compounds as corrosion inhibitors for mild steel in acidic media: correlation between inhibition efficiency and chemical structure

Author(s): Ozcan, M; Dehri, I; Erbil, M

Source: APPLIED SURFACE SCIENCE Volume: 236 Issue: 1-4 Pages: 155-164 DOI: 10.1016/j.apsusc.2004.04.017 Abstract Number: A2005-04-8160B-012 Published: SEP 15 2004

31. Title: Inhibitive action of indole-5-carboxylic acid towards corrosion of mild steel in deaerated 0.5 M sulfuric acid solutions

Author(s): Quartarone, G.; Bonaldo, L.; Tortato, C.

Source: APPLIED SURFACE SCIENCE Volume: 252 Issue: 23 Pages: 8251-8257 DOI: 10.1016/j.apsusc.2005.10.051 Published: SEP 30 2006

32. Title: Inhibition of mild steel corrosion in sulfuric acid solution by thiadiazoles

Author(s): Quraishi, MA; Khan, S

Source: JOURNAL OF APPLIED ELECTROCHEMISTRY Volume: 36 Issue: 5 Pages: 539-544 DOI: 10.1007/s10800-005-9087-6 Published: MAY 2006

33. Title: [not available]

Author(s): Radovici, O.

Conference: Proceedings of the 2nd European Symposium on Corrosion Inhibitors Location: Ferrara

Source: P 2 EUR S CORR INH F Published: 1965

34. Title: [not available]

Author(s): Riggs, O. L.

Source: Theoretical Aspects of Corrosion Inhibitors and Inhibition Published: 1974

Publisher: NACE, Houston, TX

35. Title: Molecular orbital theoretical studies of some organic corrosion inhibitors

Author(s): Sastri, VS; Perumareddi, JR

Source: CORROSION Volume: 53 Issue: 8 Pages: 617-622 Published: AUG 1997

36. Title: Corrosion inhibition of mild steel by benzotriazole derivatives in acidic medium

Author(s): Selvi, ST; Raman, V; Rajendran, N

Source: JOURNAL OF APPLIED ELECTROCHEMISTRY Volume: 33 Issue: 12 Pages: 1175-1182 Published: DEC 2003

37. Title: Inhibition of copper corrosion in 3.0% NaCl solution by N-phenyl-1,4-phenylenediamine

Author(s): Sherif, EM; Park, SM

Source: JOURNAL OF THE ELECTROCHEMICAL SOCIETY Volume: 152 Issue: 10 Pages: B428-B433 DOI: 10.1149/1.2018254 Published: 2005

38. Title: Effects of 2-amino-5-(ethylthio)-1,3,4-thiadiazole on copper corrosion as a corrosion inhibitor in 3% NaCl solutions

Author(s): Sherif, El-Sayed M.

Source: APPLIED SURFACE SCIENCE Volume: 252 Issue: 24 Pages: 8615-8623 DOI: 10.1016/j.apsusc.2005.11.082 Published: OCT 15 2006

39. Title: Effects of 2-amino-5-ethylthio-1,3,4-thiadiazole on copper corrosion as a corrosion inhibitor in aerated acidic pickling solutions

Author(s): Sherif, E. M.; Park, Su-Moon

Source: ELECTROCHIMICA ACTA Volume: 51 Issue: 28 Pages: 6556-6562 DOI: 10.1016/j.electacta.2006.04.047 Published: SEP 15 2006

40. Title: Inhibition of copper corrosion in acidic pickling solutions by N-

phenyl-1,4-phenylenediamine

Author(s): Sherif, EM; Park, SM

Source: ELECTROCHIMICA ACTA Volume: 51 Issue: 22 Pages: 4665-4673 DOI: 10.1016/j.electacta.2006.01.007 Published: JUN 5 2006

41. Title: Secondary amines as copper corrosion inhibitors in acid media

Author(s): Stupnisek-Lisac, E; Brnada, A; Mance, AD

Source: CORROSION SCIENCE Volume: 42 Issue: 2 Pages: 243-257 DOI: 10.1016/S0010-938X(99)00065-7 Published: FEB 2000

42. Title: Effect of adsorption of some azoles on copper passivation in alkaline medium

Author(s): Subramanian, R; Lakshminarayanan, V

Source: CORROSION SCIENCE Volume: 44 Issue: 3 Pages: 535-554 DOI: 10.1016/S0010-938X(01)00085-3 Published: MAR 2002

43. Title: Electrochemical behaviour of an inhibitor film formed on copper surface

Author(s): Szocs, E; Vastag, G; Shaban, A; et al.

Source: CORROSION SCIENCE Volume: 47 Issue: 4 Pages: 893-908 DOI: 10.1016/j.corsci.2004.06.029 Published: APR 2005

44. Title: Quantitative relationships between the structure of some thiol compounds and their inhibition efficiencies

Author(s): Yurt, A.; Mihrican, Y.

Source: ANTI-CORROSION METHODS AND MATERIALS Volume: 55 Issue: 4 Pages: 195-203 DOI: 10.1108/00035590810887691 Published: 2008

45. Title: Tetrazole derivatives as corrosion inhibitors for copper in chloride solutions

Author(s): Zucchi, F; Trabanelli, G; Fonsati, M

Source: CORROSION SCIENCE Volume: 38 Issue: 11 Pages: 2019-2029 DOI: 10.1016/S0010-938X(96)00094-7 Abstract Number: A1997-03-8160B-053 Published: NOV 1996