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کنترل شکل آخالها و تأثیر آن بر خوردگی و خسارات هیدروژنی فولاد از نوع API در محیطهای شامل گاز H_2S

H_2S

API-X^{۵۲}

NACE

H₂S

CaSi

Effect of Inclusion Shape Control on Corrosion and Hydrogen Damage in H₂S Included Environment on API Steel

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Abstract

Recently steel producers have used several different methods to increase properties such as ductility, impact strength and formability.

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In this regards producing steel with very low amount of inclusion, very small size inclusion and modified inclusion can be mentioned. It should be considered, however, presence of inclusions in steel can have worse effects on corrosion properties and strength of hydrogen damage in H₂S included environment. In this research, the API-X₈₀ steel produced by Mobarekeh Steel Co. was used. The steel was melted in a ۵۰kg, medium frequency induction furnace and deoxidation was performed using aluminum. The calcium was added outside of the furnace. The effect of using calcium barrier materials on the morphology control, distribution, amount and size of aluminum oxide inclusions was studied using scanning electron microscope and image analyzing computer program. Displacement of glycerin was used to measure the amount of diffusible hydrogen. Immersed test in sour media was performed on NACE standard and similar media with added thiosulphate ions. The results suggest that thiosulphate ions can be a suitable replacement for H₂S gas, at least in research tests. The results also show that reducing and spherical inclusions lead to reducing diffusible hydrogen and corrosion rate.

Keywords: Modified inclusions, Immersed corrosion test, Hydrogen damage, CaSi and spherical inclusions

API

(HSLA)

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. Metal – Matrix Composites, MMCs

. High Strength Low Alloy

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H₂S

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H₂S

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MnS

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CA_γ, CA_τ,

Al_γO_τ-CaO

C_γA, C_τA_γ, CA

. C= CaO, A= Al O

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CA C₁A_v

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API-0L-X02

API X02

:

%C	%Si	%Mn	%P	%S	%Nb	%Al
/ /	/ /	/ /	/ /	/ /	/ /	/ /

(* mm^y)

(FOSCO)

°C

CaSi (% Si % Ca)

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°C

%

* mm^y

x x x x

ASTM-E ξ °

(SEM)

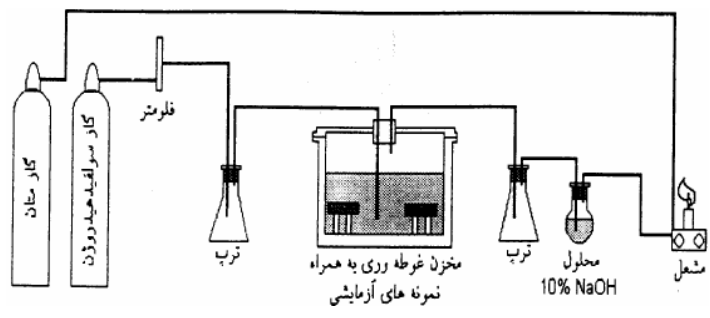
EDAX

() UHSCSA Image Tool

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() NACE TM ۰۲۸۴-۹۶
± t× ×

(
۰ wt% NaCl, ۰,۰ wt% CH₃COOH ۹۴,۰ wt% distilled water
mlit/min
H₂S
pH . mlit/min
(/ lit/hr) H₂S



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H₂S

mlit/min

pH .

pH

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°c

CaSi

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$$C.R = 534\Delta W / D.A.T$$

ΔW , mpy

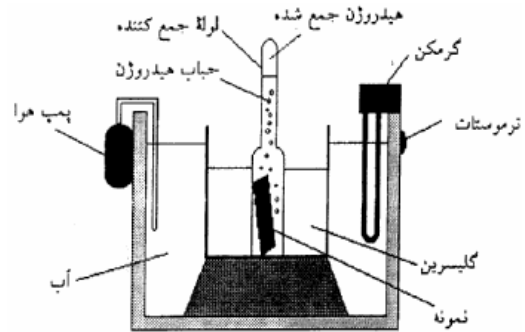
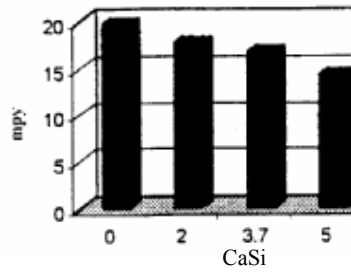
C.R.

T in^y

gr/cm³ A

D, mgr

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- . Diffusible Hydrogen
 - . Glycerin Displacement



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CaSi

EDS

CaSi

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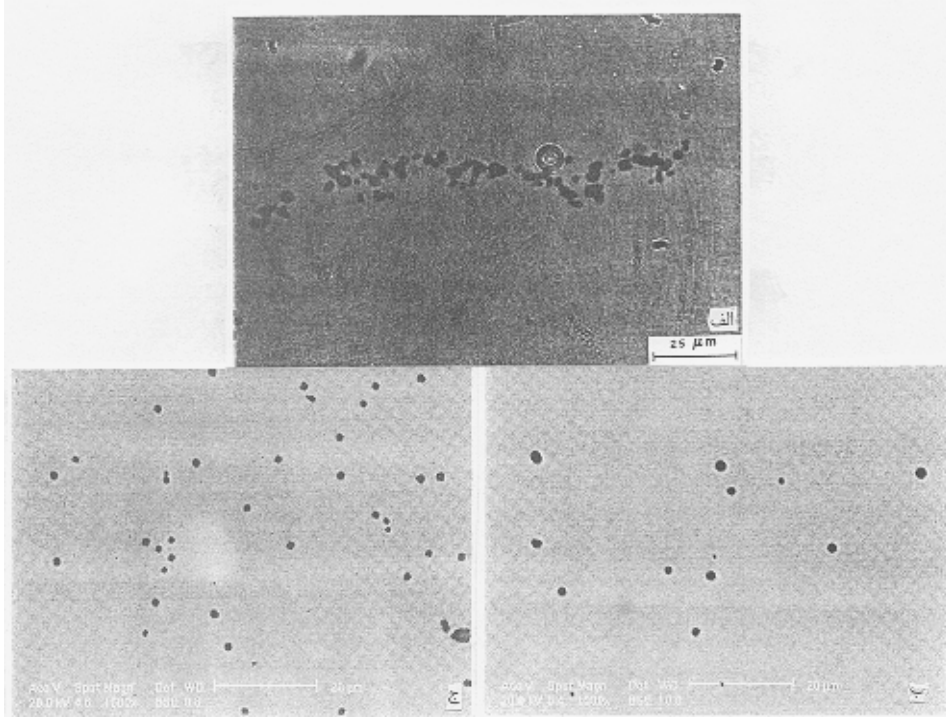
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CaSi /
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APIX⁰²,

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CaSi,

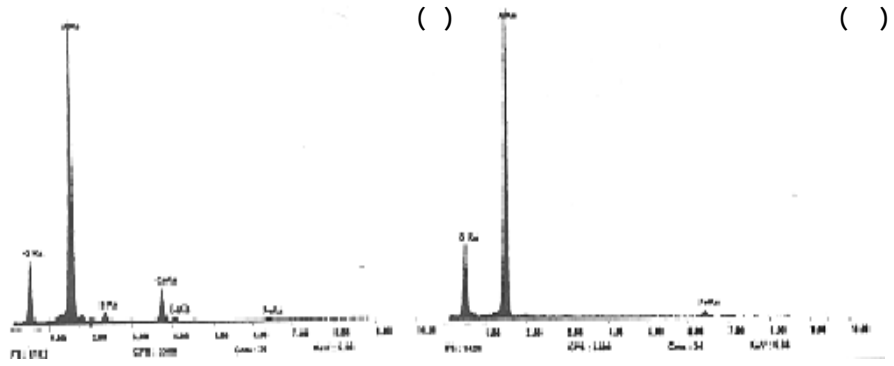
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H₂S

CaSi

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CaSi

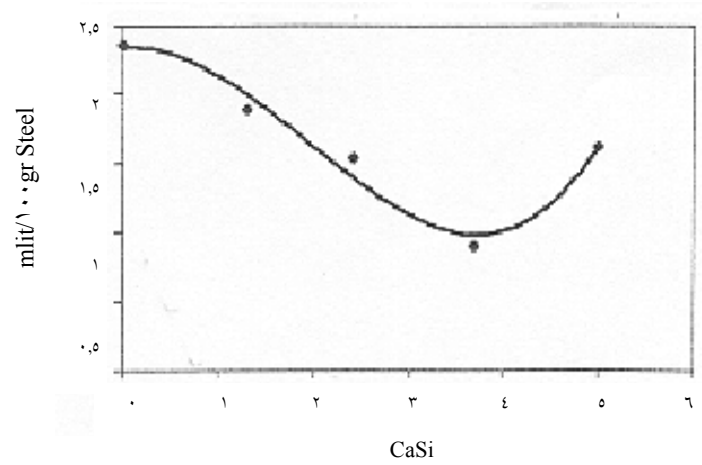


APIX 02

EDS

CaSi /

: CaSi :

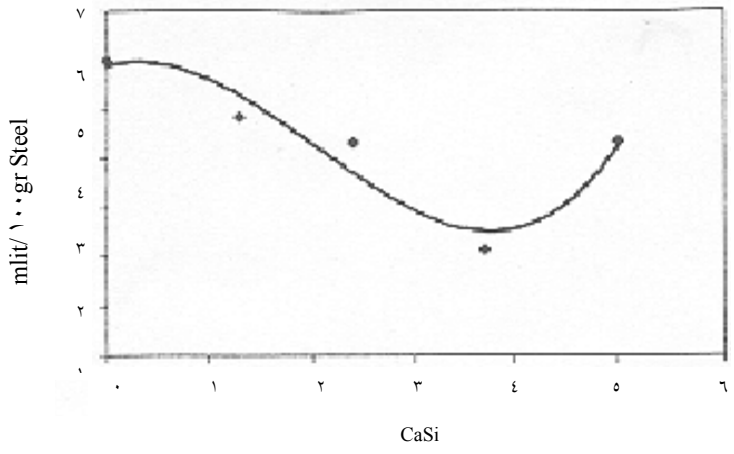


CaSi

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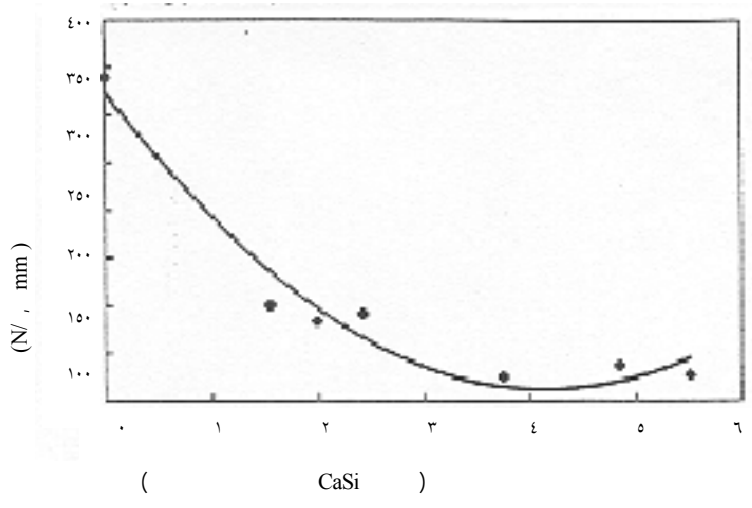
/ NACE

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CaSi

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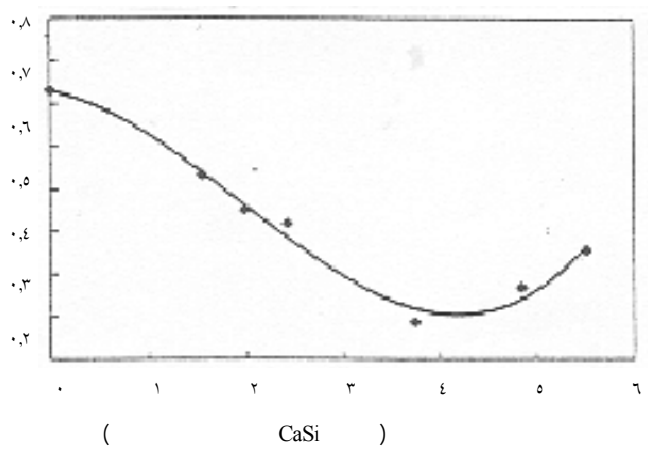


(CaSi)

CaSi

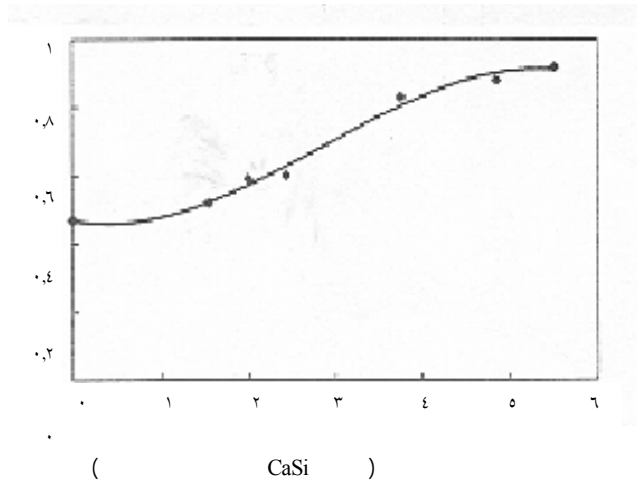
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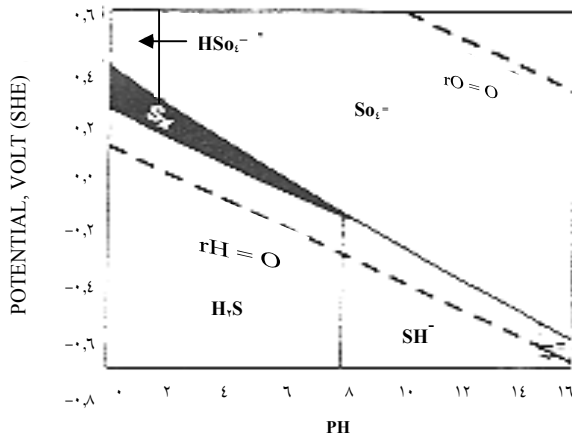
CaSi



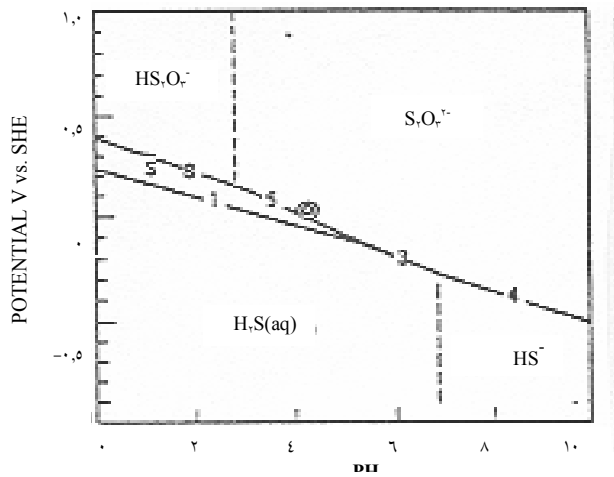
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CaSi

CaSi



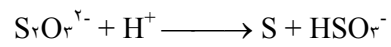
(14) H₂O-H₂S pH :



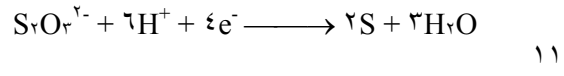
(11) SO₄²⁻-H₂O pH :

PH

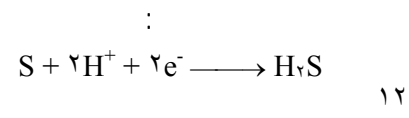
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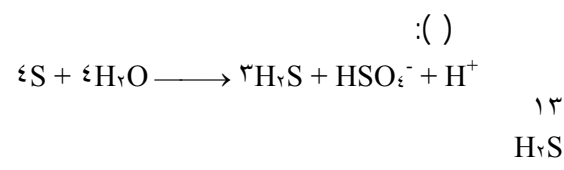
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. H_rS



H_rS



EDS

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Al_rO_r

CaSi

EDS ()

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Al₂O₃

CaSi

H₂S

H₂S

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