The plot of inhibitor concentration over degree of surface coverage versus inhibitor concentration

gives a straight line as shown in Fig. 5. The strong correlation reveals that egg shell adsorption on

stainless surface in 0.5 M H2SO4 follow Langmuir adsorption isotherm. Figs. 6–8 show the SEM/EDX

surface morphology analysis of stainless steel. Figs. 7 and 8 are the SEM/EDX images of the stainless

steel specimens without and with inhibitor after weight loss experiment in sulphuric acid medium.

The stainless steel surface corrosion product layer in the absence of inhibitor was porous and as a

result gives no corrosion protection. With the presence of ES, corrosion damage was minimized, with

an evidence of ES present on the metal surface as shown in Fig. 8.

Table 1

Potentiodynamic polarization data for stainless steel in the absence and presence of ES in 0.5 M H2SO4 solution.

Inhibitor

concentration (g)

bc (V/dec)

ba (V/dec)

Ecorr (V)

icorr (A/cm2)

Polarization

resistance (Ω)

Corrosion

rate (mm/year)

0

0.0335

0.0409

0.9393

0.0003

24.0910

2.8163

2

1.9460

0.0596

0.8276

0.0002

121.440

1.5054

4

0.0163

0.2369

0.8825

0.0001

42.121

0.9476

6

0.3233

0.0540

0.8027

5.39E-05

373.180

0.4318

8

0.1240

0.0556

0.5896

5.46E-05

305.650

0.3772

10

0.0382

0.0086

0.5356

1.24E-05

246.080

0.0919

Fig. 4. Anodic and cathodic polarization curve of stainless steel in 0.5 M H2SO4 solution in the presence and absence of ES.

10

8

6

4

2

2

4

6

8

10

12

C/0

Concentration (g)

 C/0

Fig. 5. Langmuir adsorption isotherm of ES.