

Scilab Textbook Companion for
Engineering Chemistry
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Book Description

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Scilab numbering policy used in this document and the relation to the above book.

Exa Example (Solved example)

Eqn Equation (Particular equation of the above book)

AP Appendix to Example(Scilab Code that is an Appednix to a particular Example of the above book)

For example, Exa 3.51 means solved example 3.51 of this book. Sec 2.3 means a scilab code whose theory is explained in Section 2.3 of the book.

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List of Scilab Codes

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Chapter 1

Water

Scilab code Exa 1.1 Calculating Hardness

```
1 //calculating hardness
2 //Example 1.1
3 clc
4 clear
5 //100gm of CaCO3 = 136gm of CaSO4
6 m=204//mass of the substance
7 wt=136//molecular mass
8 Eq=(m*100)/wt//Equivalents of CaCO3
9 printf('Thus Equivalents of CaCO3 = %3.2f mg/L or
   ppm ',Eq)
```

Scilab code Exa 1.2 Calculating Mass

```
1 //calculating mass
2 //Example 1.2
3 clc
4 clear
5 wt=152//molar mass of FeSo4 in moles
```

```

6 Eq=210.5//equivalents of CaCO3 in ppm
7 m=wt*Eq/100//Mass of FeSO4 in ppm
8 m1=m/1000//Mass of FeSO4 required per liter
9 printf('Thus the mass of FeSO4 required per litre is
        %2.5 f g/L',m1)

```

Scilab code Exa 1.3 Calculating Hardness

```

1 //calculating hardness
2 //Example 1.3
3 clc
4 clear
5 //For Ca(HCO3)2,
6 q1=10//quantity
7 wt1=162//molecular weight
8 M1=100/wt1//multiplication factor
9 Eq1=M1*q1//CaCO3 equivalents in mg/L
10 //For Mg(HCO3)2,
11 q2=8.5//quantity
12 wt2=146//molecular weight
13 M2=100/wt2//multiplication factor
14 Eq2=M2*q2//CaCO3 equivalents in mg/L
15 //For CaSO4,
16 q3=12//quantity
17 wt3=136//molecular weight
18 M3=100/wt3//multiplication factor
19 Eq3=M3*q3//CaCO3 equivalents in mg/L
20 //For MgSO4,
21 q4=14//quantity
22 wt4=120//molecular weight
23 M4=100/wt4//multiplication factor
24 Eq4=M4*q4//CaCO3 equivalents in mg/L
25 Th=Eq1+Eq2//Temporery hardness due to Mg(HCO3)2 and
    Ca(HCO3)2
26 Ph=Eq3+Eq4//Permanent hardness due to CaSO4 and

```



```

MgSO4
27 T=Th+Ph//Total hardness
28 printf('Thus (i) in mg/L Temporary hardness = %2.2f'
    ,Th)
29 printf('\n and permanent hardness = %2.2f',Ph)
30 printf('\n and total hardness = %2.2f',T)
31 printf('\n\n(ii) in ppm Temporary hardness = %2.2f',
    Th)
32 printf('\n and permanent hardness = %2.2f',Ph)
33 printf('\n and total hardness = %2.2f',T)
34 ThC=Th*0.07//temperory hardness in degreeCl
35 PhC=Ph*0.07//permanent hardness in degreeCl
36 TC=T*0.07//total hardness in degreeCl
37 ThF=Th*0.1//temperory hardness in degreeFr
38 PhF=Ph*0.1//permanent hardness in degreeFr
39 TF=T*0.1//total hardness in degreeFr
40 printf('\n\n(iii) in degreeCl Temporary hardness =
    %2.4f',ThC)
41 printf('\n and permanent hardness = %2.4f',PhC)
42 printf('\n and total hardness = %2.4f',TC)
43 printf('\n\n(iv) in degreeFr Temporary hardness = %2
    .4f',ThF)
44 printf('\n and permanent hardness = %2.4f',PhF)
45 printf('\n and total hardness = %2.4f',TF)

```

Scilab code Exa 1.4 Calculating Hardness

```

1 //calculating hardness
2 //Example 1.4
3 clc
4 clear
5 //For Ca(HCO3)2,
6 q1=40.5//quantity
7 wt1=162//molecular weight
8 M1=100/wt1//multiplication factor

```

```

9 Eq1=M1*q1//CaCO3 equivalents in mg/L
10 //For Mg(HCO3)2,
11 q2=46.5//quantity
12 wt2=146//molecular weight
13 M2=100/wt2//multiplication factor
14 Eq2=M2*q2//CaCO3 equivalents in mg/L
15 //For MgSO4,
16 q3=27.6//quantity
17 wt3=120//molecular weight
18 M3=100/wt3//multiplication factor
19 Eq3=M3*q3//CaCO3 equivalents in mg/L
20 //For CaSO4,
21 q4=32.1//quantity
22 wt4=136//molecular weight
23 M4=100/wt4//multiplication factor
24 Eq4=M4*q4//CaCO3 equivalents in mg/L
25 //For CaCl2
26 q5=22.45//quantity
27 wt5=111//molecular weight
28 M5=100/wt5//multiplication factor
29 Eq5=M5*q5//CaCO3 equivalents in mg/L
30 Th=Eq1+Eq2//Temporary hardness due to Mg(HCO3)2 and
    Ca(HCO3)2
31 Ph=Eq3+Eq4+Eq5//Permanent hardness due to CaSO4 and
    MgSO4 and CaCl2
32 T=Th+Ph//Total hardness
33 printf('Thus in Temporary hardness = %2.2f mg/L',Th)
34 printf('\n and permanent hardness = %2.2f mg/L',Ph)
35 printf('\n and total hardness = %3.2f mg/L',T)

```

Scilab code Exa 1.5 Calculating Hardness

```

1 //calculating hardness
2 //Example 1.5
3 clc

```

```

4 clear
5 //For Ca(HCO3)2,
6 q1=12.5//quantity
7 wt1=162//molecular weight
8 M1=100/wt1//multiplication factor
9 Eq1=M1*q1//CaCO3 equivalents in mg/L
10 //For CaCl2,
11 q2=8.2//quantity
12 wt2=111//molecular weight
13 M2=100/wt2//multiplication factor
14 Eq2=M2*q2//CaCO3 equivalents in mg/L
15 //For MgSO4,
16 q3=2.6//quantity
17 wt3=120//molecular weight
18 M3=100/wt3//multiplication factor
19 Eq3=M3*q3//CaCO3 equivalents in mg/L
20 Th=Eq1//Temporary hardness due to Ca(HCO3)2 in ppm
21 Ph=Eq3+Eq2//Permanent hardness due to MgSO4 and
    CaCl2 in ppm
22 T=Th+Ph//Total hardness in ppm
23 TF=T*0.1//Total hardness in degreeFr
24 printf('Thus in ppm Temporary hardness = %2.2 f ppm',
    Th)
25 printf('\n and permanent hardness = %2.2 f ppm',Ph)
26 printf('\n in degreeFr total hardness = %3.3 f',TF)

```

Scilab code Exa 1.6 Calculating Lime and Soda

```

1 //calculating lime and soda
2 //Example 1.6
3 clc
4 clear
5 //For Ca(HCO3)2,
6 q1=4.86//quantity
7 wt1=162//molecular weight

```

```

8 M1=100/wt1//multiplication factor
9 Eq1=M1*q1//CaCO3 equivalents in mg/L
10 //For Mg(HCO3)2,
11 q2=7.3//quantity
12 wt2=146//molecular weight
13 M2=100/wt2//multiplication factor
14 Eq2=M2*q2//CaCO3 equivalents in mg/L
15 //For CaSO4,
16 q3=6.8//quantity
17 wt3=136//molecular weight
18 M3=100/wt3//multiplication factor
19 Eq3=M3*q3//CaCO3 equivalents in mg/L
20 //For MgCl2,
21 q4=5.7//quantity
22 wt4=95//molecular weight
23 M4=100/wt4//multiplication factor
24 Eq4=M4*q4//CaCO3 equivalents in mg/L
25 //For MgSO4,
26 q5=9//quantity
27 wt5=120//molecular weight
28 M5=100/wt5//multiplication factor
29 Eq5=M5*q5//CaCO3 equivalents in mg/L
30 //SiO2 and NaCl neglected
31 V=25000//Volume of water in litres
32 L=74*(Eq1+(2*Eq2)+Eq4+Eq5)/100//lime requirement in
    mg/L
33 L1=L*V/1000000//Lime required for softening 25000
    litres in kg
34 S=106*(Eq3+Eq4+Eq5)/100//soda requirement in mg/L
35 S1=S*V/1000000//soda required for softening 25000
    litres in kg
36 printf('Thus amount of lime required to soften 25000
    litres of water = %2.5f kg\n',L1)
37 printf('and amount of soda required to soften 25000
    litres of water = %2.5f kg\n',S1)

```

Scilab code Exa 1.7 Calculating Hardness and Lime Soda

```
1 //calculating lime-soda and hardness
2 //Example 1.7
3 clc
4 clear
5 //For Ca(HCO3)2,
6 q1=40.5//quantity
7 wt1=162//molecular weight
8 M1=100/wt1//multiplication factor
9 Eq1=M1*q1//CaCO3 equivalents in mg/L
10 //For Mg(HCO3)2,
11 q2=36.5//quantity
12 wt2=146//molecular weight
13 M2=100/wt2//multiplication factor
14 Eq2=M2*q2//CaCO3 equivalents in mg/L
15 //For MgSO4,
16 q3=30//quantity
17 wt3=120//molecular weight
18 M3=100/wt3//multiplication factor
19 Eq3=M3*q3//CaCO3 equivalents in mg/L
20 //For CaSO4,
21 q4=34//quantity
22 wt4=136//molecular weight
23 M4=100/wt4//multiplication factor
24 Eq4=M4*q4//CaCO3 equivalents in mg/L
25 //For CaCl2,
26 q5=27.75//quantity
27 wt5=111//molecular weight
28 M5=100/wt5//multiplication factor
29 Eq5=M5*q5//CaCO3 equivalents in mg/L
30 // NaCl neglected
31 V=20000//Volume of water in litres
32 L=(74*(Eq1+(2*Eq2)+Eq3)/100)*(V/1000)//Lime required
```

```

    for softening 20000 litres in g
33 S=(106*(Eq3+Eq4+Eq5)/100)*(V/1000)//soda required
    for softening 20000 litres in g
34 L1=(100*L)/(84*1000)//Lime required for 84% purity
    in kg
35 S1=(100*S)/(92*1000)//Soda required for 92% purity
    in kg
36 Th=Eq1+Eq2//Temporory hardness due to Mg(HCO3)2 and
    Ca(HCO3)2
37 Ph=Eq3+Eq4+Eq5//Permanent hardness due to CaSO4 and
    MgSO4and CaCL2
38 printf('Thus amount of lime(84percent pure) required
    to soften 20000 litres of water = %2.5f kg\n',L1
    )
39 printf('and amount of soda(92percent pure) required
    to soften 20000 litres of water = %2.5f kg\n',S1)
40 printf('\nAlso Temporary hardness = %2.2f ppm',Th)
41 printf('\n and permanent hardness = %2.2f ppm',Ph)

```

Scilab code Exa 1.8 Calculating Lime and Soda

```

1 //calculating lime and soda
2 //Example 1.8
3 clc
4 clear
5 //For raw water Ca+2,
6 q1=240//quantity
7 wt1=40//molecular weight
8 M1=100/wt1//multiplication factor
9 Eq1=M1*q1//CaCO3 equivalentents in mg/L
10 //For Mg+2,
11 q2=96//quantity
12 wt2=24//molecular weight
13 M2=100/wt2//multiplication factor
14 Eq2=M2*q2//CaCO3 equivalentents in mg/L

```

```

15 //For CO2,
16 q3=44//quantity
17 wt3=44//molecular weight
18 M3=100/wt3//multiplication factor
19 Eq3=M3*q3//CaCO3 equivalents in mg/L
20 //For HCO3-,
21 q4=732//quantity
22 wt4=122//molecular weight
23 M4=100/wt4//multiplication factor
24 Eq4=M4*q4//CaCO3 equivalents in mg/L
25 //For FeSO4.7H2O,
26 q5=278//quantity
27 wt5=278//molecular weight
28 M5=100/wt5//multiplication factor
29 Eq5=M5*q5//CaCO3 equivalents in mg/L
30 V=250000//Volume of water in litres
31 L=(74*(Eq2+Eq3+Eq4+Eq5)/100)*(V/1000000)//lime
    requirement in kg
32 S=(106*(Eq1+Eq2+Eq5-Eq4)/100)*(V/1000000)//soda
    requirement in kg
33 printf('Thus amount of lime required to soften
    250000 litres of water = %3.1f kg\n',L)
34 printf('and amount of soda required to soften 250000
    litres of water = %3.1f kg\n',S)

```

Scilab code Exa 1.9 Calculating Lime and Soda

```

1 //calculating lime and soda
2 //Example 1.9
3 clc
4 clear
5 //For raw water Ca+2,
6 q1=160//quantity
7 wt1=40//molecular weight
8 M1=100/wt1//multiplication factor

```

```

 9 Eq1=M1*q1//CaCO3 equivalents in mg/L
10 //For Mg+2,
11 q2=96//quantity
12 wt2=24//molecular weight
13 M2=100/wt2//multiplication factor
14 Eq2=M2*q2//CaCO3 equivalents in mg/L
15 //For CO2,
16 q3=34//quantity
17 wt3=44//molecular weight
18 M3=100/wt3//multiplication factor
19 Eq3=M3*q3//CaCO3 equivalents in mg/L
20 //For HCO3-,
21 q4=403//quantity
22 wt4=122//molecular weight
23 M4=100/wt4//multiplication factor
24 Eq4=M4*q4//CaCO3 equivalents in mg/L
25 //For NaAlO2,
26 q5=20//quantity
27 wt5=82*2//molecular weight
28 M5=100/wt5//multiplication factor
29 Eq5=M5*q5//CaCO3 equivalents in mg/L
30 V=300000//Volume of water in litres
31 L=(74*(Eq2+Eq3+Eq4-Eq5)/100)*(V/1000000)//lime
    requirement in kg
32 S=(106*(Eq1+Eq2-Eq4)/100)*(V/1000000)//soda
    requirement in kg
33 printf('Thus amount of lime required to soften
    250000 litres of water = %3.1f kg\n',L)
34 printf('and amount of soda required to soften 250000
    litres of water = %3.1f kg\n',S)

```

Scilab code Exa 1.10 Calculating Volume

```

1 //calculating volume
2 //Example 1.10

```



```

3  clc
4  clear
5  v=100//Amount of NaCl solution in litres
6  m=120*v//Amount of NaCl in g
7  wt=58.5*2//molecular mass of NaCl
8  Eq=m*100/wt//Equivalentents of CaCO3 in g
9  h=500//hardness in ppm
10 V=Eq*1000/h//water required to soften the zeolite
    softner in litres
11 printf('Thus the zeolite softner can soften %5.2f L
    of Hard water',V)

```

Scilab code Exa 1.11 Calculating Hardness

```

1  //calculating hardness
2  //Example 1.11
3  clc
4  clear
5  v=30//Amount of NaCl solution in litres
6  m=15*v//Amount of NaCl in g
7  wt=58.5*2//molecular mass of NaCl
8  Eq=m*100/wt//Equivalentents of CaCO3 in g
9  V=1000//water required to soften the zeolite softner
    in litres
10 h=Eq*1000/V//hardness in ppm
11 printf('Thus the hardness of water = %3.2f ppm',h)

```

Chapter 2

Fuel

Scilab code Exa 2.1 Calculating GCV and NCV

```
1 //calculating GCV and NCV
2 //Example 2.1
3 clc
4 clear
5 C=60//percentage of Carbon in coal
6 O=33//percentage of Oxygen in coal
7 H=6//percentage of Hydrogen in coal
8 S=0.5//percentage of Sulphur in coal
9 N=0.5//percentage of Nitrogen in coal
10 GCV=((8080*C)+(34500*(H-O/8))+(2240*S))/100//gross
    calorific value in kcal/kg
11 NCV=(GCV-(0.09*H*587))//net calorific value in kcal/
    kg
12 printf('Thus the higher calorific value of coal = %4
    .2f kcal/kg',GCV)
13 printf('\n and the lower calorific value of coal =
    %4.2f kcal/kg',NCV)
```

Scilab code Exa 2.2 Calculating GCV and NCV

```

1 //calculating GCV and NCV
2 //Example 2.2
3 clc
4 clear
5 C=90//percentage of Carbon in coal
6 O=2//percentage of Oxygen in coal
7 H=4//percentage of Hydrogen in coal
8 S=2.5//percentage of Sulphur in coal
9 N=1//percentage of Nitrogen in coal
10 GCV=((8080*C)+(34500*(H-O/8))+(2240*S))/100//gross
    calorific value in kcal/kg
11 NCV=(GCV-(0.09*H*587))//net calorific value in kcal/
    kg
12 printf('Thus the gross calorific value of coal = %4
    .2f kcal/kg',GCV)
13 printf('\n and the net calorific value of coal = %4
    .2f kcal/kg',NCV)

```

Scilab code Exa 2.3 Calculating GCV and NCV

```

1 //calculating GCV and NCV
2 //Example 2.3
3 clc
4 clear
5 C=80//percentage of Carbon in coal
6 O=3//percentage of Oxygen in coal
7 H=7//percentage of Hydrogen in coal
8 S=3.5//percentage of Sulphur in coal
9 N=2.1//percentage of Nitrogen in coal
10 GCV=((8080*C)+(34500*(H-O/8))+(2240*S))/100//gross
    calorific value in kcal/kg
11 NCV=(GCV-(0.09*H*587))//net calorific value in kcal/
    kg
12 printf('Thus the gross calorific value of coal = %4
    .0f kcal/kg',GCV)

```

```
13 printf('\n and the net calorific value of coal = %4
    .0f kcal/kg',NCV)
```

Scilab code Exa 2.4 Calculating GCV and NCV

```
1 //calculating GCV and NCV
2 //Example 2.4
3 clc
4 clear
5 C=84//percentage of Carbon in coal
6 O=8.4//percentage of Oxygen in coal
7 H=5.5//percentage of Hydrogen in coal
8 S=1.5//percentage of Sulphur in coal
9 N=0.6//percentage of Nitrogen in coal
10 GCV=((8080*C)+(34500*(H-O/8))+(2240*S))/100//gross
    calorific value in kcal/kg
11 NCV=(GCV-(0.09*H*587))//net calorific value in kcal/
    kg
12 printf('Thus the gross calorific value of coal = %4
    .0f kcal/kg',GCV)
13 printf('\n and the net calorific value of coal = %4
    .0f kcal/kg',NCV)
```

Scilab code Exa 2.5 Proximate Analysis

```
1 //calculating proximate analysis
2 //Example 2.5
3 clc
4 clear
5 m1=1//mass of air dried coal in g
6 m2=0.985//mass of dry coal residue after heating for
    1hr in g
7 m3=0.8//mass of residue after heating for 7min in g
```

```

8 m4=0.1//mass of last residue
9 Mm=m1-m2//mass of moisture in coal sample in g
10 Mv=m2-m3//mass of volatile matter in g
11 Ma=m4//mass of ash
12 %m=Mm*100//percentage moisture
13 %v=Mv*100//percentage of volatile matter
14 %a=Ma*100//percentage of ash
15 %c=100-(%m+%v+%a)//percentage of fixed carbon
16 printf('Thus (i)percentage of moisture = %2.1f
    percent\n',%m)
17 printf('(ii)percentage of volatile matter = %2.1f
    percent\n',%v)
18 printf('(iii)percentage of ash = %2.0f percent\n',%a
    )
19 printf('(iv)percentage of fixed carbon = %2.0f
    percent \n',%c)

```

Scilab code Exa 2.6 Calculating percentage C and H

```

1 //calculating percentage C and H
2 //Example 2.6
3 clc
4 clear
5 wt1=2.75//increase in wt of KOH tube in gm
6 wt2=0.45//increase in wt of CaCl2 tube in gm
7 wt=1//weight of coal sample in gm
8 %c=(wt1*12*100)/(wt*44)//percentage of carbon
9 %h=(wt2*2*100)/(wt*18)//percentage of hydrogen
10 printf('Thus (i)Percentage of carbon = %2.0f percent
    ',%c)
11 printf('\n(ii)Percentage of hydrogen =%2.0f percent '
    ,%h)

```

Scilab code Exa 2.7 Calculating percentage S and N

```
1 //calculating percentage S and N
2 //Example 2.7
3 clc
4 clear
5 wt1=2.6//weight of coal taken for quantitative
   analysis in gm
6 wt=1.56//weight of coal sample taken in gm
7 v=50-6.25//volume of H2SO4 used
8 N=0.1//normality
9 m=0.1755//wt of BaSO4 ppt. obtained
10 %n=(v*N*1.4)/(wt)//percentage of nitrogen
11 %su=(m*32*100)/(wt1*233)//percentage of sulphur
12 printf('Thus (i)Percentage of nitrogen = %2.3f
   percent ',%n)
13 printf('\n(ii)Percentage of sulphur =%2.3f percent ',
   %su)
```

Scilab code Exa 2.8 Calculating percentage S

```
1 //calculating percentage S
2 //Example 2.8
3 clc
4 clear
5 wt=0.5//weight of coal taken for quantitative
   analysis in gm
6 m=0.05//wt of BaSO4 ppt. obtained
7 %su=(m*32*100)/(wt*233)//percentage of sulphur
8 printf('Thus Percentage of sulphur =%2.3f percent ',
   %su)
```

Chapter 5

Lubricants and Greases

Scilab code Exa 5.1 Calculating VI

```
1 //calculating VI
2 //Example 5.1
3 clc
4 clear
5 L=674//viscosity of low viscosity index oil
6 H=314//viscosity of high viscosity index oil
7 U=464//viscosity of test oil in S
8 VI=(L-U)*100/(L-H)//viscosity index
9 printf('Thus VI of the oil sample under test =%2.2f',
    ,VI)
```

Chapter 6

Electrochemical System

Scilab code Exa 6.1 Calculating emf

```
1 //calculating emf
2 //Example 6.1
3 clc
4 clear
5 Es=1.5273//emf of known cell in V
6 Ns=90//null point of known cell in cm
7 Nu=60//null point of unknown cell in cm
8 Eu=Nu*Es/Ns//Emf of cell
9 printf('Thus the emf of cell = %2.4f V',Eu)
```

Scilab code Exa 6.2 Calculating pH

```
1 //calculating pH
2 //Example 6.2
3 clc
4 clear
5 //for quinhydrone electrode
6 Ecell=0.284//Emf of cell in V
```



```
7 pH=(0.6996-0.2422-Ecell)/0.0591//pH of the solution
8 printf('Thus the pH of the solution = %2.3f V',pH)
```

Scilab code Exa 6.3 Calculating pH

```
1 //calculating pH
2 //Example 6.3
3 clc
4 clear
5 //for hydrogen electrode
6 Ecell=0.6734//Emf of cell in V
7 pH=(Ecell-0.2422)/0.0591//pH of the solution
8 printf('Thus the pH of the solution = %2.3f ',pH)
```

Scilab code Exa 6.4 Calculating potential

```
1 //calculating potential
2 //Example 6.4
3 clc
4 clear
5 Ag=1
6 Ksp=8.7*(10^-17)
7 Agplus=sqrt(Ksp)
8 X=Ag/Agplus
9 E1=0.799//E(Ag+/Ag)
10 E2=E1-(0.0591*log10(X))
11 printf('Thus E(Ag+/Ag) = %2.3f V',E2)
```

Scilab code Exa 6.5 Calculating solubility

```

1 //calculating solubility
2 //Example 6.5
3 clc
4 clear
5 Ecell=0.169
6 AgC=0.01
7 C1=AgC/(10^(Ecell/0.0591))
8 S=C1*143.5//solubility of AgCl in g/L
9 Ksp=C1^2//solubility product of AgCl in Mol^2/L^2
10 printf('Thus solubility of AgCl = %e g/L',S)
11 printf('\n and Ksp = %e Mol^2/L^2',Ksp)

```

Scilab code Exa 6.6 Calculating Ksp

```

1 //calculating Ksp
2 //Example 6.6
3 clc
4 clear
5 Ec=0.071
6 Ea=0.799
7 Ecell=Ec-Ea
8 Ksp=10^(Ecell/0.0591)//solubility product of AgCl in
   Mol^2/L^2
9 printf('Thus Ksp = %e Mol^2/L^2',Ksp)

```

Scilab code Exa 6.7 Calculating Kc

```

1 //calculating Kc
2 //Example 6.7
3 clc
4 clear
5 //E' cell=0.0591*logKc/n
6 Eag=0.8

```

```

7 Ecu=0.34
8 Ecell=Eag-Ecu
9 n=2
10 Kc=10^(n*Ecell/0.059)//equilibrium constant
11 printf('Thus the equilibrium constant for the
    reaction = %e',Kc)

```

Scilab code Exa 6.8 Calculating Kc

```

1 //calculating Kc
2 //Example 6.8
3 clc
4 clear
5 //E' cell=0.0591*logKc/n
6 Ecell=0.16
7 n=4
8 Kc=10^(n*Ecell/0.0591)//equilibrium constant
9 printf('Thus the equilibrium constant for the
    reaction = %e',Kc)

```

Scilab code Exa 6.9 Calculating deltaG and Kc

```

1 //calculating deltaG and Kc
2 //Example 6.9
3 clc
4 clear
5 Ecell=0.89//in V
6 n=6
7 F=96500// in 1/mol
8 deltaG=-n*F*Ecell//in C.V or J
9 //Kc related to deltaG
10 R=8.314//in J/molK
11 T=298//in K

```

```

12 Kc1=10^(-deltaG/(2.303*R*T))
13 //Kc related to Ecell
14 Kc2=10^((n*F*Ecell)/(2.303*R*T))
15 printf('Thus (i)deltaG = %e',deltaG)
16 printf('\n(ii)Kc in relation with deltaG = %e',Kc1)
17 printf('\n(iii)Kc in relation with Ecell = %e',Kc2)

```

Scilab code Exa 6.10 Calculating Kc

```

1 //calculating Kc
2 //Example 6.10
3 clc
4 clear
5 //E' cell=0.0591*logKc/n
6 Ecell=-0.8277
7 n=1
8 Kc=10^(n*Ecell/0.0591)//equilibrium constant
9 printf('Thus the equilibrium constant for the
    reaction = %e',Kc)

```

Scilab code Exa 6.11 Calculating Ecell and Energy

```

1 //calculating Ecell and energy
2 //Example 6.11
3 clc
4 clear
5 Ec=0.4
6 Ea=-0.87
7 Ecell=Ec-Ea
8 F=96500
9 Wmax=(2*F*Ecell)/1000
10 printf('Thus (i) Ecell = %2.2f V',Ecell)
11 printf('\n (ii)Wmax= %3.0f kJ',Wmax)

```

Scilab code Exa 6.12 Calculating Kc

```
1 //calculating Kc
2 //Example 6.12
3 clc
4 clear
5 //E' cell=0.0591*logKc/n
6 Ec=0.77
7 Ea=0.54
8 Ecell=Ec-Ea
9 n=2
10 Kc=10^(n*Ecell/0.059)//equilibrium constant
11 printf('Thus the equilibrium constant for the
    reaction = %e',Kc)
```
