SC-Database
Software version = 5.81 Data version = 4.62
Experiment list contains 41 experiments for
 (no ligands specified)
 5 metals : Re(I), Re(II), Re(IV), Re(V), Re(VII)
 (no references specified)
 (no experimental details specified)

****
e- HL Electron (442)
Electron;

Metal Mtd Medium Temp Conc Cal Flags Lg K values Reference ExptNo
---
Re(I) EMF none 0°C 0.0 U 1960KIa (875) 1
  K(Re(s)+e=Re-)=-2.51(-136 mV)
****
C3H9P L CAS 594-09-2 (1732)
Trimethyl phosphine; (CH3)3P

Metal Mtd Medium Temp Conc Cal Flags Lg K values Reference ExptNo
---
Re(I) sp non-aq 25°C 100% U M 1980CJb (28056) 2
  B(ReA+2L)=-2.85
Medium: THF. ReA=Re(C5H5)(CO)(NO)(CH3)
****
CN- HL Cyanide CAS 74-90-8 (230)
Cyanide;

Metal Mtd Medium Temp Conc Cal Flags Lg K values Reference ExptNo
---
Re(II) gl KCl 30°C 0.50M U 1964SEb (2757) 3
  K(H+ReL5)=10.5
  K(H+HReL5)=1.57
****
Cl- HL Chloride CAS 7647-01-0 (50)
Chloride;

Metal Mtd Medium Temp Conc Cal Flags Lg K values Reference ExptNo
---
Re(II) kin oth/un 25°C 0.32M U K1=2.0 1965PYa (5609) 4
Medium:H2SO4
****
ClO3- HL Chlorate CAS 7790-93-4 (971)
Chlorate;

Metal Mtd Medium Temp Conc Cal Flags Lg K values Reference ExptNo
---
Re(II) kin oth/un 25°C 0.16M U I 1965PYa (6059) 5
  B(ReLI)=2.4

Medium: HCl. In 0.33 M H2SO4: B=3.4

****

e- HL Electron (442)

Electron;

Metal	Mtd	Medium	Temp	Conc	Cal	Flags	Lg K values	Reference	ExptNo
Re(IV)	oth	none	25°C	0.00	U		1969BSb (876)		6
							K=-42.3(-1.25V)		
							K'=-33.77(-333mV)		

K: 2ReO2(H2O)2(s)+2e=Re2O3(s)+2OH-+3H2O. K': Re2O3(s)+3H2O+6e=2Re(s)+6OH.
Method: combination of thermodynamic data

Metal	Mtd	Medium	Temp	Conc	Cal	Flags	Lg K values	Reference	ExptNo
Re(IV)	oth	none	25°C	0.0	U		1957KCa (877)		7
							K=13.0(385 mV)		

K: ReO3(s)+2H+2e=ReO2(s)+H2O. From thermodynamic data

Metal	Mtd	Medium	Temp	Conc	Cal	Flags	Lg K values	Reference	ExptNo
Re(IV)	oth	none	25°C	0.0	U		1953BCa (878)		8
							K=13.5(400 mV)		

K: ReO3(s)+2H+2e=ReO2(s)+H2O. From thermodynamic data

Metal	Mtd	Medium	Temp	Conc	Cal	Flags	Lg K values	Reference	ExptNo
Re(IV)	oth	none	25°C	0.0	U		1953BCa (879)		9
							K=17.6(260 mV)		

K: ReO2(s)+4H+4e=Re(s)+2H2O. From thermodynamic data

****

Br- HL Bromide CAS 10035-10-6 (19)

Bromide;

Metal	Mtd	Medium	Temp	Conc	Cal	Flags	Lg K values	Reference	ExptNo
Re(IV)	ISE	NaClO4	15°C	3.0M	U		1965SCf (2286)		10
							K6=5.26		

Medium:HClO4

****

Cl- HL Chloride CAS 7647-01-0 (50)

Chloride;

Metal	Mtd	Medium	Temp	Conc	Cal	Flags	Lg K values	Reference	ExptNo
Re(IV)	dis	NaCl	?	5.0M	U		1973TJa (5610)		11
							K(ReCl6+H)=-1.22		
Re(IV)	cal	oth/un	25°C	var	U	H	1966BGc (5611)		12

DH(ReCl6+4OH=ReO2(H2O)2(s)+6Cl)=-309.3(fresh solid),-330.6(aged,est)kJ mol-1

Metal	Mtd	Medium	Temp	Conc	Cal	Flags	Lg K values	Reference	ExptNo
Re(IV)	oth	oth/un	25°C	var	U	T H	1965JWa (5612)		13
							K(Re2OCl10+H2O=2ReOHCl5)=-1.41		

Method:magnetic susceptibility. Medium:HCl var. K=-2.72(25 C), -2.04(15 C)
DH=100.3 kJ mol-1, DS=334 J K-1 mol-1

```
Re(IV)     ISE NaClO4 15°C  3.0M U                          1965SCf  (5613)  14
                                          K6=6.34
--------------------------------------------------------------------------------
Re(IV)     cal none   25°C  0.0  U   H                      1957KVa  (5614)  15
DH(Ag2ReCl6(s)=2Ag+ReCl6)=-60.7 kJ mol-1.
DH(Cs2ReCl6(s)=2Cs+ReCl6)=-73.6
--------------------------------------------------------------------------------
Re(IV)     sol oth/un 25°C .005M U                         1955MEa  (5615)  16
                                          Ks(Ag2ReCl6=2Ag+ReCl6)=-10.14
********************************************************************************
NO                      L    Nitric oxide     CAS 10102-43-9  (850)
Nitric oxide;
--------------------------------------------------------------------------------
Metal      Mtd Medium Temp Conc Cal Flags Lg K values       Reference ExptNo
--------------------------------------------------------------------------------
Re(IV)     oth oth/un 30°C 0.50M U    M                    1962SGc  (9307)  17
                                          K(HRe(CN)5NO+H)=1.35
                                          K(Re(CN)5NO+H)=11.80
********************************************************************************
OH-                     HL    Hydroxide          (57)
Hydroxide;
--------------------------------------------------------------------------------
Metal      Mtd Medium Temp Conc Cal Flags Lg K values       Reference ExptNo
--------------------------------------------------------------------------------
Re(IV)     gl  KNO3   20°C 0.21M U  I                      1962PEa (12040)  18
                                          *K1=-11.17
*K1=-11.05(I=1.515), -11.09(I=1.015)
********************************************************************************
O2--                   H2L    Peroxide         CAS 7772-84-1  (2813)
Peroxide; -O.O-
--------------------------------------------------------------------------------
Metal      Mtd Medium Temp Conc Cal Flags Lg K values       Reference ExptNo
--------------------------------------------------------------------------------
Re(IV)     sp  oth/un   ?   var  U                          1955JPa (12697)  19
                                          K(Re2OCl10+3H2L)=14.01
********************************************************************************
SCN-                    HL    Thiocyanate      CAS 463-56-9  (106)
Thiocyanate;
--------------------------------------------------------------------------------
Metal      Mtd Medium Temp Conc Cal Flags Lg K values       Reference ExptNo
--------------------------------------------------------------------------------
Re(IV)     sp  oth/un   ?    4?M U  I     K1=3.7           1966TMa (15241)  20
Medium:H2SO4. In HCl: K1=3.64
--------------------------------------------------------------------------------
Re(IV)     sp  KCl      ?   var  U        K2=3.64          1964TMa (15242)  21
K1=3.64 also quoted
********************************************************************************
CH4N2S                  L    Thiourea         CAS 62-56-6  (51)
Thiocarbamide, Thiourea; (H2N)2CS
--------------------------------------------------------------------------------
```

Metal	Mtd	Medium	Temp	Conc	Cal	Flags	Lg K values	Reference	ExptNo
Re(IV)	ix	oth/un	?	4.00M	U	M		1971MBd (17850)	22
							K(ReOL4+Cl=ReOClL3+L)=2.38		
							K(ReOL4+2Cl=ReOCl2L2+2L)=5.5		
							K(ReOL4+3Cl=ReOCl3L+3L)=6.85		
							K(ReOL4+4Cl=ReOCl4+4L)=8.8		

Medium: HCl

Metal	Mtd	Medium	Temp	Conc	Cal	Flags	Lg K values	Reference	ExptNo
Re(IV)	sp	KCl	?	2.50M	U			1969BOd (17851)	23
							K4=2.52		

Medium: 2-3 M HCl

****

C4H6N2 L N-Me-Imidazole CAS 616-47-7 (354)

N-Methyl-1,3-diazole; C3H3N2.CH3

Metal	Mtd	Medium	Temp	Conc	Cal	Flags	Lg K values	Reference	ExptNo
Re(IV)	sp	oth/un	3°C	?	C			1996BBe (29605)	24
							K(ReO(OH)L4=ReO2L4)=2.0		
							K(ReO(H2O)L4=ReO(OH)L4)=-4.0		

Re(V).

****

C5H8N2 L CAS 1759-84-0 (173)

1,2-Dimethylimidazole; C3H2N2(CH3)2

Metal	Mtd	Medium	Temp	Conc	Cal	Flags	Lg K values	Reference	ExptNo
Re(IV)	sp	oth/un	25°C	?	C			1996BBe (37634)	25
							K(ReO(OH)L4=ReO2L4)=3.8		
							K(ReO(H2O)L4=ReO(OH)L4)=-4.1		

Re(V).

****

C6H6N4 L Biimidazole CAS 492-98-8 (1007)

2,2'-Biimidazole; C3H3N2-C3H3N2

Metal	Mtd	Medium	Temp	Conc	Cal	Flags	Lg K values	Reference	ExptNo
Re(IV)	sp	non-aq	RT	100%	C			2001FBb (43482)	26
							K(Re(H-2L)A2Cl2+H)=9.8		
							K(Re(H-1L)A2Cl2+H)=4.8		

Medium: CH2Cl2. Metal ion is Re(III). A is triphenylphosphine.

****

C7H10 L Norbornylene CAS 498-66-8 (4404)

2-Norbornene (bicyclo[2.2.1]hept-2-ene);

Metal	Mtd	Medium	Temp	Conc	Cal	Flags	Lg K values	Reference	ExptNo
Re(IV)	nmr	non-aq	90°C	100%	U	T HM		1993GPa (56532)	27
							K(ReAO3+L=ReLAO+H2O)=1.51		

Method:NMR. Medium:C6D6. T. 89.7-126.4C. B=1,2,3,4,5-pentamethylcyclopenta-
diene. K=1.57(97.2C);1.19(113.8);1.06(122.3);1.03(126.4). DH=-45.6 kJ mol-1.

****

C8H16N2O4S2 H4L (6947)
2,7-Dicarboxy-3,6-diaza-1,8-octanedithiol;
HS.CH2.CH(COOH)NH.CH2CH2.NH.CH(COOH)CH2.SH

Metal	Mtd	Medium	Temp	Conc	Cal	Flags	Lg K values	Reference	ExptNo
Re(IV)	gl	oth/un	25°C	?	U		1994MBa (62551)		28
							K(ReOL+H=ReOHL)=10.2		
							K(ReOHL+H=ReOH2L)=6.64		
							K(ReOH2L+H=ReOH3L)=3.8		

****

C10H27N5 L CAS 58214-71-4 (5539)
4,7,10-Triazatridecane-1,13-diamine;

Metal	Mtd	Medium	Temp	Conc	Cal	Flags	Lg K values	Reference	ExptNo
Re(IV)	kin	KCl	25°C	0.50M	U	M	1994MMb (76829)		29
							K(CoLH2O=CoLOH+H)=-12.45		
							K(CoL+O2=CoLO2)=7.34		
							K(CoLO2+CoL=Co2L2O2)=12.73		

****

CN- HL Cyanide CAS 74-90-8 (230)
Cyanide;

Metal	Mtd	Medium	Temp	Conc	Cal	Flags	Lg K values	Reference	ExptNo
Re(V)	gl	KNO3	27°C	0.50M	U		1964CHb (2758)		30
							K(H+ReO2L4)=4.2		
							K(H+HReO2L4)=1.4		

****

OH- HL Hydroxide (57)
Hydroxide;

Metal	Mtd	Medium	Temp	Conc	Cal	Flags	Lg K values	Reference	ExptNo
Re(V)	gl	KCl	25°C	1.2M	C		1998ARa (12041)		31
							*K(ReO(H2O)(CN)4)=-1.31		
							*K(ReO(OH)(CN)4)=-3.72		

Medium: KCl/KNO3.

Metal	Mtd	Medium	Temp	Conc	Cal	Flags	Lg K values	Reference	ExptNo
Re(V)	EMF	KCl	27°C	0.50M	U	M	1970CHd (12042)		32
							K(Re(py)4O2+H)=1.7		
Re(V)	gl	oth/un	25°C	0.02M	U	IHM	1963MFd (12043)		33
							*K2=-3.26		

*K1=0.6(I=5). By calorimetry DH(Re(en)2OH+H2O=Re(en)2(OH)2+H)=14.64

****

C10H24N4 L Cyclam CAS 295-37-4 (8)
1,4,8,11-Tetraazacyclotetradecane; cyclo(-(HN.CH2.CH2.NH.(CH2)3)2-)

Metal	Mtd	Medium	Temp	Conc	Cal	Flags	Lg K values	Reference	ExptNo
Re(V)	gl	KCl	25°C	1.0M	C		1993TRa (76674)		34
							K(ReO2L+H=ReO(OH)L)=2.95		

****

e- HL Electron (442)
Electron;

Metal	Mtd	Medium	Temp	Conc	Cal	Flags	Lg K values	Reference	ExptNo
Re(VII)	oth	none	25°C	0.0	U			1966BGc (880)	35
							K=9.6 (190 mV)		
							K'=34.0 (500 mV)		

K: ReO4- + 8H + 6Cl + 3e = ReCl6-- + 4H2O. K': ReCl6-- + 4e = Re(s) + 6Cl

Metal	Mtd	Medium	Temp	Conc	Cal	Flags	Lg K values	Reference	ExptNo
Re(VII)	sp	non-aq	?	100%	U			1961BUa (881)	36
							K=-0.49		
							K(2Re(VI)=Re(VI)2)=2.15		

Medium: H2SO4(liquid). K: Re(VII)+Re(V)=2Re(VI)

Metal	Mtd	Medium	Temp	Conc	Cal	Flags	Lg K values	Reference	ExptNo
Re(VII)	gl	none	25°C	0.0	U			1960KIa (882)	37
							K=12.98(768 mV)		

K: ReO4+2H+e=ReO3(s)+H2O

Metal	Mtd	Medium	Temp	Conc	Cal	Flags	Lg K values	Reference	ExptNo
Re(VII)	EMF	none	25°C	0.0	U			1952HUa (883)	38
							K=25.9(510 mV)		
							K'=-30.1(-594 mV)		

K: ReO4+4H+3e=ReO2(s)+2H2O. K': ReO4+2H2O+3e=ReO2(s)+4OH

****

Br- HL Bromide CAS 10035-10-6 (19)
Bromide;

Metal	Mtd	Medium	Temp	Conc	Cal	Flags	Lg K values	Reference	ExptNo
Re(VII)	sp	non-aq	25°C	100%	U	M		1974WEb (2287)	39
							K(Re2A4X2+Br=Re2A4XBr+X)=1.96		
							K(Re2A4XBr+Br=Re2A4Br2+X)=2.40		

Medium: CH3CN. HA=propanoic acid, X=chloride

****

O2-- H2L Peroxide CAS 7772-84-1 (2813)
Peroxide; -O.O-

Metal	Mtd	Medium	Temp	Conc	Cal	Flags	Lg K values	Reference	ExptNo
Re(VII)	sp	NaClO4	25°C	0.10M	U	M		1993YEa (12698)	40
							K(CH3ReO3+L)=0.89		
							K(CH3ReO3L+L)=2.16		

****

CH4N2S L Thiourea CAS 62-56-6 (51)

Thiocarbamide, Thiourea; (H2N)2CS

Metal	Mtd	Medium	Temp	Conc	Cal	Flags	Lg K values	Reference	ExptNo
Re(VII)	sp	KCl	25°C	6.00M	U		1974KZb (17852)		41
							K(ReOCl4L+Cl)=3.45		

REFERENCES

2001FBb S Fortin,A Beauchamp; Inorg.Chem.,40,105 (2001)
1998ARa A Abou-Hamdan,A Roodt,A Merbach; Inorg.Chem.,37,1278 (1998)
1996BBe S Belanger,A Beauchamp; Inorg.Chem.,35,7836 (1996)
1994MBa L Marzilli,M Banaszczyk et al; Inorg.Chem.,33,4850 (1994)
1994MMb M Maeder,H Macke; Inorg.Chem.,33,3135 (1994)
1993GPa K Gable,T Phan; J.Am.Chem.Soc.,115,3036 (1993)
1993TRa B Tsang,J Reibenspies,A Martell; Inorg.Chem.,32,988 (1993)
1993YEa S Yamazaki,J Espenson,P Huston; Inorg.Chem.,32,4683 (1993)
1980CJb C Casey,W Jones; J.Am.Chem.Soc.,102,6154 (1980)
1974KZb K Kotegov,T Zegzda et al; Zh.Neorg.Khim.,19,737(399) (1974)
1974WEb T Webb,J Espenson; J.Am.Chem.Soc.,96,6289 (1974)
1973TJa S Tribalat,A Jamard; Ann.Chim.,(France),8,87 (1973)
1971MBd I Marov,L Borisova et al; Zh.Neorg.Khim.,16,7,1869 (1971)
1970CHd M Chakravorti; J.Indian Chem.Soc.,47,844 (1970)
1969BOd L Borisova; Zh.Anal.Khim.,24,9,1361 (1969)
1969BSb R Busey,E Sprague,R Bevan; J.Phys.Chem.,73,1039 (1969)
1966BGc R Busey,K Gayer,R Gilbert,R Bevan; J.Phys.Chem.,70,2609 (1966)
1966TMa V Tarayan,L Mushegyan; Armenian Khim.Zh.,19,918 (1966)
1965JWa B Jezowska-Trzebiatowska,W Wojciechowski; Rocz.Chem.,39,1187 (1965)
1965PYa K Pavlova,K Yatsimirskii; Zh.Neorg.Khim.,10,1027 (1965)
1965SCf K Schwochau; Z.Naturforsch.,20A,1286 (1965)
1964CHb M Chakravorti; J.Indian Chem.Soc.,41,477 (1964)
1964SEb S Sen; Z.Anorg.Chem.,333,160 (1964)
1964TMa V Tarayan,L Mushegyan; Izv.Akad.Nauk Armenian SSR,17,46 (1964)
1963MFd R Murmann,D Foerster; J.Phys.Chem.,67,1383 (1963)
1962PEa D Perrin; J.Chem.Soc.,2197 (1962)
1962SGc B Sen,N Ghosh; Sci.Cult.,28,142 (1962)
1961BUa R Busey; ORNL-3176,14 (1961)
1960KIa J King; Diss.Abs.,21,69 (1960)
1957KCa J King,J Cobble; J.Am.Chem.Soc.,79,1559 (1957)
1957KVa A Kapustinskii,K Vasilevskii; Zh.Neorg.Khim.,2,2031 (1957)
1955JPa B Jezowska-Trzebiatowska,H Przywarska; Bull.Acad.Polon.Sci.Chim.,3,429 (1955)
1955MEa R Meyer; Thesis,Univ.Michigan.Univ.Mic.fil.18628 (1955)
1953BCa G Boyd,J Cobble,W Smith; J.Am.Chem.Soc.,75,5783 (1953)
1952HUa Z Hugus; Personal communication (1952)

EXPLANATORY NOTES

DATA Flags are :-

T Data at other TEMPERATURES
I Data with various BACKGROUNDS
H Data for THERMOCHEMICAL quantities
M Data for TERNARY Complexes

END