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 | | |

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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

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END