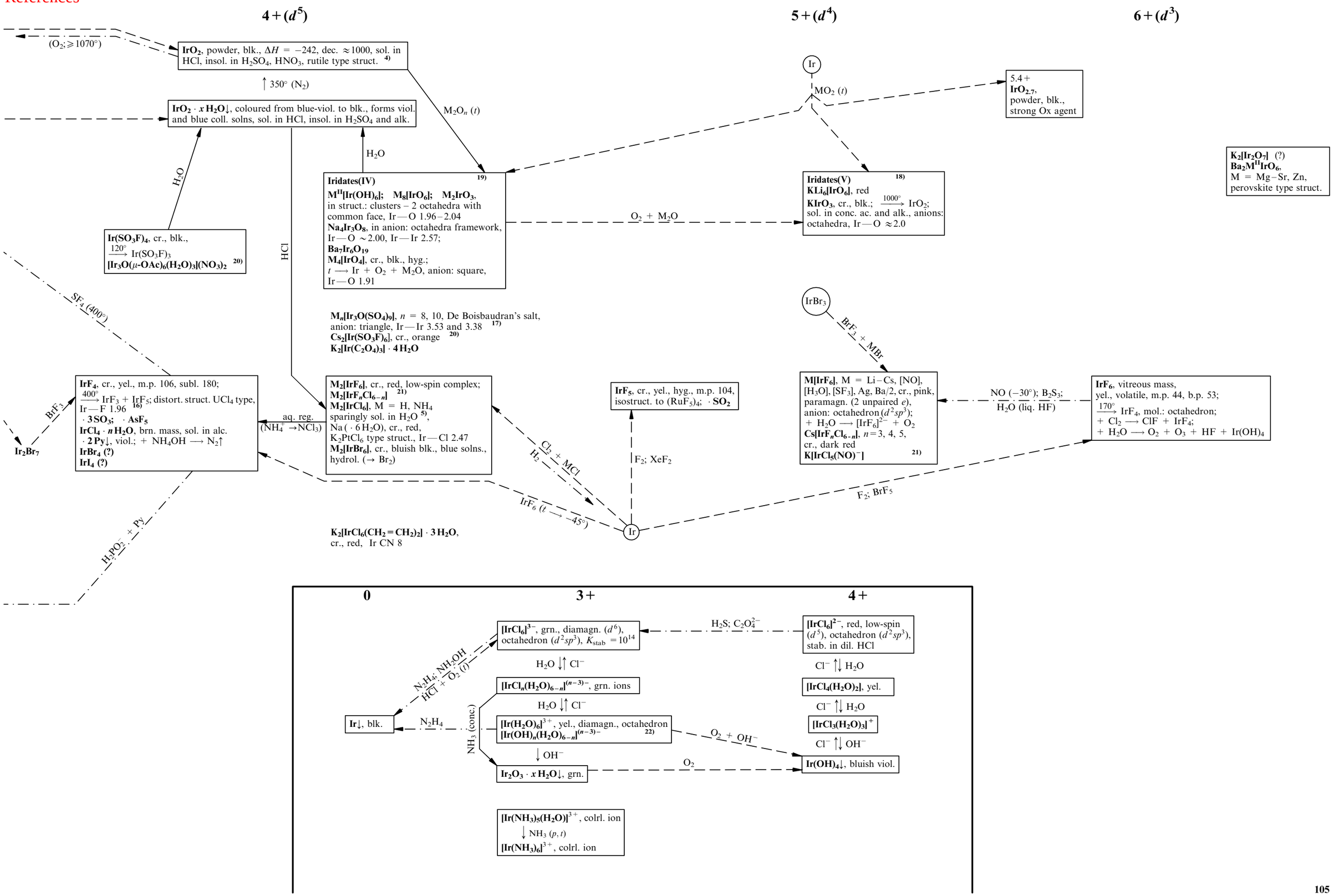
4 + (d^5)
5 + (d^4)
6 + (d^3)
(O_2; ⩾1070°)
IrO_2, powder, blk., ΔH = −242, dec. ≈1000, sol. in HCl, insol. in H_2SO_4, HNO_3, rutile type struct. 4)
↑ 350° (N_2)
$IrO_2 \cdot x\,H_2O$↓, coloured from blue-viol. to blk., forms viol. and blue coll. solns, sol. in HCl, insol. in H_2SO_4 and alk.
M_2O_n (*t*)
H_2O
H_2O
Iridates(IV) 19)
$M^{II}[Ir(OH)_6]$; **$M_8[IrO_6]$**; **M_2IrO_3**, in struct.: clusters – 2 octahedra with common face, Ir—O 1.96–2.04
$Na_4Ir_3O_8$, in anion: octahedra framework, Ir—O ~2.00, Ir—Ir 2.57;
$Ba_7Ir_6O_{19}$
$M_4[IrO_4]$, cr., blk., hyg.; *t* ⟶ Ir + O_2 + M_2O, anion: square, Ir—O 1.91
$Ir(SO_3F)_4$, cr., blk., 120° ⟶ $Ir(SO_3F)_3$
$[Ir_3O(\mu\text{-}OAc)_6(H_2O)_3](NO_3)_2$ 20)
HCl
O_2 + M_2O
Ir
MO_2 (*t*)
5.4 + **$IrO_{2.7}$**, powder, blk., strong Ox agent
Iridates(V) 18)
$KLi_6[IrO_6]$, red
$KIrO_3$, cr., blk.; 1000° ⟶ IrO_2; sol. in conc. ac. and alk., anions: octahedra, Ir—O ≈2.0
$K_2[Ir_2O_7]$ (?)
$Ba_2M^{II}IrO_6$, M = Mg–Sr, Zn, perovskite type struct.
SF_4 (400°)
$M_n[Ir_3O(SO_4)_9]$, *n* = 8, 10, De Boisbaudran's salt, anion: triangle, Ir—Ir 3.53 and 3.38 17)
$Cs_2[Ir(SO_3F)_6]$, cr., orange 20)
$K_2[Ir(C_2O_4)_3] \cdot 4\,H_2O$
IrBr$_3$
BrF_3 + MBr
IrF_4, cr., yel., m.p. 106, subl. 180; 400° ⟶ IrF_3 + IrF_5; distort. struct. UCl_4 type, Ir—F 1.96 16)
$\cdot 3\,SO_3$; **$\cdot AsF_5$**
$IrCl_4 \cdot n\,H_2O$, brn. mass, sol. in alc.
$\cdot 2\,Py$↓, viol.; + NH_4OH ⟶ N_2↑
$IrBr_4$ (?)
IrI_4 (?)
BrF_3
Ir_2Br_7
aq. reg. ($NH_4^+ \rightarrow NCl_3$)
$M_2[IrF_6]$, cr., red, low-spin complex; **$M_2[IrF_nCl_{6-n}]$** 21)
$M_2[IrCl_6]$, M = H, NH_4 sparingly sol. in H_2O 5), Na(· 6 H_2O), cr., red, K_2PtCl_6 type struct., Ir—Cl 2.47
$M_2[IrBr_6]$, cr., bluish blk., blue solns., hydrol. (→ Br_2)
IrF_5, cr., yel., hyg., m.p. 104, isostruct. to $(RuF_5)_4$; **$\cdot SO_2$**
Cl_2 + MCl
H_2
F_2; XeF_2
$M[IrF_6]$, M = Li–Cs, [NO], $[H_3O]$, $[SF_3]$, Ag, Ba/2, cr., pink, paramagn. (2 unpaired *e*), anion: octahedron (d^2sp^3); + H_2O ⟶ $[IrF_6]^{2-}$ + O_2
$Cs[IrF_nCl_{6-n}]$, *n* = 3, 4, 5, cr., dark red
$K[IrCl_5(NO)^-]$ 21)
NO (−30°); B_2S_3; H_2O (liq. HF)
IrF_6, vitreous mass, yel., volatile, m.p. 44, b.p. 53; 170° ⟶ IrF_4, mol.: octahedron; + Cl_2 ⟶ ClF + IrF_4; + H_2O ⟶ O_2 + O_3 + HF + $Ir(OH)_4$
IrF_6 (*t* ⟶ −45°)
F_2; BrF_5
$K_2[IrCl_6(CH_2{=}CH_2)_2] \cdot 3\,H_2O$, cr., red, Ir CN 8
$H_2PO_2^-$ + Py
0
3 +
4 +
$[IrCl_6]^{3-}$, grn., diamagn. (d^6), octahedron (d^2sp^3), K_{stab} = 10^{14}
H_2S; $C_2O_4^{2-}$
$[IrCl_6]^{2-}$, red, low-spin (d^5), octahedron (d^2sp^3), stab. in dil. HCl
H_2O ↓↑ Cl^-
Cl^- ↑↓ H_2O
N_2H_4; NH_2OH HCl + O_2 (*l*)
$[IrCl_n(H_2O)_{6-n}]^{(n-3)-}$, grn. ions
$[IrCl_4(H_2O)_2]$, yel.
Ir↓, blk.
N_2H_4
NH_3 (conc.)
$[Ir(H_2O)_6]^{3+}$, yel., diamagn., octahedron
$[Ir(OH)_n(H_2O)_{6-n}]^{(n-3)-}$ 22)
$[IrCl_3(H_2O)_3]^+$
O_2 + OH^-
↓ OH^-
$Ir_2O_3 \cdot x\,H_2O$↓, grn.
O_2
$Ir(OH)_4$↓, bluish viol.
$[Ir(NH_3)_5(H_2O)]^{3+}$, colrl. ion
↓ NH_3 (*p*, *t*)
$[Ir(NH_3)_6]^{3+}$, colrl. ion