



P L A S U S

Spectroscopic plasma monitor and
process control systems

July 2024



PLASUS SPECLINE

Version 3.1

Content of Database for Version:

SPECLINE A

SPECLINE AM

SPECLINE AMS

SPECLINE AMS-UD

Atoms in PLASUS SPECLINE A, AM and AMS:

The ionization states are given in spectroscopic notation: 'I' denotes neutrals, 'II' single ionized elements, 'III' double ionized elements, etc..

Z	Element	Symbol	Ionization state	Z	Element	Symbol	Ionization state
1	Hydrogen	H, D, T	I	52	Tellurium	Te	I - II
2	Helium	He	I - II	53	Iodine	I	I - V
3	Lithium	Li	I - III	54	Xenon	Xe	I - VIII
4	Beryllium	Be	I - IV	55	Cesium	Cs	I - IV
5	Boron	B	I - V	56	Barium	Ba	I - V
6	Carbon	C	I - V	57	Lanthanum	La	I - V
7	Nitrogen	N	I - VII	58	Cerium	Ce	I - V
8	Oxygen	O	I - VII	59	Praseodymium	Pr	I - V
9	Fluorine	F	I - VIII	60	Neodymium	Nd	I - II
10	Neon	Ne	I - IX	61	Promethium	Pm	I - II
11	Sodium	Na	I - IX	62	Samarium	Sm	I - II
12	Magnesium	Mg	I - XII	63	Europium	Eu	I - III
13	Aluminum	Al	I - XIII	64	Gadolinium	Gd	I - IV
14	Silicon	Si	I - XII	65	Terbium	Tb	I - IV
15	Phosphorus	P	I - XIII	66	Dysprosium	Dy	I - II
16	Sulfur	S	I - XVI	67	Holmium	Ho	I - II
17	Chlorine	Cl	I - X	68	Erbium	Er	I - III
18	Argon	Ar	I - XIV	69	Thulium	Tm	I - III
19	Potassium	K	I - XIV	70	Ytterbium	Yb	I - IV
20	Calcium	Ca	I - XV	71	Lutetium	Lu	I - V
21	Scandium	Sc	I - XXI	72	Hafnium	Hf	I - V
22	Titanium	Ti	I - XXI	73	Tantalum	Ta	I - V
23	Vanadium	V	I - XXII	74	Tungsten	W	I - II
24	Chromium	Cr	I - XXIII	75	Rhenium	Re	I - II
25	Manganese	Mn	I - XXIV	76	Osmium	Os	I - II
26	Iron	Fe	I - XXV	77	Iridium	Ir	I - II
27	Cobalt	Co	I - XXVI	78	Platinum	Pt	I - II
28	Nickel	Ni	I - XXVII	79	Gold	Au	I - III
29	Copper	Cu	I - V	80	Mercury	Hg	I - III
30	Zinc	Zn	I - IV	81	Thallium	Tl	I - IV
31	Gallium	Ga	I - V	82	Lead	Pb	I - V
32	Germanium	Ge	I - V	83	Bismuth	Bi	I - V
33	Arsenic	As	I - V	84	Polonium	Po	I
34	Selenium	Se	I - V	85	Astatine	At	I
35	Bromine	Br	I - V	86	Radon	Rn	I
36	Krypton	Kr	I - VIII	87	Francium	Fr	I
37	Rubidium	Rb	I - IV	88	Radium	Ra	I - II
38	Strontium	Sr	I - V	89	Actinium	Ac	I - IV
39	Yttrium	Y	I - V	90	Thorium	Th	I - IV
40	Zirconium	Zr	I - V	91	Protactinium	Pa	I - II
41	Niob	Nb	I - V	92	Uranium	U	I - II
42	Molybdenum	Mo	I - IV	93	Neptunium	Np	I
43	Technetium	Tc	I - II	94	Plutonium	Pu	I - II
44	Ruthenium	Ru	I - III	95	Americium	Am	I - II
45	Rhodium	Rh	I - III	96	Curium	Cm	I - II
46	Palladium	Pd	I - III	97	Berkelium	Bk	I - II
47	Silver	Ag	I - III	98	Californium	Cf	I - II
48	Cadmium	Cd	I - IV	99	Einsteinium	Es	I - II
49	Indium	In	I - V				
50	Tin	Sn	I - V				
51	Antimony	Sb	I - V				

Molecules in PLASUS SPECLINE AM and AMS:

Element	Molecules
Silver molecules	Ag ₂ , AgCl, AgF, AgH, AgO
Aluminum molecules	Al ₂ , AlCl, AlF, AlH, AlH ⁺ , AlN, AlO, AlS
Arsenic molecules	As ₂ , AsCl, AsF, AsH, AsN, AsO, AsO ⁺ , AsP, AsS, AsS ⁺
Gold molecules	Au ₂ , AuCl, AuH
Boron molecules	B ₂ , BCl, BF, BH, BH ⁺ , BN, BO, BO ⁺ , BS
Barium molecules	BaCl, BaF, BaH, BaO, BaS
Beryllium molecules	BeCl, BeF, BeH, BeH ⁺ , BeO, BeS
Carbon molecules	C ₂ , C ₂ ⁺ , C ₂ ⁻ , C ₃ , CCl, CF, CF ₂ , CH, CH ⁺ , CH ₂ , CH ₃ , CN, CN ⁺ , CN ₂ , C ₂ N, C ₂ N ₂ , CO, CO ⁺ , CO ₂ , CO ₂ ⁺ , CP, CS, CS ₂ , CS ₂ ⁺
Calcium molecules	CaCl, CaF, CaH, CaO, CaS
Cadmium molecules	CdCl, CdF, CdH, CdH ⁺
Chlorine molecules	Cl ₂ , Cl ₂ ⁺ , ClF, ClO
Chromium molecules	CrCl, CrF, CrH, CrO, CrS
Copper molecules	Cu ₂ , CuCl, CuF, CuH, CuO, CuS
Fluorine molecules	F ₂ , F ₂ ⁺
Iron molecules	FeCl, FeF, FeO
Gallium molecules	Ga ₂ , GaCl, GaF, GaH, GaO
Germanium molecules	GeCl, GeF, GeH, GeO, GeS
Hydrogen molecules	HCN, HCl, HCl ⁺ , HF, HF ⁺ , H ₂ O, H ₂ O ⁺
Helium molecules	He ₂ , HeNe
Mercury molecules	Hg ₂ , Hg ₂ ⁺ , HgCl, HgF, HgH, HgH ⁺
Indium molecules	In ₂ , InCl, InF, InH, InO, InO ⁺
Potassium molecules	K ₂
Lithium molecules	Li ₂ , LiCl, LiH
Magnesium molecules	Mg ₂ , MgCl, MgF, MgH, MgH ⁺ , MgO, MgS
Nitrogen molecules	N ₂ , N ₂ ⁺ , NCl, NF, NH, NH ⁺ , NH ₂ , NO, NO ₂ , N ₂ O, N ₂ O ⁺ , NS, NS ⁺
Sodium molecules	Na ₂ , NaF, NaH, NaK
Neon molecules	Ne ₂
Nickel molecules	NiCl, NiF, NiH, NiO
Oxygen molecules	O ₂ , O ₂ ⁺ , O ₃ , OH, OH ⁺
Phosphorus molecules	P ₂ , P ₂ ⁺ , PCl, PF, PF ⁺ , PH, PH ⁺ , PN, PO, PO ⁺ , PS, PS ⁺
Platinum molecules	PtC, PtH, PtO
Sulfur molecules	S ₂ , SF, SH, SH ⁺ , SO, SO ₂ , S ₂ O
Selenic molecules	Se ₂ , SeCl, SeH, SeO, SeS
Silicon molecules	Si ₂ , SiC ₂ , SiCl, SiF, SiH, SiH ⁺ , SiH ₂ , SiN, SiO, SiO ⁺ , SiO ₂ , SiS
Tin molecules	SnCl, SnF, SnH, SnO, SnS
Strontium molecules	SrCl, SrF, SrH, SrO
Tantalum molecules	TaO, TaO ⁺
Titanium molecules	TiCl, TiF, TiH, TiN, TiO, TiS
Vanadium molecules	VCl, VH, VO
Tungsten molecules	WO
Zinc molecules	Zn ₂ , ZnCl, ZnF, ZnH, ZnH ⁺ , ZnO

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Additional molecules in PLASUS SPECLINE AMS:

Element	Molecules
Silver molecules	AgBr
Aluminum molecules	AlBr
Arsenic molecules	AsH ₂
Boron molecules	BBr, BO ₂ , BOF ₂
Bromine molecules	Br ₂ , Br ₂ ⁺ , BrCl, BrF, BrO
Carbon molecules	CBr, CHCl, CHF, CHNO, CHNS, CHO, CHOCHO, CHOF, CHOOH, CH ₂ O, CH ₂ CHCHO, CH ₃ Br, CH ₃ Cl, CH ₃ NO ₂ , CH ₃ O, C ₂ H ₂ , C ₂ H ₄ , C ₂ H ₄ O, C ₂ H ₅ , C ₂ H ₅ CHO, C ₂ H ₅ NO ₂ , C ₃ H ₃ , C ₃ H ₅ , C ₃ H ₆ O, C ₄ H ₂ , C ₄ H ₂ ⁺ , C ₅ H ₅ , C ₆ H ₅ , C ₆ H ₅ Cl, C ₆ H ₅ F, C ₆ H ₅ CHO, C ₆ H ₅ OH, C ₆ H ₆ , C ₇ H ₇ , C ₁₀ H ₈ , CF ₃ NO, C ₃ F ₇ NO ₂ , C ₃ F ₇ NO, CF ₃ NO ₂ , COCl ₂ , C ₂ O, C ₃ O ₂ , COS, COS ⁺ , C ₃ S ₂
Calcium molecules	CaBr, CaOH
Cadmium molecules	CdBr
Cerium molecules	CeO
Chlorine molecules	ClF ₃ , ClO ₂
Chromium molecules	CrBr
Copper molecules	CuBr, CuOH
Fluorine molecules	FCO, F ₂ CO
Iron molecules	FeBr
Gallium molecules	GaBr
Germanium molecules	GeBr
Hydrogen molecules	H ₂ , HBr, HBr ⁺ , HCP, HNF, HNO, HNO ₂ , HS ₂ , H ₂ S, H ₂ S ⁺
Mercury molecules	HgBr, HgBr ₂ , HgCl ₂
Indium molecules	InBr, InBr ₂ , InCl ₂
Lithium molecules	LiBr
Magnesium molecules	MgBr, MgOH
Nitrogen molecules	N ₃ , NCO, NCS, NCl ₂ , NF ₂ , NH ₃ , N ₂ H ₂ , N ₂ H ₄ , NO ₃ , N ₂ O ₃ , N ₂ O ₄ , N ₂ O ₅ , NSF
Nickel molecules	NiBr
Phosphorus molecules	PH ₂ , PH ₃ , PHO, POBr, POBr ₂ , POCl, POCl ₂
Sulfur molecules	S ₃ , S ₄ , SO ₃
Selenic molecules	SeBr, SeBr ₂ , SeCl ₂ , SeO ₂
Silicon molecules	SiBr, SiBr ⁺ , SiHBr, SiCl ₂ , SiHCl, SiF ₂ , SiF ₃ , SiH ₄
Tin molecules	SnBr
Strontium molecules	SrBr, SrOH
Titanium molecules	TiBr
Zinc molecules	ZnBr

Additional User-Database in PLASUS SPECLINE AMS-UD:

Editable user database for adding custom species and spectral lines to the SPECLINE database.
Only available with PLASUS SPECLINE AMS.