

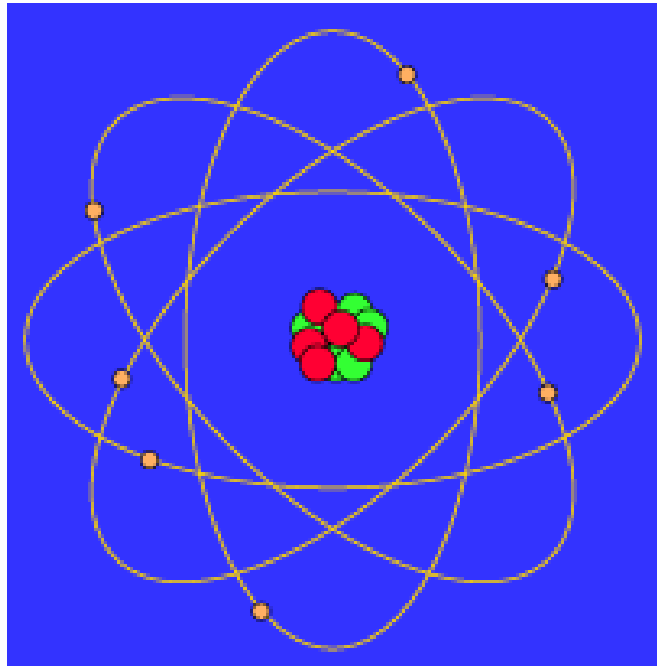
Struktur dan Ikatan Atom

Material Teknik

Pendahuluan

- Atom terdiri dari elektron dan inti atom
- Inti atom disusun oleh proton dan neutron
- Elektron mengelilingi inti atom dalam orbitnya masing-masing
- Massa elektron $9,109 \times 10^{-28}$ g dan bermuatan $-1,602 \times 10^{-19}$ C
- Massa proton $1,673 \times 10^{-24}$ g dan bermuatan $1,602 \times 10^{-19}$ C
- Massa neutron $1,675 \times 10^{-24}$ g dan tidak bermuatan
- Massa atom terpusat pada inti atom
- Jumlah elektron dan proton sama, sedangkan neutron netral, maka atom menjadi netral

Model atom Bohr



Konfigurasi elektron unsur

No.	Element	K	L	M	N	O	P	Q
		1	2	3	4	5	6	7
		s	s p	s p d	s p d f	s p d f	s p d f	s
1	H	1						
2	He	2						
3	Li	2	1					
4	Be	2	2					
5	B	2	2 1					
6	C	2	2 2					
7	N	2	2 3					
8	O	2	2 4					
9	F	2	2 5					
10	Ne	2	2 6					
11	Na	2	2 6	1				
12	Mg	2	2 6	2				
13	Al	2	2 6	2 1				
14	Si	2	2 6	2 2				
15	P	2	2 6	2 3				
16	S	2	2 6	2 4				
17	Cl	2	2 6	2 5				
18	Ar	2	2 6	2 6				
19	K	2	2 6	2 6 -	1			
20	Ca	2	2 6	2 6 -	2			
21	Sc	2	2 6	2 6 1	2			
22	Ti	2	2 6	2 6 2	2			
23	V	2	2 6	2 6 3	2			
24	Cr	2	2 6	2 6 5*	1			
25	Mn	2	2 6	2 6 5	2			
26	Fe	2	2 6	2 6 6	2			
27	Co	2	2 6	2 6 7	2			
28	Ni	2	2 6	2 6 8	2			
29	Cu	2	2 6	2 6 10	1*			
30	Zn	2	2 6	2 6 10	2			
31	Ga	2	2 6	2 6 10	2 1			
32	Ge	2	2 6	2 6 10	2 2			
33	As	2	2 6	2 6 10	2 3			
34	Se	2	2 6	2 6 10	2 4			
35	Br	2	2 6	2 6 10	2 5			
36	Kr	2	2 6	2 6 10	2 6			

Tabel Periodik

PERIODIC TABLE OF ELEMENTS

1 H 1																	2 He 4
3 Li 7	4 Be 9											5 B 11	6 C 12	7 N 14	8 O 16	9 F 19	10 Ne 20
11 Na 23	12 Mg 24											13 Al 27	14 Si 28	15 P 31	16 S 32	17 Cl 35.5	18 Ar 40
19 K 39	20 Ca 40	21 Sc 45	22 Ti 48	23 V 51	24 Cr 52	25 Mn 55	26 Fe 56	27 Co 59	28 Ni 59	29 Cu 63.5	30 Zn 65	31 Ga 70	32 Ge 73	33 As 75	34 Se 79	35 Br 80	36 Kr 84
37 Rb 85.5	38 Sr 88	39 Y 89	40 Zr 91	41 Nb 93	42 Mo 96	43 Tc (98)	44 Ru 101	45 Rh 103	46 Pd 106	47 Ag 108	48 Cd 112	49 In 115	50 Sn 119	51 Sb 122	52 Te 128	53 I 127	54 Xe 131
55 Cs 133	56 Ba 137	71 Lu 175	72 Hf 178.5	73 Ta 181	74 W 184	75 Re 186	76 Os 190	77 Ir 192	78 Pt 195	79 Au 197	80 Hg 201	81 Tl 204	82 Pb 207	83 Bi 209	84 Po (209)	85 At (210)	86 Rn (222)
87 Fr (223)	88 Ra 226	103 Lr (260)	104 Rf (261)	105 Db (262)	106 Sg (263)	107 Bh (262)	108 Hs (265)	109 Mt (266)	110 Uun (269)	111 Uuu (272)	112 Uub (277)	113 Uut	114 Uuq (289)			116 Uuh (289)	

- C SOLID METAL
Hg LIQUID SEMIMETAL (Metalloid)
H GAS NONMETAL

KEY

6 C 12	57 La 138	58 Ce 140	59 Pr 141	60 Nd 144	61 Pm (145)	62 Sm 150	63 Eu 152	64 Gd 157	65 Tb 159	66 Dy 162.5	67 Ho 165	68 Er 167	69 Tm 169	70 Yb 173
	89 Ac 227	90 Th 232	91 Pa 231	92 U 238	93 Np 237	94 Pu (244)	95 Am (243)	96 Cm (247)	97 Bk (247)	98 Cf (251)	99 Es (252)	100 Fm (257)	101 Md (258)	103 No (259)

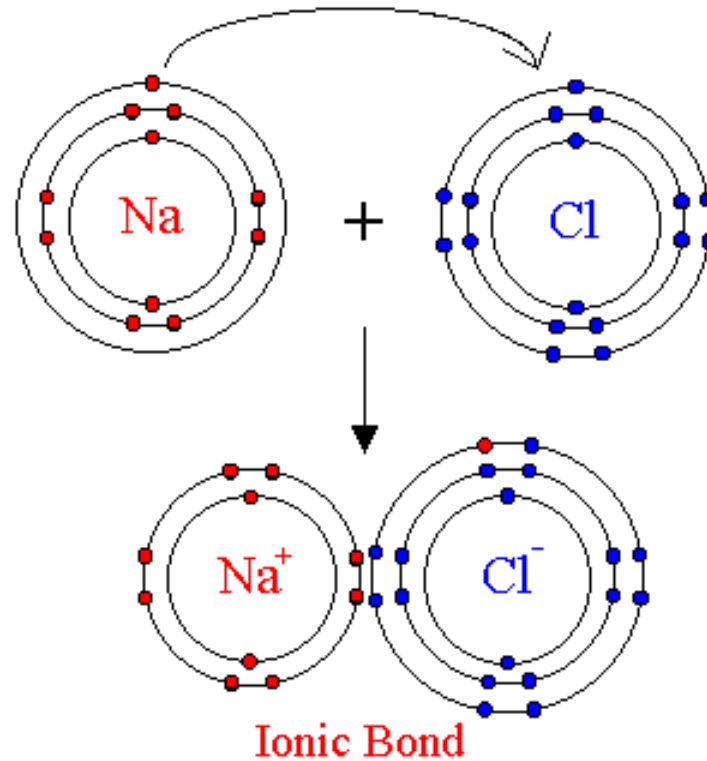
Elektronegatif dari Unsur

Z_{eff} ionization energy, electronegativity, and nonmetallic character increase
 Atomic radius and metallic character decrease

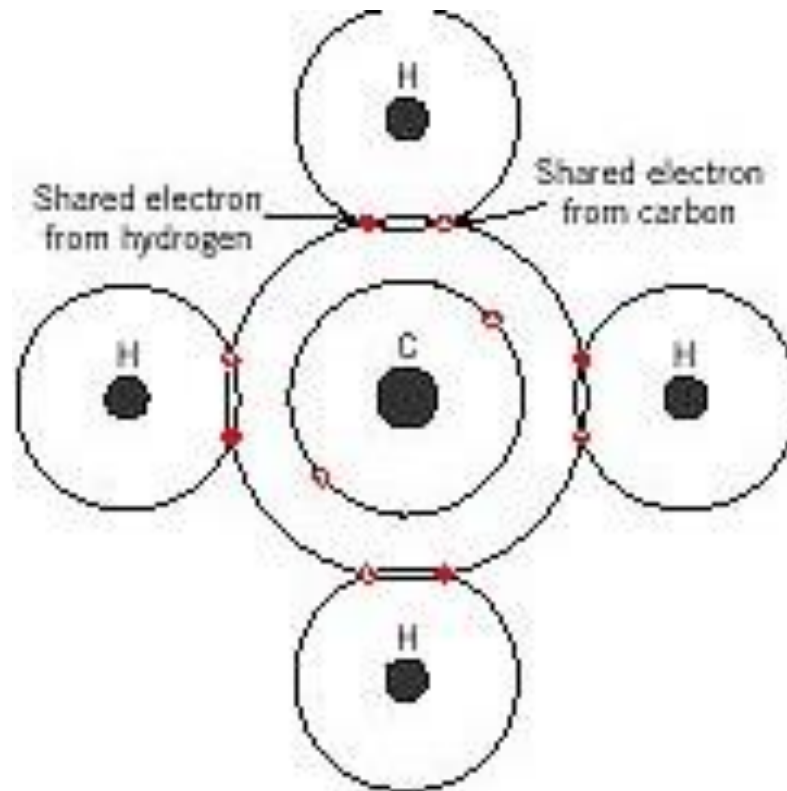
Ionization energy, electronegativity, and nonmetallic character decrease
 Atomic radius and metallic character increase

1 1A	2 2A	13 3A	14 4A	15 5A	16 6A	17 7A	18 8A
H							He
Li	Be	B	C	N	O	F	Ne
Na	Mg	Al	Si	P	S	Cl	Ar
K	Ca	Ga	Ge	As	Se	Br	Kr
Rb	Sr	In	Sn	Sb	Te	I	Xe
Cs	Ba	Tl	Pb	Bi	Po	At	Rn
Fr	Ra		114		116		118

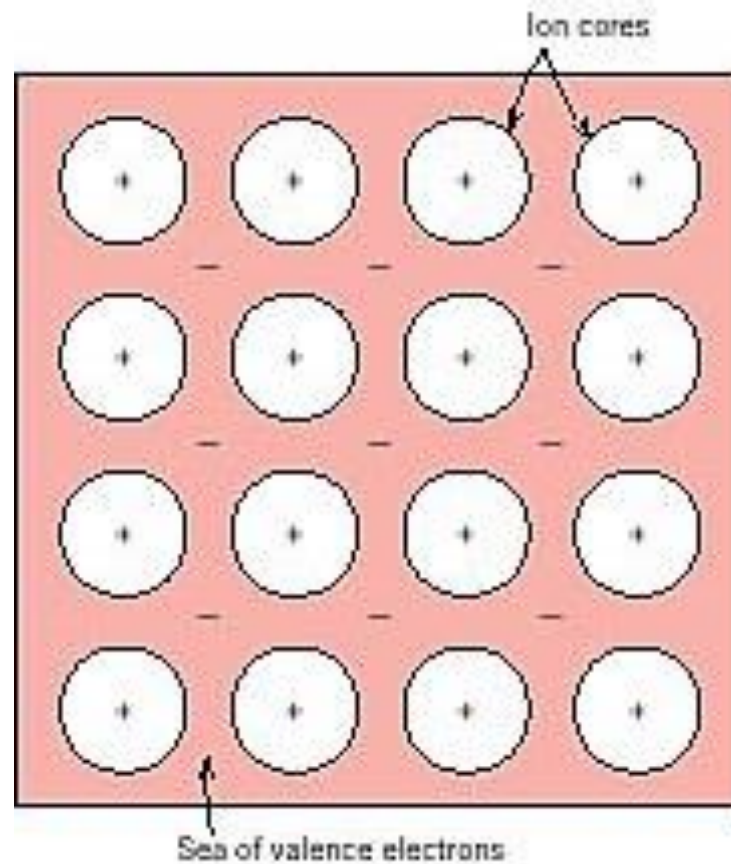
Ikatan Atom Ionik



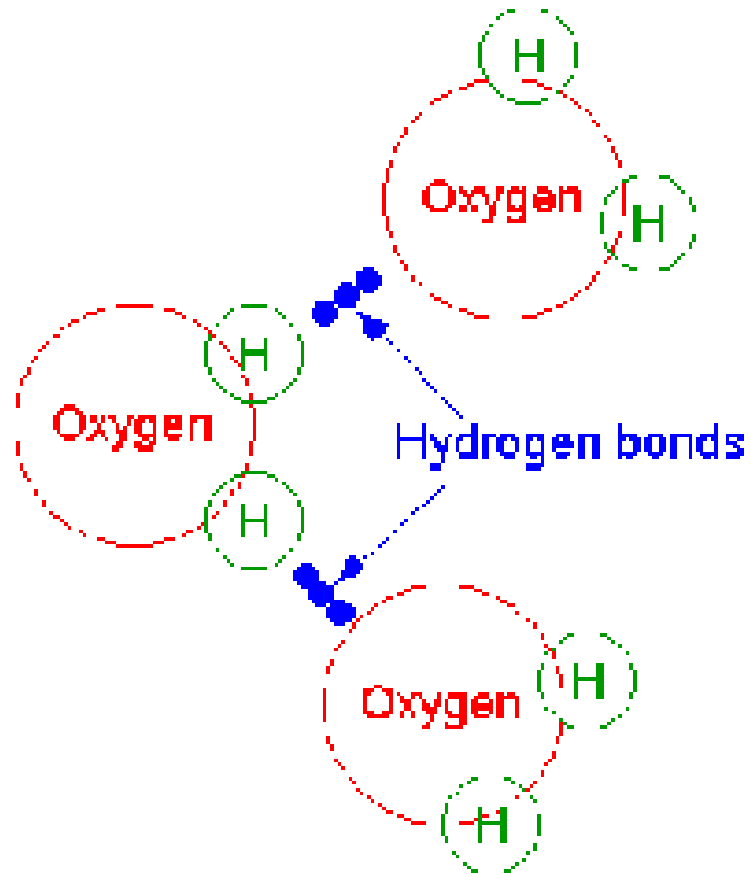
Ikatan Atom Kovalen



Ikatan Atom Logam



Ikatan Atom Hidrogen



Bilangan Koordinasi utk Ikatan Atom

Lattice Types and Madelung Constants for Different Stoichiometries and Radius Ratios of Cations and Anions

Radius Ratio (Cation/Anion)	Lattice Type	Coordination Number of Cation	Coordination Number of Anion	Madelung Constant	Reduced Madelung Constant
A. 1:1 Stoichiometry of Salt (MX)					
0.225–0.414	Wurtzite (ZnS)	4	4	1.63805	1.63805
	Zinc blende (ZnS)	4	4	1.64132	1.64132
0.414–0.732	Rock salt (NaCl)	6	6	1.74756	1.74756
0.732–1.000	CsCl	8	8	1.76267	1.76267
B. 1:2 Stoichiometry of Salt (MX₂)					
0.225–0.414	Beta-quartz (SiO ₂)	4	2	2.201	1.467
0.414–0.732	Rutile (TiO ₂)	6	3	2.408 ^a	1.605
0.732–1.000	Fluorite (CaF ₂)	8	4	2.51939	1.6796
C. 2:3 Stoichiometry of Salt (M₂X₃)					
0.414–0.732	Corundum (Al ₂ O ₃)	6	4	4.1719 ^a	1.6688
D. Other Stoichiometries and Lattice Types					
Never favored	Ion pair	1	1	1.00000	1.0000
0.000–0.155		2			
0.155–0.225		3			
0.225–0.414		4			
0.414–0.732		6			
0.732–1.000		8			
1.000		12			

NOTE: Reduced Madelung constant = Madelung constant $\times 2/\rho$, where ρ = number of ions in the simplest formula of the salt.

^a Exact value dependent on details of the structure.