

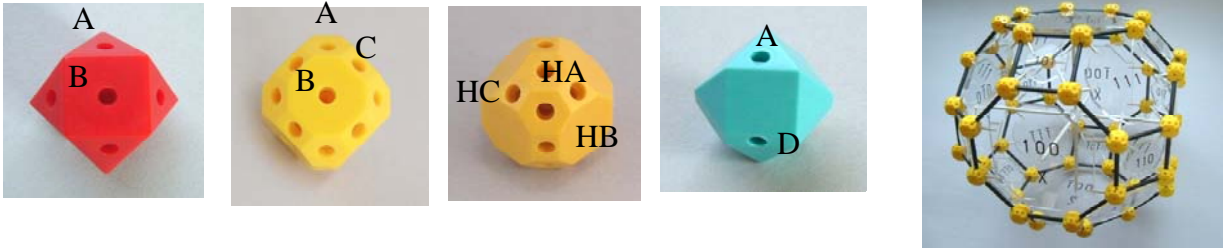
**HGS**

URL <http://www.hgs-model.com>

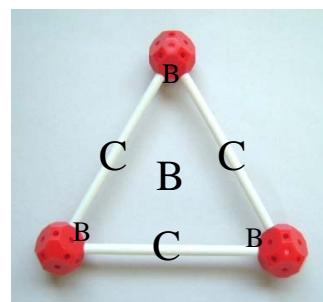
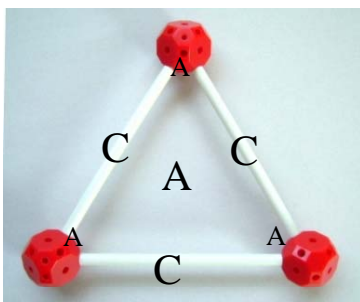
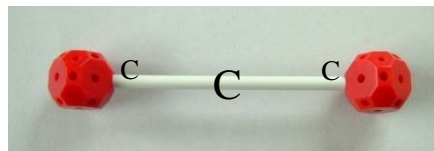
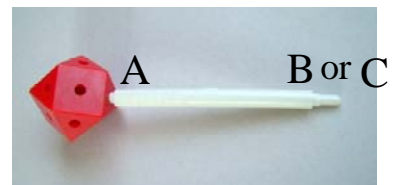
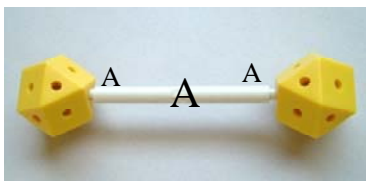
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### The mark of polyhedron fields



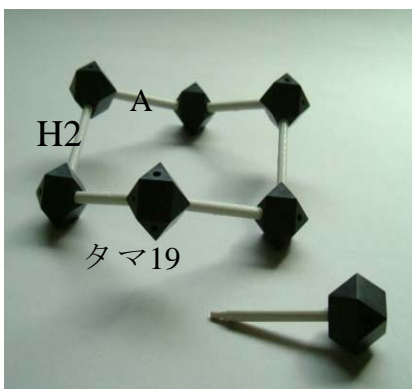
Mark	14-hedron	20-hedron	26-hedron	H-26-hedron	Faces number	Miller indices
A	triangular faces	triangular faces	hexagon faces		8	111
B	square faces		octagon faces		6	100
C			rectangular faces		12	110
D		rectangular faces			6	110
HA				hexagon faces	8	
HB				octagon faces	6	
HC				rectangular faces	12	



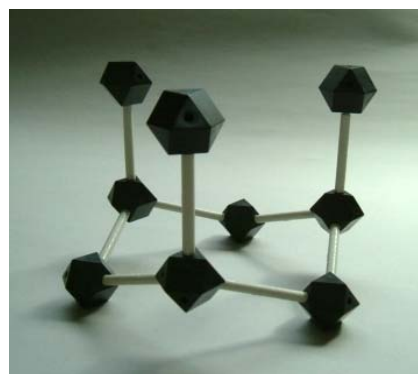
P2

## Diamond Structure

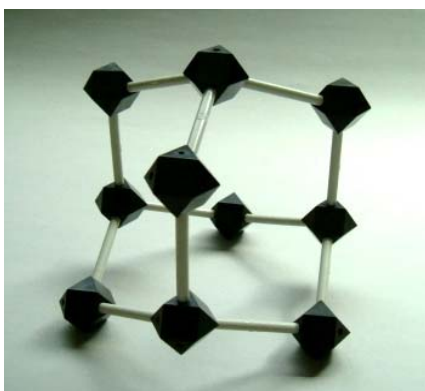
	Item No.	Parts No.	Color	Qty
Atom	19	LC4	Black	10
	31B	LM14B	Black	8
Bond	H2		White	16
	H4		White	12



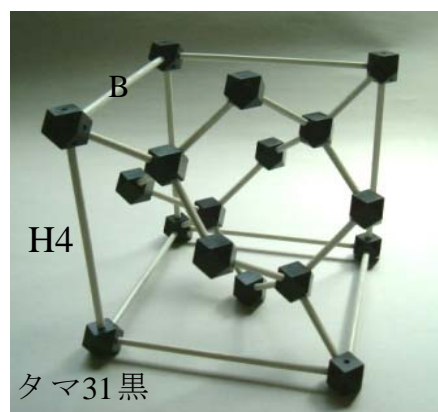
I



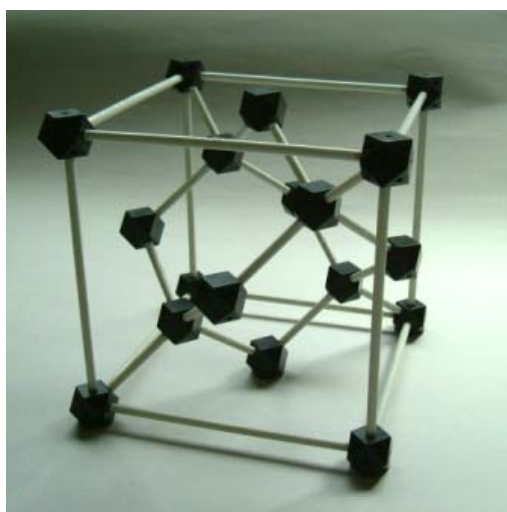
II



III



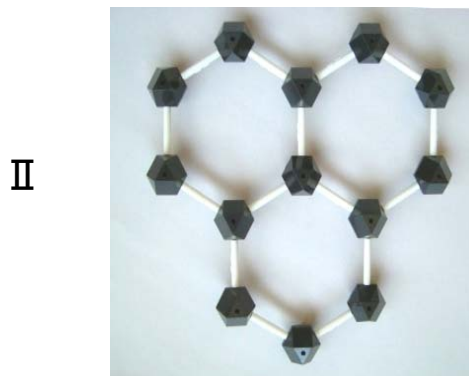
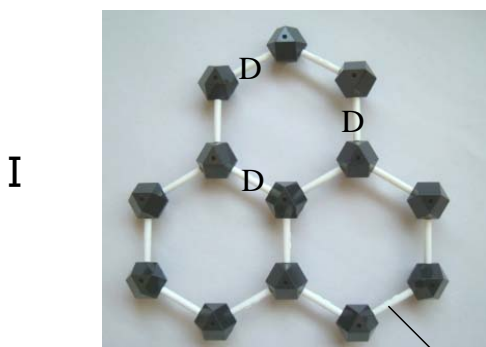
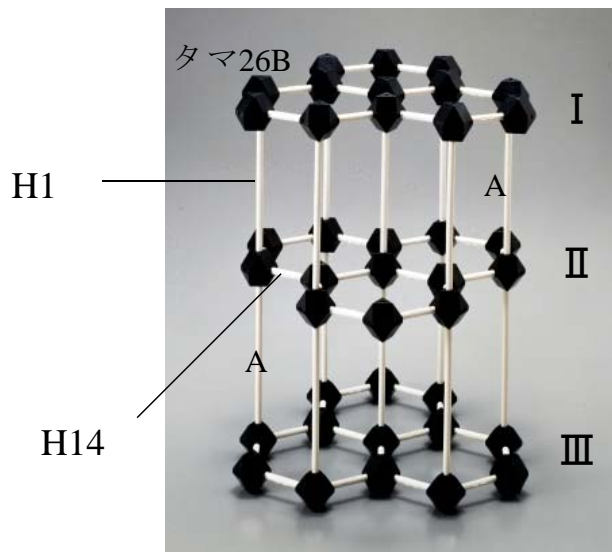
IV



V

# Graphite Structure

	Item No.	Parts No.	Color	Qty
Atom	26	LC <sup>5</sup>	Black	39
Bond	H6		White	14
	H11		White	45

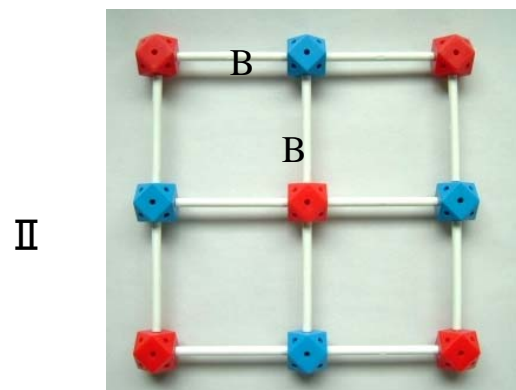
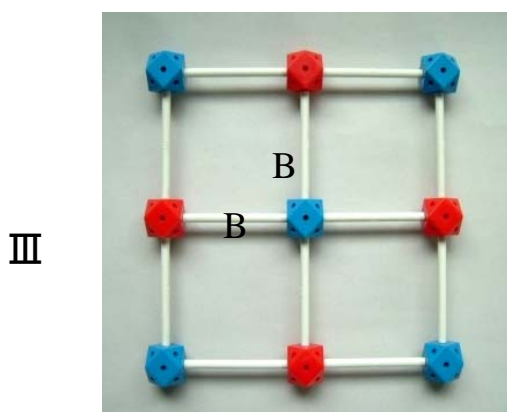
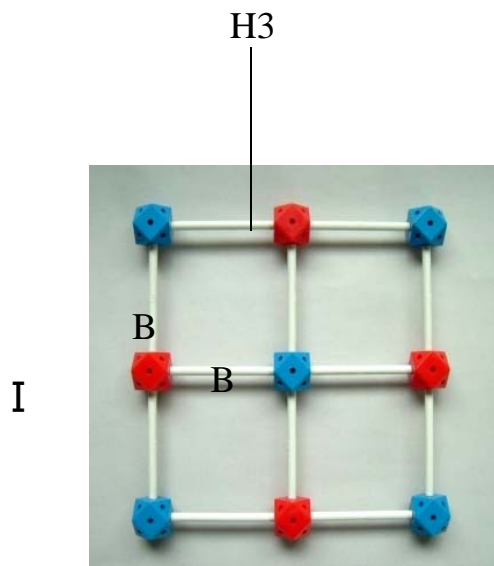
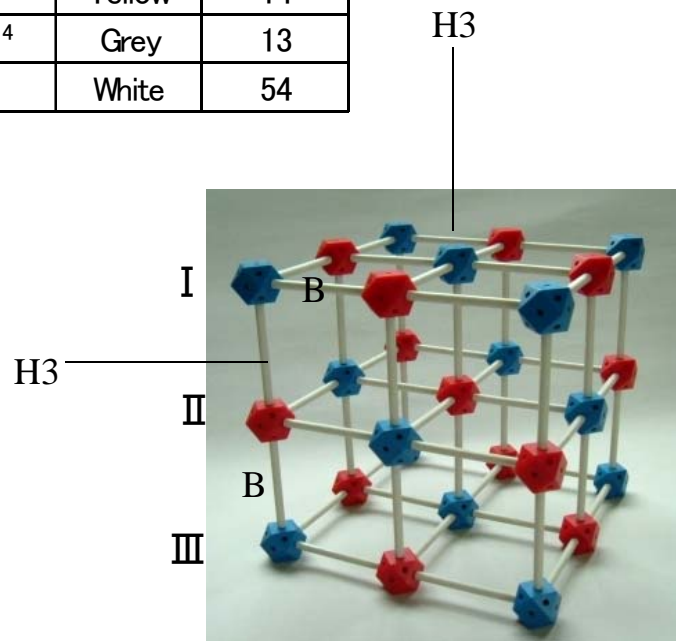


H1

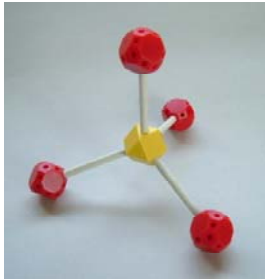
P4

## Rock salt Structure

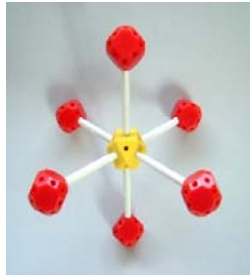
	Item No.	Parts No.	Color	Qty
Atom	30	LM <sup>14</sup>	Yellow	14
	31	LM <sup>14</sup>	Grey	13
Bond	H9		White	54



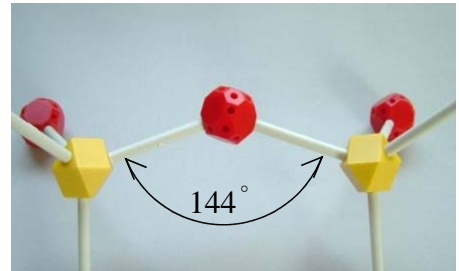
# The basic form of silicates



Tetrahedral



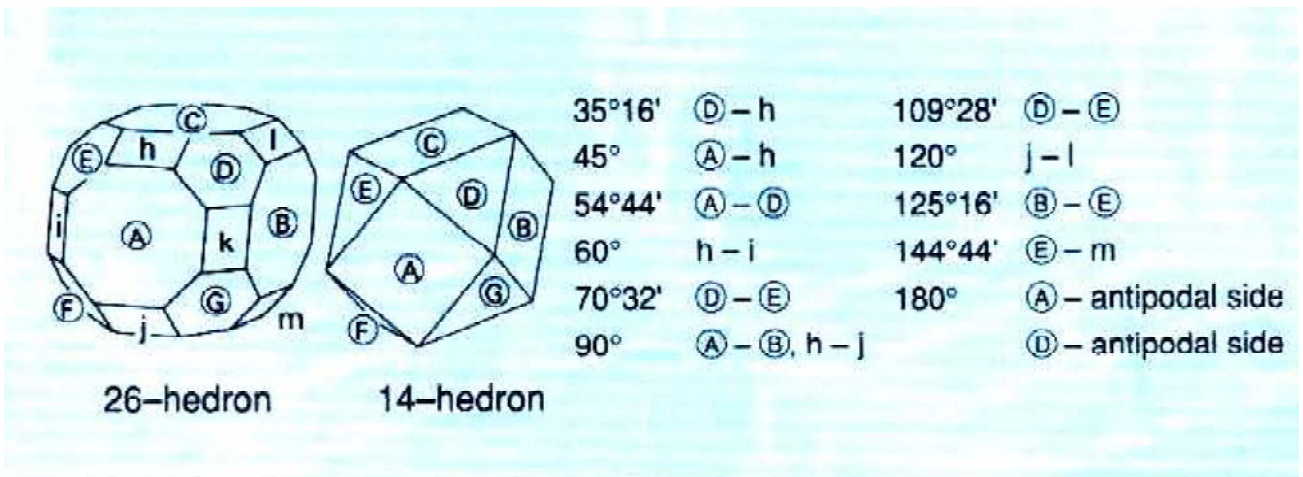
Octahedral



Si - O - Si angle

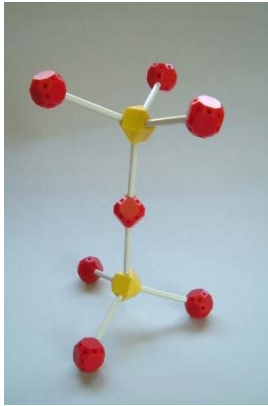
Note. Since the parts of octahedral are not contained in this model, please use a supplementary parts.

## The bond angles of HGS Polyhedron atoms

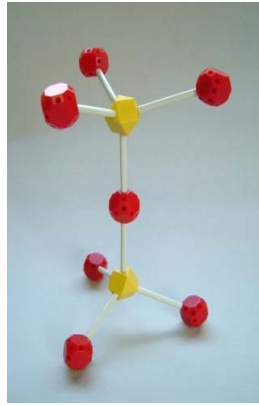


P6

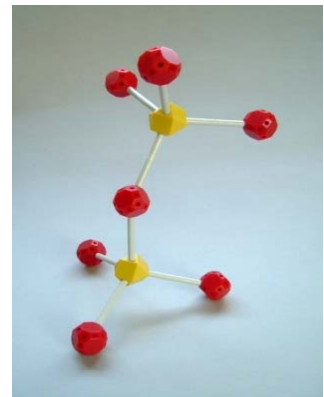
# Cilica(SiO2)--- structure



I

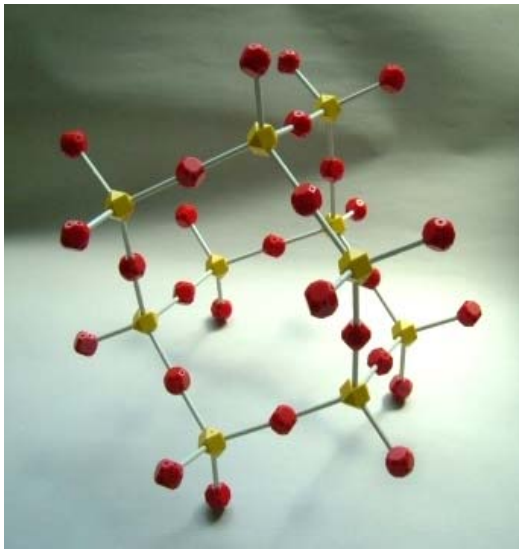


II

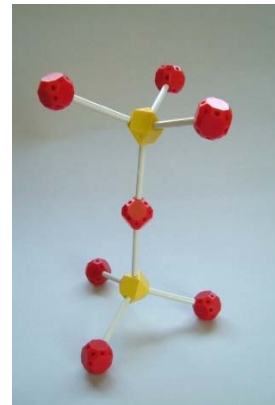


III

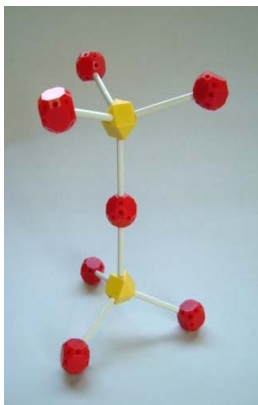
## $\beta$ -Cristbalite and $\beta$ - Tridymite



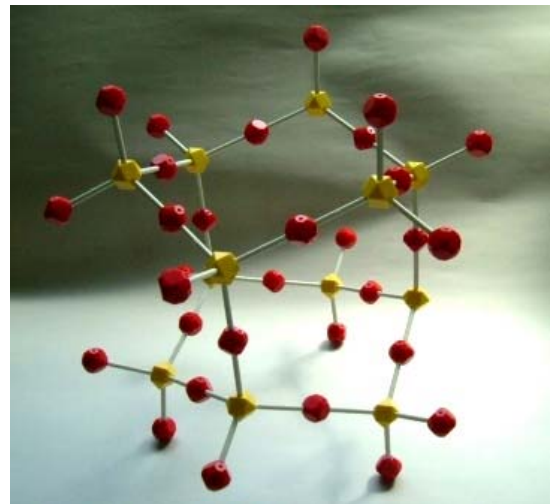
$\beta$  -Cristbalite



I



II

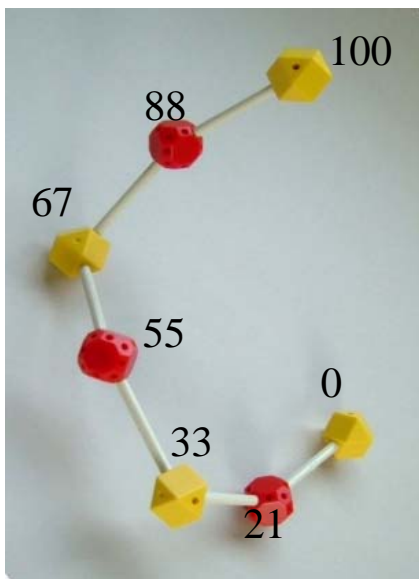
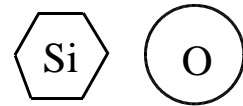


$\beta$  - Tridymite

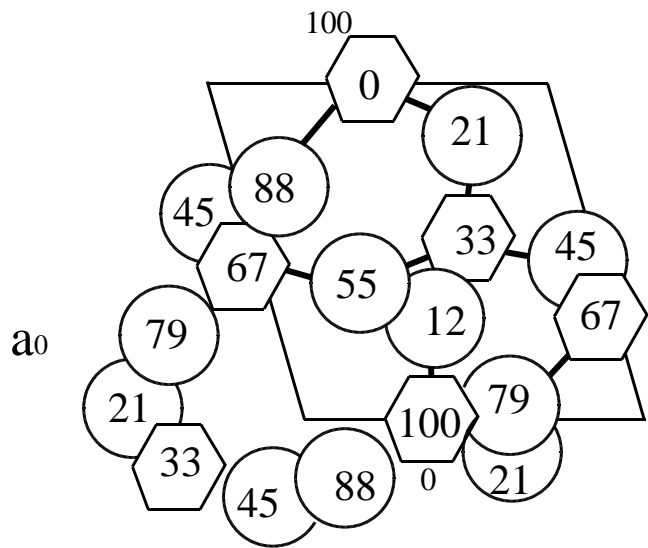
Rock crystal(SiO<sub>2</sub>) structure(1)

A right figure is equally divided into 100 upwards from space, when space is set to 0, and it expresses height numerically.

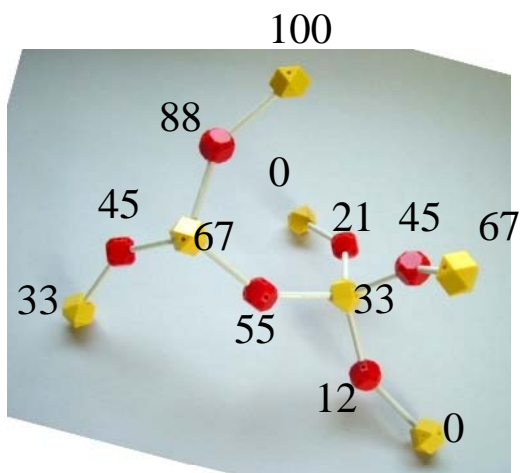
A circle is oxygen and a hexagon is silicon.



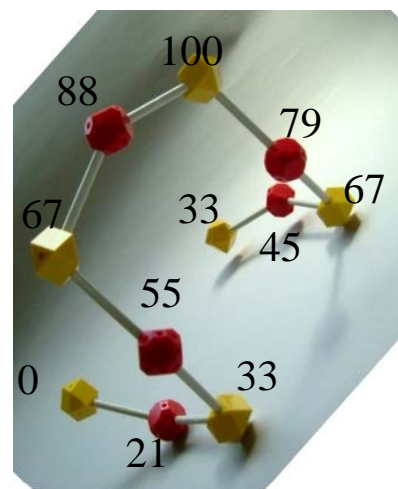
I



a<sub>0</sub>



II

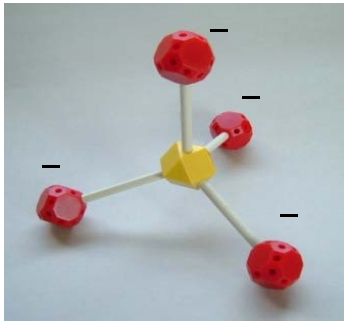


III

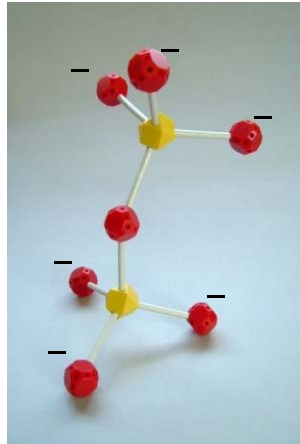


# Silicate ion--tetrahedral structure( $\text{SiO}_4$ )

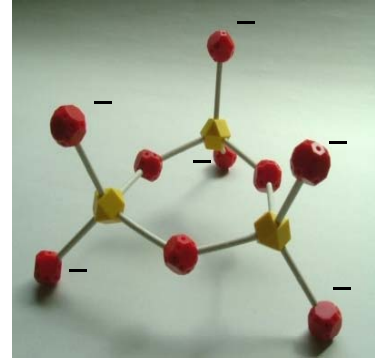
Note; The parts of octahedral structure ( $\text{SiO}_6$ ) are not contained  
Please use a supplementary parts.



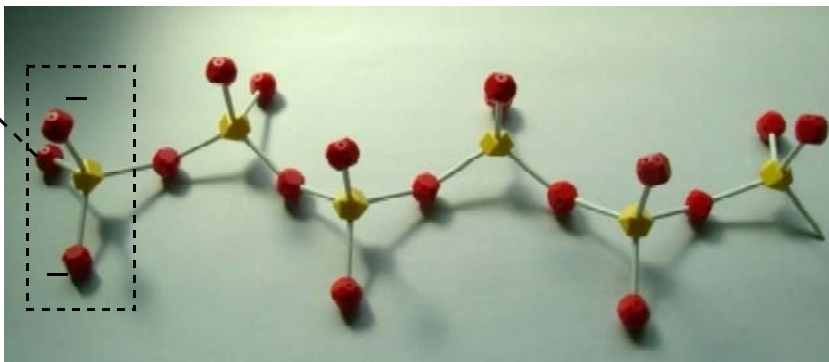
$[\text{SiO}_4]^{4-}$



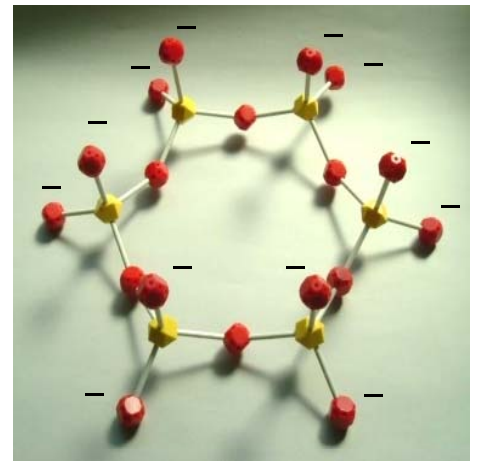
$[\text{Si}_2\text{O}_7]^{6-}$



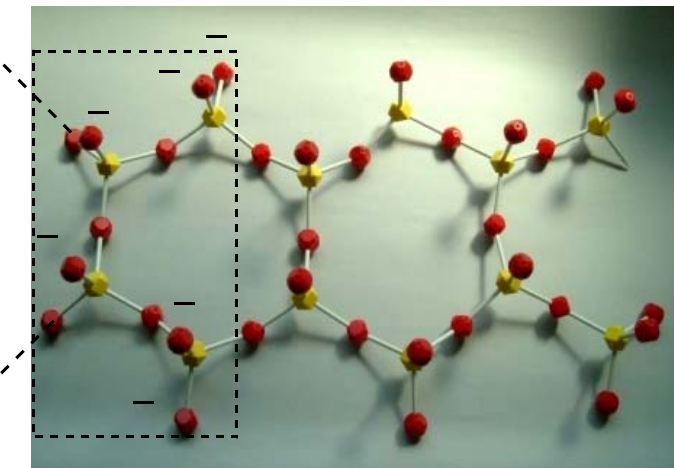
$[\text{Si}_3\text{O}_9]^{6-}$



$[(\text{SiO}_3)_n]^{2n-}$



$[\text{Si}_6\text{O}_{18}]^{12-}$



$[(\text{Si}_4\text{O}_{11})_n]^{6n-}$

Silicate ion	Silicate		
$[\text{SiO}_4]^{4-}$	Orthosilicate	Zircon	$\text{ZrSiO}_4$
$[\text{Si}_2\text{O}_7]^{6-}$	Pyrosilicate	Thortveitite	$\text{Sc}_2\text{Si}_2\text{O}_7$
$[\text{Si}_3\text{O}_9]^{6-}$	Benitoite etc.	Benitoite	$\text{BaTiSi}_2\text{O}_9$
$[(\text{SiO}_3)_n]^{2n-}$	Pyroxene etc.	Diopside	$\text{CaMg}(\text{SiO}_3)_2$
$[\text{Si}_6\text{O}_{18}]^{12-}$	Beryl etc.	Beryl	$\text{Ba}_3\text{Al}_2\text{Si}_6\text{O}_{18}$
$[(\text{Si}_4\text{O}_{11})_n]^{6n-}$	Amphibole etc.	Tremalite $\text{Ca}_2\text{Mg}_2(\text{Si}_4\text{O}_{11})_2(\text{OH})_2$	

## P 10

Contents of Diamond Graphite Set

● Atom					
Atom No.	Color	Parts code	Bond angle	Use	Quantity
19	black	LC4	109° 28`	sp3	10
24	yellow	LSi4	109° 28`	sp3	28
26B	black	LC5	90, 120°	sp2 dsp3	39
31 黒	black	LM14	90° 109° 28`	sp2 sp3	8
			125° 16`	d2sp	
28	blue	LM14	90° 109° 28`	sp2 sp3	14
			125° 16`	d2sp	
29	red	LM14	90° 109° 28`	sp2 sp3	13
			125° 16`	d2sp	
35	red	LM20	45° 60° 90°	sp2 sp3	82
			109° 28` 144° 44`	d2sp3	
● Bond					
Bond No.	Bond distance		Use	Quantity	
	A	ratio			
H1			graphite C=C	45	
H2		$\sqrt{3}/4$	diamond C-C	128	
H3			rock salt Na-Cl	54	
H4		1	diamond unit cell lattice	26	

## Note

The Diamond Graphite set is designed to make  $1 \text{ \AA} = 2.5 \text{ cm}$  in zink-blende crystals.

The magnification of bond distances of some of the other crystals is approximate one.

Consequently, bond distances shown in parentheses are not always the same as the bond distances

in the crystals themselves, but are those in the models.