



# COCHRANES MOLECULAR MODELS

## for teaching and research

### ORBIT AND MINIT SYSTEMS

Cochranes model kits are available in two sizes for building molecules on a scale of 3cm=100pm in the Orbit system or 2cm=100pm in the Minit system.

**15 atomic bonding configurations**, with atom centers color coded according to the element, permit 54 color/shape combinations. **Carbon** is represented in nine configurations: linear, trigonal (in five angle variations), tetrahedral, octahedral and trigonal-bipyramidal. **Oxygen** has eight configurations, **nitrogen** has ten. The Minit system has additional atom centers for use in minerals such as quartz and mica.

**Pre-cut plastic bond tubes** connect the atom centers at the proper scale. Rigid and flexible bond tubing is available in longer lengths for special requirements.

**Multiple bond pegs** prevent rotation of double bonds.

**Fieldhouse Heliwire bonds** make flexible connecting links with Orbit size bond tubes to create non-standard angles.

**Accessory atoms and bonds** are available. See the parts chart on the inside of this bulletin.

### Orbit Kits

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**Basic organic .....Z11,966-0**

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For the study of smaller organic compounds. Includes 70 atom centers and 180 bonds, with instruction card.

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**Basic structures .....Z18,477-2**

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Presents structural chemistry at an elementary level. Includes study cards covering topics such as sulfur, diamond and graphite, sodium chloride, metals, petroleum, acids and bases, soaps and detergents, polymers, nylon, water and ice. 240 atom centers and 250 bonds.

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**Biochemistry .....Z18,476-4**

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Includes a variety of special atom centers for building amino acids, heterocyclic rings and macromolecular groups. Topics covered in the text include: amino acids, monosaccharides, glycerol, fatty acids, steroids, purines and pyrimidines, peptides, disaccharides, lipids, nucleosides, nucleotides, proteins, polysaccharides and nucleic acids. 240 atom centers and 250 bonds.

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**Chem-Tutor ..... Z22,249-6**

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A low-cost model set for use by organic chemistry students during examinations. Includes text with problem and answer sections. 86 atom centers and 56 bonds packed in a sturdy plastic tub.

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**Large set .....Z11,963-6**

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Covers all branches of chemistry, from simple organic structures to macromolecules such as a complete pitch of DNA and extended lattices. Over 1300 atom centers including some of every center in the Orbit system and 1200 bonds.

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**Lattices .....Z18,478-0**

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Special 8 and 12 coordinate atom centers are included for easy construction of complex models. Text covers seven crystal systems: diamond, graphite, metals, sodium chloride, zinc blende and wurtzite, 8-coordinated ionic structures, rutile, ice and layer structures. 240 atom centers and 250 bonds.

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**Organic/Inorganic .....Z18,475-6**

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For the study of simple organic and inorganic molecules. Text covers topics such as saturated, unsaturated and cyclic hydrocarbons, benzene derivatives, optical isomerism, multiple bonds, functional groups, polymers and complex ions. 240 atom centers and 250 bonds.

# Cochranes Molecular Models

Technical Information Bulletin

Number AL-183

The name and catalog number of each Cochranes model set is shown in the top row of the chart. Parts included in each set are listed below each catalog number in a vertical column. Atom centers may be ordered separately in packages of 100 pieces. Use the descriptive information on the left side of the chart to locate specific atom centers. Catalog numbers for ordering parts are shown in the yellow color-coded columns.



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**Minit Size Model Sets**  
Scale 2cm=100 picometers  
Scale 1.25cm=100 picometers, Micrit set only



**Orbit Size Model Sets**  
Scale 3cm=100 picometers

Atoms	Color	Organic/ inorganic	Lattices	Biochemistry	Organic/ inorganic group set	Lattices group set	Biochemistry group set	Micrit group set	Minit atom centers 100/Pkg.	Large set	Basic organic	Chem-Tutor	Organic/ inorganic	Lattices	Biochemistry	Basic structures	Orbit atom centers 100/Pkg.	
																		Z11,967-9
Hydrogen	Univalent	White	50	-	70	250	-	280	-	Z12,720-5	250	18	12	50	-	70	80	Z12,712-4
Nitrogen	Nitrile	Blue	10	-	-	50	-	-	-	Z15,975-1	10	2	-	10	-	-	-	Z15,977-8
Oxygen	Carbonyl	Red	10	-	10	50	-	50	-	Z12,721-3	50	2	4	10	-	10	5	Z12,713-2
Fluorine	Univalent	Light green	10	-	-	50	-	-	-	Z15,978-6	10	-	-	10	-	-	-	Z18,528-0
Sulfur	Doubly bonded	Yellow	2	-	2	20	-	20	-	Z15,979-4	10	-	-	2	-	2	-	Z15,980-8
Chlorine	Univalent	Green	15	-	2	90	-	20	-	Z15,981-6	10	6	-	15	-	2	4	Z18,529-9
Bromine	Univalent	Blue green	-	-	-	-	-	-	-	NA	10	-	-	-	-	-	-	Z15,982-4
Iodine	Univalent	Dark green	-	-	-	-	-	-	-	NA	10	-	-	-	-	-	-	Z15,983-2
Hydrogen	Hydrogen bond	White	-	25	10	-	125	100	-	Z15,947-6	40	-	-	-	25	10	25	Z15,923-9
Carbon	Allene/ Acetylene	Black	10	-	-	50	-	-	-	Z15,984-0	5	2	-	10	-	-	-	Z15,985-9
Nitrogen	Half azo Azide	Blue	2	-	-	20	-	-	-	Z15,948-4	5	-	-	2	-	-	-	Z15,940-9
Oxygen	Hydrogen bonding	Red	-	-	10	-	-	100	50	Z15,949-2	20	-	-	-	10	-	-	Z15,957-3
Sulfur	Diunivalent	Yellow	10	-	2	50	-	20	50	Z15,950-6	10	-	-	10	-	2	9	Z18,609-0
Nitrogen	5 ring azo	Blue	-	-	2	-	-	20	-	Z15,986-7	10	-	-	-	-	2	-	Z15,408-3
Oxygen	Diunivalent/ Hydrogen bonding	Red	25	-	25	125	-	100	200	Z12,722-1	120	6	8	25	-	25	21	Z12,714-0
Nitrogen	6 ring azo	Blue	-	-	5	-	-	25	-	Z18,610-4	10	-	-	-	-	5	-	Z15,409-1
Carbon	For strained rings	Brown	-	-	-	-	-	-	-	NA	5	-	-	-	-	-	-	Z15,987-5
Phosphorus	Trivalent	Purple	-	-	-	-	-	-	-	NA	10	-	-	-	-	-	-	Z15,988-3
Oxygen	For rutile	Red	-	-	-	-	-	-	-	NA	-	-	-	-	-	-	-	Z15,989-1
Carbon	5/6 ring planar	Black	-	-	5	-	-	-	-	Z18,611-2	20	-	-	-	-	5	-	Z15,410-5
Carbon	5 ring planar	Black	-	-	5	-	-	25	-	Z12,724-8	20	-	-	-	-	5	-	Z12,715-9
Nitrogen	5 ring planar	Blue	-	-	2	-	-	20	-	Z15,951-4	20	-	-	-	-	2	-	Z15,411-2
Oxygen	Coordination/ Hydrogen bonding	Red	-	-	-	-	-	-	-	NA	10	-	-	-	-	-	-	Z15,990-5
Carbon	Carbonyl	Black	-	-	20	-	-	100	200	Z12,734-5	20	-	-	-	-	20	-	Z12,733-7
Nitrogen	Amine, amide	Blue	-	-	20	-	-	100	75	Z14,619-6	20	-	-	-	20	-	-	Z14,618-8
Carbon	6 ring planar	Black	20	30	20	100	150	100	400	Z12,725-6	100	6	14	20	30	20	25	Z12,716-7
Nitrogen	6 ring planar/ Azo	Blue	6	-	10	30	-	50	100	Z12,958-5	50	2	4	6	-	10	2	Z12,957-7
Oxygen	Trigonal	Red	-	30	-	-	150	-	-	Z15,991-3	20	-	-	-	30	-	-	Z15,992-1
Carbon	Tetrahedral	Black	30	35	30	200	175	150	400	Z12,726-4	110	12	24	30	35	30	50	Z12,717-5
Nitrogen	Tetrahedral	Blue	10	-	2	50	-	20	100	Z12,727-2	10	2	10	10	-	2	4	Z12,718-3
Oxygen	Tetrahedral	Red	10	15	-	50	75	-	100	Z15,925-5	20	2	2	10	15	-	20	Z15,926-3
Phosphorus	Tetrahedral	Purple	5	-	5	25	-	25	-	Z12,728-0	20	1	4	5	-	5	-	Z12,719-1
Sulfur	Tetrahedral	Yellow	5	20	-	25	100	-	10	Z15,994-8	12	1	2	5	20	-	1	Z15,927-1
Copper	Tetrahedral	Copper	-	-	-	-	-	-	-	NA	10	-	-	-	-	-	-	Z15,995-6
Halogen	Tetrahedral	Green	-	10	-	-	50	-	-	Z18,461-6	20	-	-	-	10	-	-	Z15,996-4
Metal	Tetrahedral	Silver	2	25	1	20	125	10	10	Z15,997-2	30	-	-	2	25	1	-	Z15,998-0
Carbon	Octahedral	Black	2	-	-	90	-	-	-	Z15,099-1	6	2	-	2	-	-	-	Z15,098-3
Nitrogen	Octahedral	Blue	-	-	-	-	-	-	-	Z15,101-7	4	-	-	-	-	-	-	Z15,100-9
Oxygen	Octahedral	Red	-	-	-	-	-	-	-	NA	14	-	-	-	-	-	-	Z15,999-9
Sulfur	Octahedral	Yellow	1	-	-	10	-	-	-	Z17,549-8	5	-	-	1	-	-	-	Z17,550-1
Iron	Octahedral	Dark grey	-	-	1	-	-	6	-	Z18,549-3	12	-	-	-	-	1	-	Z18,550-7
Halogen	Octahedral	Green	-	20	-	-	100	-	-	Z18,467-5	20	-	-	-	20	-	15	Z18,551-5
Metal	Octahedral	Silver	2	15	-	20	75	-	15	Z18,552-3	20	-	-	2	15	-	15	Z18,553-1
Carbon	Trigonal bipyramid	Black	6	-	-	50	-	-	-	Z18,462-4	6	2	-	6	-	-	-	Z15,929-8
Nitrogen	Trigonal bipyramid	Blue	1	-	-	10	-	-	-	Z18,464-0	4	-	-	1	-	-	-	Z18,555-8
Oxygen	Trigonal bipyramid	Red	1	-	-	15	-	-	-	Z18,465-9	4	-	-	1	-	-	-	Z18,556-6
Phosphorus	Trigonal bipyramid	Purple	1	-	-	10	-	-	-	Z18,466-7	2	-	-	1	-	-	-	Z18,533-7
Halogen	8 coordinate	Green	-	5	-	-	25	-	-	Z17,552-8	5	-	-	-	5	-	-	Z17,553-6
Metal	8 coordinate	Silver	-	20	-	-	100	-	-	Z14,846-6	20	-	-	-	20	-	-	Z14,845-8
Metal	12 coordinate	Silver	-	20	-	-	100	-	-	Z14,848-2	40	-	-	-	20	-	13	Z14,847-4
Oxygen	Minerals	Red	-	-	-	-	30	-	-	Z15,955-7	-	-	-	-	-	-	-	NA
Oxygen	Minerals	Red	-	-	-	-	30	-	-	Z18,558-2	-	-	-	-	-	-	-	NA
Oxygen	Minerals	Red	-	-	-	-	30	-	-	Z18,559-0	-	-	-	-	-	-	-	NA
Bonding Pegs	2-Prong, 90°	Neutral	8	-	-	50	-	-	-	Z18,574-4	12	-	-	8	-	-	-	Z18,575-2
Bonding Pegs	1-Prong	Neutral	-	-	5	50	-	25	-	Z14,616-1	30	4	-	6	-	5	-	Z14,615-3
Bonding Pegs	2-Prong, 180°	Neutral	-	-	-	20	-	-	-	Z18,567-1	12	-	-	4	-	-	-	Z18,569-8
Total no. of atoms/set			240	270	260	1510	1470	1395	>1700		1300	70	86	240	240	240	240	
Total no. of bonds/set			250	250	250	1700	1600	1855	>1000		1200	180	56	250	250	250	250	

## ACCESSORY BOND TUBES

### Minit Size Bond Tube Sets

Color	Length/cm	Quantity	Catalog Number
Green	21.0	100	Z15,952-2
White	21.0	100	Z15,958-1
Red	21.0	100	Z15,960-3
Flexible White	21.0	10	Z15,097-5
Green	3.5	800	Z15,943-3
Green	2.5	800	Z18,463-2
White	3.5	800	Z15,944-1
Red	3.0	600	Z15,946-8

### Bond Tube Assortment Set-Minit Size

This set includes the following tubes:	Quantity	Catalog Number
Green	2.5	160
Green	2.0	160
Green	1.5	400
Green	21.0	10
White	21.0	6
Red	21.0	3
Flexible White	21.0	5

### Orbit Size Bond Tube Sets

Color	Length/cm	Quantity	Catalog Number
Green	21.0	100	Z15,953-0
White	21.0	100	Z15,967-0
Flexible White	21.0	10	Z15,096-7
Green	3.5	700	Z15,412-1

### Bond Tube Assortment Set-Orbit Size

This set includes the following tubes:	Quantity	Catalog Number
Green	3.5	140
Green	2.5	140
Green	2.0	420
Green	21.0	10
Grey	21.0	3
White	21.0	3
Red	21.0	3
Flexible White	21.0	5

## Minit Kits

Minit size atoms and bonds are like those in the Orbit System only smaller. Text materials cover the same topics as those described in the corresponding Orbit size kits. Individual kits include single text; group kits include 5 texts.

### Micrit .....Z15,320-6

For building models of large enzymes, proteins and macromolecules. 1700 Minit size atom centers, 1000 strengthened bonds for holding the angle of rotation in larger models, and 115 polystyrene spheres which fit over the edges of a model to show overall shape and surface contours. Scale is 1.25cm=100pm.

### Biochemistry

#### **Individual**

260 atom centers and 250 bonds .....Z15,317-6

#### **Group**

1395 atom centers and 1855 bonds .....Z15,319-2

### Lattices

#### **Individual**

270 atom centers and 250 bonds .....Z15,316-8

#### **Group**

1470 atom centers and 1600 bonds .....Z15,318-4

### Organic/Inorganic

#### **Individual**

240 atom centers and 250 bonds .....Z11,967-9

#### **Group**

1510 atom centers and 1700 bonds .....Z11,968-7

## ACCESSORY BOND TUBES

### Orbit Size Bond Tube Sets

Color	Length (cm)	Quantity	Catalog No.
Green	21.0	100	Z15,953-0
White	21.0	100	Z15,967-0
Flexible White	21.0	10	Z15,096-7
Green	3.5	700	Z15,412-1

#### **Bond Tube Assortment Set .....Z12,735-3**

This set includes the following Orbit size tubes:

Green	21.0	10
Flexible White	21.0	5
Grey	21.0	3
White	21.0	3
Red	21.0	3
Green	3.5	140
Green	2.5	140
Green	2.0	420

### Minit Size Bond Tube Sets

Color	Length (cm)	Quantity	Catalog No.
Green	21.0	100	Z15,952-2
Red	21.0	100	Z15,960-3
White	21.0	100	Z15,958-1
Flexible White	21.0	10	Z15,097-5
Green	3.5	800	Z15,943-3
White	3.5	800	Z15,944-1
Red	3.0	600	Z15,946-8
Green	2.5	800	Z18,463-2

#### **Bond Tube Assortment Set .....Z12,736-1**

This set includes the following Minit size tubes:

Green	21.0	10
White	21.0	6
Flexible White	21.0	5
Red	21.0	3
Green	2.5	160
Green	2.0	160
Green	1.5	400

#### **Fieldhouse Heliwire bonds .....Z18,479-9**

Coiled ribbon of 22-gauge vinyl-coated wire loops for making flexible connecting links with Orbit-size bonding tubes. Loops are cut from coil and inserted into tubes. Especially useful where non-standard bond angles are needed. Includes instruction booklet.

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Aldrich warrants that its products conform to the information contained in this and other Aldrich publications. Purchaser must determine the suitability of the product for its particular use. See reverse side of invoice or packing slip for additional terms and conditions of sale.

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