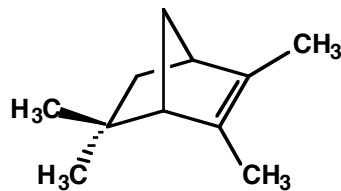


CHEMDRAW LESSON

A) Draw Figure 1.

Drawing solid bonds. Draw bent six-membered ring using Solid Bond tool and fixed lengths and angles. Attach 4 methyl groups. Make bridge at center of ring.



1,2,4,4-tetramethylbicyclo[2.2.1]hept-2-ene

Fig 1

Changing the angle and distance of bonds. Elongate the bridge by Shift-Dragging the bridge bonds with the Lasso tool.

Changing the perspective of bonds. Bring the ring bond to the front by Double-Clicking on the ring bond covered by the bridge bond with the Solid Bond tool.

Converting single bonds to multiple bonds. Draw over the ring bond with the Solid Bond tool to create a double bond. Further overdrawing gives triple bond and then back to a single bond.

Positioning double bonds. Double-Click on the double bond to change its position to the one that you want.

Converting solid bonds to wedge and dash bonds. Select the Wedge Bond and then Single-Click on the solid bond you want to convert. Select the Dash Bond and repeat. The thicker end of the wedge or dash will change from end to end as you Click on the bond.

Rotating and scaling the structure. Select the Lasso tool. Lasso (encircle) the structure to select it. Select the Solid Bond tool to deselect the structure. Select the Lasso tool. Double-Click with the loose end of the Lasso tool on any one of the bonds in the structure to select the entire structure.

Move the cursor to the bottom right corner until a double-headed arrow appears. Drag the corner until the structure is the size that you want. A window will appear asking if you wish to change settings; keep the original settings.

Move the cursor to the upper right corner until a double-headed curved arrow appears. Drag the corner until the structure is rotated the way you want it.

Using pre-formed structures. The core of the structure you have drawn is available as a structure template from the Drawing Palette. Choose the palette box with the three small polygons and hold down the mouse button. Move the cursor to Bicyclics option and then over to the structure you want to draw. Release the mouse button. Now draw the core bicyclic structure; add the double bond and methyl groups, including the wedge bonds as before.

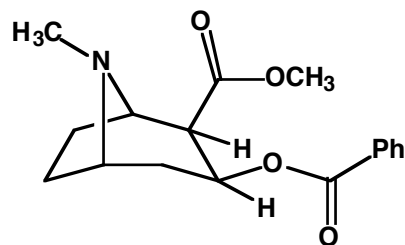
B) Draw Figure 2. Cocaine.

Drawing rings. Choose the bicyclic ring system from the structure template palette that most closely resembles the cocaine molecule. You should find one with an 8-membered ring plus bridging carbon. Add ring substituents in the proper places.

Adding heteroatoms. Choose the Annotation tool and position the cursor over a location where you want an oxygen. Click the mouse after the cursor changes to a small "A". A text box appears. Type "O" in the box and press Return. An O appears in the position you wanted. Add other oxygens by Double-Clicking on the other positions.

To add nitrogen Single-Click on the position, type "N" in the text box, and press Return. Make the nitrogen atom bigger and boldfaced by clicking on it with the Annotation tool and selecting the styles under the Text Menu or using the Styles Toolbar.

Moving parts of a structure. Use the lasso tool to select one of the attached functional groups, then drag the group to alter its position. Return the group to its original position by selecting the Undo option from the Edit menu (or command z). Note this must be done before any new action is taken or the Undo is no longer available.



Cocaine

Fig 2

C) Draw Figure 3. Stanozolol (an anabolic steroid)

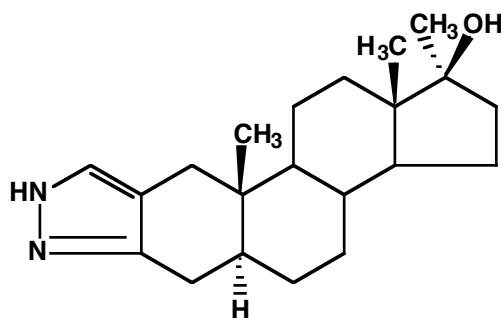
Fusing rings. Start by drawing the left-most six-membered ring. Draw the next ring to the right by clicking on the right-hand bond of the first ring. Draw the third 6-membered ring in the same manner.

Pick a 5-membered ring and add it to the right side of the structure. The result is ok but it is not the "look" you are going for. Erase the 5-membered ring; "Command z". Add a six-membered ring to the structure. Choose the Solid Bond tool and Shift-drag the bottom atom (at ~ 7 o'clock) to the atom at 4 o'clock to make a bicyclic ring system with a 3 and 5-membered ring. See how the bond is longer than what is specified under Drawing Settings (all the other bonds). Delete the carbon at 6 o'clock to give the 5-membered ring. Make the other 5-membered ring in the same manner.

Draw the other bonds with the Wedge or Dash tool and add the double bonds with the Solid Bond tool.

Adding atom labels with more than one character. Labels can be connected on the right, left, center, above, and below. Add the methyl groups in the required orientation. Note that numbers are automatically subscripted.

Add an H Dash and the nitrogen groups, N and NH.



Stanozolol

Fig 3

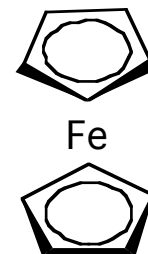
Changing the size or font of all the atom labels . Select the structure. Choose 12 pt. under the Text menu. Choose another font under the Font menu. The size and font of all the atom labels in all structures can be changed by selecting Text Settings under the File menu. The structures do not have to be selected to make these changes.

{You could have started with the steroid backbone provided as part of the structure templates / aromatics.}

D) Draw Figure 4. Ferrocene

Drawing aromatic rings with "electron ring". Select the 5-membered aromatic ring from the pre-formed structure templates. You may need to deselect the fixed angle settings under the Tools menu. Rotate the ring until the bottom bond is perfectly straight.

Compressing or expanding a structure. Move the cursor across the lower right corner of the selected area until a double-headed arrow appears. Hold down the Command key to give a arrow-headed cross. Click and Drag the corner to the right to expand the structure horizontally.



Ferrocene

Fig 4

Duplicating a structure. Hold down the Option key while the Lasso tool is in the selected area. A + appears inside the little hand. Click and Drag the copy out of the selected area.

Inverting a structure. Under the Object menu select Flip Vertical to invert one of the rings.

Highlight the rings using the Wedge tool.

Annotation. Select the Annotation (A) tool. Click the cursor somewhere on the screen, and then select a font size, type, and format. Type "Fe".

Move the three objects (2 rings and metal) into the proper configuration.

Lining up separate structures. Lasso (select) the entire ferrocene complex. Alternatively, select the first cyclopentadienyl ring by Double-Clicking on the structure. Hold the Shift key down while Double-Clicking on the next ring, and then on the iron. Note how the entire area is now selected.

Choose L/R centers under the Align submenu under the Object menu. The 3 objects will be center aligned. Try other alignments to see what they give.

Grouping objects. Select the entire ferrocene structure. Under the Tools menu select Group. Now three parts of the structure will act as a unit. Deselect the structure then Double Click on any part of it. The entire structure should now be selected.

An easier way. Select Cp rings from the structure template palette, add "Fe", and align the objects.