

CHEM 321

Class Test

Wednesday, 7 Sept, 2005

Name:

Time allowed: 50 minutes

Total marks: 50

Instructions: Answer **ALL** questions. Use the back of sheets if required.
The number of minutes indicates the time you should spend on a question (e.g. 5 marks = 5 minutes)

Question 1. (10 marks)

Compare and contrast the following terms. Give examples where appropriate.

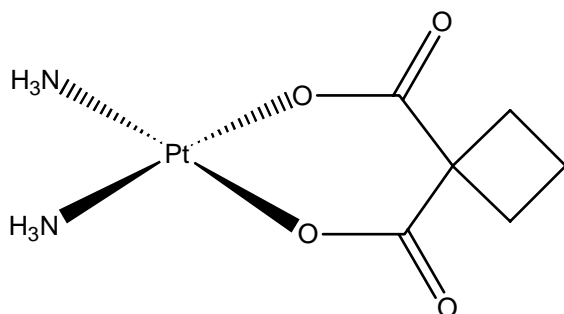
- symmetry operation and symmetry element.
- asymmetry and dissymmetry
- chirality and optical activity
- polarity and polarisability

Question 2 (15 marks)

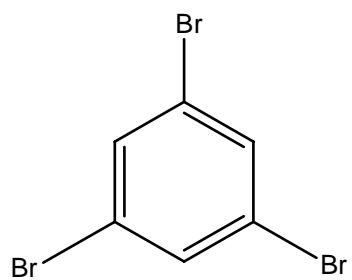
Identify the symmetry operations and elements associated with the following molecules.

a) H_2O

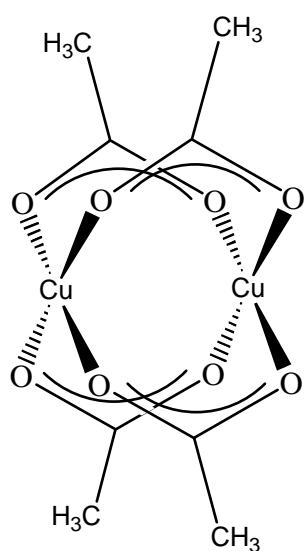
b)



c)



d)



NB. The copper centres are square planar (i.e. O-Cu-O angles are 90 degrees)

Question 3 (5 marks)

What is a point group and how is a molecule assigned to one?

Question 4 (20 marks)

a) Outline how character tables can be used in the analysis of vibrational spectra (e.g. InfraRed, Raman spectra). You may find the diagram of the showing the Pt-Cl stretches of the molecule *trans*-[Pt(NH₃)₂Cl₂] and the D_{2h} character table provided useful.

b) This molecule, *trans*-[Pt(NH₃)₂Cl₂], possesses an inversion centre, while the *cis* isomer does not. What effect does that have on the infrared and Raman spectra that will be observed?

END OF PAPER