淡江大學96學年度碩士班招生考試試題

系別：化學學系　　　　　　科目：無　機　化　學

1. (18 pts) Define the following sets of isomers with examples
   a. Δ- & Λ-isomers
   b. *fac-* & *mer-*isomers
   c. *P-* & *M-*isomers

2. (12 pts) Explain '*trans* effect' and '*trans* influence'.

3. (10 pts) Carbon-carbon double bonds (C=C) are commonly observed. However, silicon-silicon double bonds (Si=Si) are less common. Explain.

4. (12 pts) Draw an energy level diagram to give relative energy levels for d orbitals of a free transition metal ion, the same transition metal ion with a spherical ligand electrostatic field, and the same transition metal with six approaching ligands in an octahedral arrangement.

5. (16 pts) In the octahedral SF_6, the central S atom has 2s and 2p orbitals. For σ-interactions between S and F atoms, one needs to find the six linear-group orbitals of F atoms. Draw the a_{1g} and t_{iu} linear-group-orbitals.

6. (16 pts) (a) The three projections of the cyclic structure of S_8 are shown below; all S-S bond distances are equivalent, as are all S-S-S bond angles. To what point group does S_8 belong? Show your work.
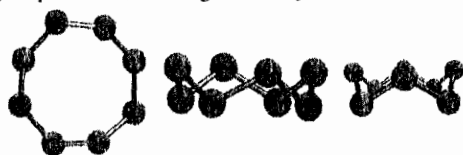
(b) Assign the point group for the hexahelicene ($C_{26}H_{16}$) shown below.
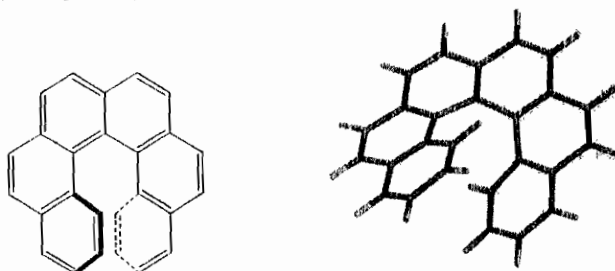
7. (16 pts) Describe and explain the temperature-dependence of resistance for conductors and semiconductors.