

淡江大學 102 學年度碩士班招生考試試題

21-1

系別：化學學系

科目：無機化學

考試日期：3月10日(星期日) 第3節

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1. (20 pts)
 - (a) Predict the structure of SF₄ using the VSEPR model.
 - (b) Account for the fact that at 298 K and in solution the ¹⁹F NMR spectrum of SF₄ exhibits a singlet but that at 175 K, two equal-intensity triplets are observed.

2. (30 pts)
 - (a) For a ferrocene molecule (staggered five membered rings), find all possible symmetry elements belong to the structure.
 - (b) If one H atom in one five-membered ring is replaced with F, which symmetry elements in (a) are lost?
 - (c) If two H atoms in one of the five-membered rings are replaced with two F atoms, what is the point group of the new compound?

3. (20 pts) Draw and assign the symmetry (e.g. *a*₂, *e*_g) for the five molecular orbitals of cyclopentadienyl.

4. (30 pts)
 - (a) Explain the interactions in M(H₂).
 - (b) Draw structures of M(CO), M(μ₂-CO), and M(μ₃-CO). Give stretching frequency ranges of these three types of carbonyls.