Chem 1C (Kahn, Spring 2006) first midterm covers Chapters 13, 14, and 16 up to 16.10 (pg 804). The questions on the exam test your knowledge and understanding of topics covered in my lectures. The first midterm is multiple-choice and you will be graded on making a correct choice. No partial credit for partially correct attempts will be given. The list below summarizes key concepts that you may be tested on the midterm. See the course syllabus for study tips.

1. Importance of knowing molecular structures
2. Experimental methods to study shapes of molecules
3. The VSEPR model: the basic rules
4. VSEPR model: dealing with multiple bonds and lone pairs
5. Application of the VSEPR model to predict molecular geometries
6. Limitations of the VSEPR model
7. The resonance concept
8. Hybridization: sp^3, sp^2, and sp hybridization of carbon
9. Covalent bonding: σ and π bonds
10. Limitations of localized electron model
11. The molecular orbital picture of chemical bonding
12. Basic quantum mechanics: wavefunctions & atomic orbitals
13. Bonding and antibonding molecular orbitals
14. MO diagrams for homodiatomic molecules
15. Unpaired electrons, radicals, paramagnetism
16. The concept of bond order and stability of molecules
17. Prediction of bond lengths based on the nature of bonding
18. Prediction of molecular structures and dipole moment directions
19. Molecular orbitals, delocalization, and electronic (UV-Vis) spectroscopy
20. Electrostatic forces between charged
21. Dipole-dipole interactions in polar molecules
22. van der Waals interaction as sum of London dispersion and repulsive overlap
23. The nature of London dispersion, polarizability
24. Properties of gases: compressibility, spontaneous expansion
25. Properties of liquids: low compressibility, surface tension, capillary action, viscosity
26. Properties of solids: resistance to deformation, low compressibility, variety of mechanical and electrical properties,
27. Classification of solids: crystalline and amorphous
28. Classification of solids: atomic, ionic, and molecular solids
29. Properties and structure of crystalline molecular solids
30. Properties and structure of crystalline ionic solids
31. Packing of ions in ionic solid: cation packing into holes and cubic packing
32. Lattice defects in crystalline solids
33. Network atomic solids (diamond, graphite, ceramics): structure and properties
34. Metals: structure and properties. Superconductivity.
35. Alloys: substitutional and interstitial. Types of steel
36. Band picture of insulators, conductors, and semiconductors.
37. Doping of semiconductors, p-n junction and the rectifier

Sample exam?

I do not have personal past examples of Chem 1C questions. Here are few questions by Petra van Koppen that may represent the style of questions I might ask..

1. A substance does not conduct electricity unless it is melted. It is hard and has a high melting point. These properties are characteristic of which one of the following crystalline solids? Circle the correct answer.

a) ionic b) metallic c) molecular d) covalent (atomic network)

2. Which one of the following has the longest CO bond length? Circle the correct answer.

a) CO b) H_2CO c) CO_3^{2-} d) CH_3OCH_3 e) CO_2

3. Indicate the dominant intermolecular force for each of the following substances.

a) SO_2 b) SF_6 c) HCl d) LiF e) CO2 f) SO_3 g) C_2H_6 h) $CaCl_2$ i) CH_3OH

4. How many π-bonds in HOCN?
a) 0 b) 1 c) 2 d) 3 e) 4

5. According to the MO model, how many unpaired electrons are there in N_2^-?

a) 0 b) 1 c) 2 d) 3 e) 4