

Department of Chemistry

Chem 331 (Fall 2003)

Midterm Exam

Time: 50 minutes

Name:.....
(please print)

Answer all the questions in the booklet. Data sheet containing periodic table and Flowchart for assigning point groups is provided.

ID:.....

Mark:...../ 50

I. Fill in the blanks in the following statements

(26)

1. The ground state electronic configuration of: a. Cu is.....
b. Cu(II) is
2. The set of quantum numbers that describe a 4f electron are:.....
3. Nitrogen molecule has higher first I.E than nitrogen atom because
.....
.....
4. The case of particle in a box illustrates the fact that.....
.....
5. In a molecule the frontier orbitals are.....and they are important because
.....
6. A δ - bond is a result of
7. According to MO theory the bond order in O_2 molecule is.....because.....
.....
8. Adding As to Si creates atype semiconductor
9. A p-orbital belongs to the point group
- 10.
11. Melting point of $AlBr_3$ is lower ($98^\circ C$) compared to that of $NaBr$ ($755^\circ C$). The reason is
.....
.....
.....
12. When a crystalline material has Frenkel defects its density....., whereas
if it has Schottky defects its density.....
13. AgI has a much lower solubility product than $AgCl$, because

.....2

- II. Sketch the Born-Haber cycle for the formation of $\text{Na}_2\text{O}(\text{s})$ from $\text{Na}(\text{s})$ and $\text{O}_2(\text{g})$. Write an expression for the ΔH°_f in terms of the various enthalpy changes involved. (4)**
- III. Consider a lattice patterned after the sodium chloride, but having half the face-centered positions of the anion sublattice removed. What is the resulting stoichiometry? (3)**

IV. Assign point group for any two of the molecules.

(4)

a. BF_3

b. SPCl_3

c. IF_5
