

Things to think about

Many people have wondered what types of problems might be on the exam.

Here are some examples. They do not reflect what the actual exam looks like. The problems on the exam may include others that are “different” and topics that are not mentioned.

Objective questions

True False

When comparing two bonds the one with the largest ionic character will always be the strongest.

Multiple Choice

Which of the following has the lowest potential energy?

- a) an electron and a hydrogen nucleus separated by  $4\text{\AA}$
- b) an electron and a helium nucleus separated by  $4\text{\AA}$
- c) an electron and a hydrogen nucleus separated by  $2\text{\AA}$
- d) an electron and a lithium nucleus separated by  $4\text{\AA}$
- e) an electron and a gold nucleus separated by  $10\text{\AA}$

Other problems with require an “explanation”.

True/False. If the statement is false explain what is incorrect.

Thompson’s famous experiment with cathode rays determined the mass of the electron.

You might need to make a sketch of something.

Make a sketch of the potential energy of a NaCl molecule where  $V = 0$  is defined as the energy of the neutral atoms separated by an infinite distance. On your graph label the bond dissociation energy and bond length.

### Structure problems

What is the geometry of the  $\text{SO}_4^{2-}$  ion? What are the bond angles? What is the average formal charge on each atom? Does this ion have a permanent dipole?

- . Which of these two is the better choice of Lewis diagrams for  $\text{N}_2\text{O}$ . Explain your choice.



Or given that we can consider these two structure as resonance structure for  $\text{N}_2\text{O}$ , how would you expect the N,N bond in  $\text{N}_2\text{O}$  to compare to the bond in  $\text{N}_2$ ? (stronger, weaker, slightly stronger, exactly the same,...) Why?

### Or numerical calculation problems

What is the change in potential energy for moving an electron that is initially  $5\text{\AA}$  away from a Li nucleus to a distance that is  $2\text{\AA}$ ?