PRACTICE 1
Draw the lewis structures for the following 3 molecules. Ensure you show all lone pairs of electrons. The central atom is underlined.

<table>
<thead>
<tr>
<th>POCI₃</th>
<th>PCl₂F₂</th>
<th>[IBr₂F₂]⁻</th>
</tr>
</thead>
</table>

PRACTICE 2
Draw the 3 most chemically reasonable Lewis structures for [C₄H₃O₂]- using the skeletons below. show all lone pairs of electrons as pairs of dots and draw in the double bonds. Write any non-zero formal charges. Circle the best Lewis structure. Why is it the best?

PRACTICE 3
Draw the radial probability distribution for a 6d orbital. How many nodes total would this orbital have? What about angular nodes? Radial nodes? Can you draw the orbital cross section with phases labelled?

PRACTICE 4
E(binding) = 3 x 10^8 J. E(photon) = 1.5 x 10^10 J. What is E(kinetic)?
PRACTICE 5
Draw the pathways that an electron could take as an electron relaxes from n=5 to n=2?
How many emission lines are there? Can you draw them? Circle the emission line with the highest energy.

Practice 6
Which of the following electron configurations is an excited state for a neutral copper atom?
A. [Ar] 4s1 3d10
B. [Ar] 4s0 3d10
C. [Ar] 4s2 3d10
D. [Ar] 4s2 3d9
E. [Ar] 4s2 3d9 4p1

Practice 7
Arrange the following ions in order of increasing ionic radius.
A. Mg2+ < K+ < Ca2+ < Cl− < S2−
B. Cl− < S2− < K+ < Ca2+ < Mg2+
C. Mg2+ < Ca2+ < K+ < S2− < Cl−
D. S2− < Cl− < K+ < Ca2+ < Mg2+
E. Mg2+ < Ca2+ < K+ < Cl− < S

Practice 8
13. [8 marks] Complete the orbital interaction diagram for carbon monoxide (CO) below.

(a) Determine the bond order of CO.

(b) Identify the highest occupied molecular orbital (HOMO) of CO.

Answer: Best Lewis structure of A

Practice 9:

24. How many $sp^2$ hybridized carbon atoms are present in cromakalim (a vasodilator)?

A. 1
B. 6
C. 7
D. 8
E. 16

Practice 10
8. [8 marks] (a) The structure of 1,3,5,7-octatetraene is shown below, drawn in the $xy$-plane. There are 8 molecular orbitals that arise from mixing the $2p_z$ orbitals. **Complete the MO diagram** on the right for the ground state of 1,3,5,7-octatetraene by adding electrons, as needed, to MO$_1$ - MO$_8$. The first electron is added as an example.

(b) Which molecular orbital is the **LUMO** of 1,3,5,7-octatetraene?

(c) How many **nodes** does molecular orbital MO$_7$ have (ignore any nodes in the $xy$-plane)?

(d) On the template below, draw the highest energy MO. Indicate phases (+) and (−) in your drawing. The dots represent the carbon nuclei of 1,3,5,7-octatetraene.