Important: Please fill out the review session evaluation form! :-)  
https://forms.gle/Cq1jd2Cfq68q9tPb9

*Kim’s section:*

1.) How many hydrogen atoms are there in 25.0 g of CH₂Cl₂?

2.) Calculate the formal charges of the oxygen and sulfur atoms in H₂SO₄ and draw the best Lewis electron-dot structure.
3.) Draw three resonance structures for the molecule nitrous oxide, \( \text{N}_2\text{O} \) (the atomic arrangement is NNO). Indicate formal charges. Rank the structures in their relative importance to the overall properties of the molecule.

4.) For each of the following pairs of ions, write the formula of the corresponding compound.
   a. \( \text{Fe}^{3+} \) and \( \text{CN}^- \)
   b. \( \text{K}^+ \) and \( \text{SO}_4^{2-} \)
   c. \( \text{Li}^+ \) and \( \text{N}^{3-} \)
   d. \( \text{Ca}^{2+} \) and \( \text{P}^{3-} \)

5.) In which of the following are the name and formula correctly paired?
   a. sodium sulfite: \( \text{Na}_2\text{S} \)
   b. calcium carbonate: \( \text{Ca}(\text{CO}_3)_2 \)
   c. magnesium hydroxide \( \text{Mg(OH)}_2 \)
   d. nitrite: \( \text{NO}_2 \)
   e. iron (III) oxide: \( \text{FeO} \)
6.) For which element is the gaining of an electron most exothermic?
   a. Li  
   b. N  
   c. F  
   d. B

7.) The species F\(^-\), Ne, and Na\(^+\) all have the same number of electrons. Which is the predicted order when they are arranged in order of decreasing size (largest first)?
   a. F\(^-\) > Ne > Na\(^+\)  
   b. Ne > Na\(^+\) > F\(^-\)  
   c. Na\(^+\) > F\(^-\) > Ne  
   d. F\(^-\) > Na\(^+\) > Ne

Jasmine’s section:

8.) Write an orbital diagram for the ground state of the potassium atom. Is the atomic substance diamagnetic or paramagnetic?

9.) The ground-state electron configurations listed here are incorrect. Explain what mistakes have been made in each and write the correct electron configurations.
   (I) Al: 1s\(^2\)2s\(^2\)2p\(^4\)3s\(^2\)3p\(^3\)
10.) Zirconium is a Group IVB element in Period 5. What would you expect for the valence-shell configuration of zirconium?

11.) Write Lewis electron-dot structures for each of the following:
   (I) BCl₃
   (II) TlCl₂⁺
   (III) BeBr₂

12.) Write Lewis electron-dot structures for each of the following:
   (I) GaCl₄⁻
   (II) IF₅
13.) One of the following compounds has a carbon–nitrogen bond length of 116 pm; the other has a carbon–nitrogen bond length of 147 pm. Match a bond length with each compound.

- *Methylamine*  
- *Acetonitrile*

14.) What is the bond order in $\text{O}_2^{2-}$?
   
   a) 2.0  
   b) 3.5  
   c) 1.0  
   d) 0  
   e) 1.5

*Jonathan’s section:*

15.) Which of the following is a covalent compound? (multiple choice)
   
   A) $\text{NaOH}$  
   B) $(\text{NH}_4)_2\text{SO}_4$  
   C) $\text{N}_2\text{O}_4$  
   D) $\text{K}_2\text{CO}_3$

16.) Place the following in order of increasing electronegativity.
   
   i) B, Rb, O, Ga  
   ii) N, K, F, Be  
   iii) Ba, Si, Ca, S  
   iv) Te, Sn, F, Br
17.) Place the following in order of increasing atomic or ionic radii:
   i) Ge, Si, Sn, C
   ii) O, O, O^2-, O^+
   iii) S^2-, Cl^-, Ca^{2+}, K^+
   iv) Co, Co^+, Co^{2+}, Co^{3+}

18.) What is the correct electron configuration for Fe^{2+}? (multiple choice)
   A) 1s^2 2s^2 2p^6 3s^2 3p^6 4s^2 3d^{10} 4p^6 4d^6
   B) 1s^2 2s^2 2p^6 3s^2 3p^6 3d^6
   C) 1s^2 2s^2 2p^6 3s^2 3p^6 4s^2 3d^4
   D) 1s^2 2s^2 2p^6 3s^2 3p^6 4s^2 3d^{10} 4p^6 5s^2 4d^4

19.) Write the electron configurations for the following. The shorthand version can be utilized
   i) Cr^{3+}
   ii) Fe^{3+}
   iii) Cu^+
   iv) Co^{2+}

20.) Which neutral atom is isoelectronic with N^{3-}? (multiple choice)
   A) P
   B) Cl
   C) Ne
   D) O
21.) The +3 cation of an unknown element, X, has the following as its outermost electron configuration in its ground state:

\[
\begin{align*}
4p & \quad - & - \\
3d & \quad - & - & - & - & - \\
4s & \quad - \\
\text{[Ar]} &
\end{align*}
\]

What is element X?