

Chemistry: CP+AP_Chemistry with Dr. Ali

AP_Students Please Pay Attention to *Pink Texts*

Dear Students,

Both you and your success are a big matter! So, I will be using all possible means to reach you to help learn chemistry. The chemistry problems are huge and the best way to deal with them is to understand fundamentals and apply them to solve real-life problems. The goal of your at home learning (AHL) is to increase your understanding and problem solving skills for everything we have learned in the current semester. I'm posting here some artefact learning approaches of key chemistry concepts that I think are essential to reinforce your problem solving skills. Please keep on checking your google classroom and reach me over email, google class, and google meet.

Positive credit: If you make revisions or complete cw/hw assignments that are due, we input those scores to positively improve your grades. If work is not completed at this time, it has no impact on your grades. This will be most important for students that need to improve grades and come back to classroom mode with better fitness after the break.

ANY Late, completed or revised work from Second Semester is due by 03 APR 2020.

Learning Goals:

- Complete what was going on in the last class
- Review for unit and final exams
- Extend learning on topics already introduced
- Improve grades (Quiz, assignments, revision, and late work)

Materials required for AHL modules: Internet access, computer, camera/mobile phone/scanner, paper, pencil/pen, periodic table, open mind and critical thinking. Special needs students and also any student can communicate to me about their needs via email: mali@jeffersonunion.net.

March 19, 2020: Thursday

- 2-AP, 4-CP, and 6-CP: Students will do modeling/simulation to understand and explain atomic interactions, Orbital Overlapping, and Chemical Bonding and write a project on it.

Phet simulation link:

https://phet.colorado.edu/sims/html/atomic-interactions/latest/atomic-interactions_en.html

- Hints: Change the distance between the two atoms (Ne-Ne, and O-O) and study the changes in potential energies and record them in a table. Explain
 - 1) Why does potential energy drastically go down with oxygen-oxygen orbital than that of Neon-Neon orbital overlap?
 - 2) Draw a diagram showing the attractive and repulsive interactions when two O-O orbitals overlap. Use Coulomb's law to explain why potential energy drastically goes up when the atoms are too close to each other, drastically goes down when they are at sufficiently close to each other, and close to zero when they are away from each other.

- **Additional Learning for AP_Students:**

(a) Relate effective nuclear charge (Z_{eff}), Nuclear Pull (NP), Penetration, and Shielding, and Coulomb's law to explain your simulation findings.

- Clarification:

(a) All students will meet @google meet to discuss and clarify their responses with the learning coach within 30 min of their respective regular class hours. Students will be invited to join the meeting by email.

(b) Instructor will post a self-recorded video or a youtube video to reinforce students' learning.

(c) A model answer will be posted to google classroom after the due date of assignment.

March 20, 2020: Friday

- 5-CP: Students will do modeling/simulation to understand and explain atomic interactions, Orbital Overlapping, and Chemical Bonding and write a project on it.

Phet simulation link:

https://phet.colorado.edu/sims/html/atomic-interactions/latest/atomic-interactions_en.html

- Hints: Change the distance between the two atoms (Ne-Ne, and O-O) and study the changes in potential energies and record them in a table. Explain
 - 1) Why does potential energy drastically go down with oxygen-oxygen orbital than that of Neon-Neon orbital overlap?
 - 2) Draw a diagram showing the attractive and repulsive interactions when two O-O orbitals overlap. Use Coulomb's law to explain why potential energy drastically goes up when the atoms are too close to each other, drastically goes down when they are at sufficiently close to each other, and close to zero when they are away from each other.
- Clarification:
 - a) All students will meet @google meet to discuss and clarify their responses with the learning coach within 30 min of their respective regular class hours. Students will be invited to join the meeting by email.
 - b) Instructor will post a self-recorded video or a youtube video to reinforce students' learning.
 - c) A model answer will be posted to google classroom after the due date of assignment.

March 23, 2020: Monday

- 2-AP, 4-CP, and 6-CP: Students will take an open book online exam. The exam questions will be posted in the google classroom in the morning, and students will be given 24 hrs to submit their responses.
- A model answer on exam questions will be posted within 7 days.

March 24, 2020: Tuesday

- 5-CP: Students will take an open book online exam. The exam questions will be posted in the google classroom in the morning, and students will be given 24 hrs to submit their responses.
- A model answer on exam questions will be posted within 7 days.

March 25, 2020: Wednesday

- 2-AP: Students will model VSEPR Theory, Electron Geometry and Molecular Shapes.

Phet simulation link:

https://phet.colorado.edu/sims/html/molecule-shapes/latest/molecule-shapes_en.html

- Study Questions:
 - 1) Study the Molecular and Electron Geometries and Bond Angles of CH₄, NH₃, and H₂O in model and real-life conditions and tabulate your findings. Explain how lone pair electrons influence the bond angles and shapes of these molecules.
 - 2) Study the Molecular and Electron Geometries and Bond Angles of H₂O, CO₂ and SO₂ in model and real-life conditions and tabulate your findings. Explain how lone pair electrons influence the bond angles and shapes of these molecules.
- Clarification:
 - a) All students will meet @google meet to discuss and clarify their responses with the learning coach within 30 min of their respective regular class hours. Students will be invited to join the meeting by email.
 - b) Instructor will post a self-recorded video or a youtube video to reinforce students' learning.
 - c) A model answer will be posted to google classroom after the due date of assignment.
- *4-CP, and 6-CP: Students will model Coulomb's Law and relate it to effective nuclear charge (Z_{eff}), and Nuclear Pull (NP).*

Phet simulation link:

https://phet.colorado.edu/sims/html/coulombs-law/latest/coulombs-law_en.htm

- (a) Simulate Coulomb's law by changing distance and charges and tabulate your findings how they affect the Effective Nuclear Charge (Zeff) and Nuclear Pull (NP).
- (b) Explain how and why attractive and repulsive forces change when you change the distances.
- (c) How do charges influence push and pull values and why?

- Clarification:

- a) All students will meet @google meet to discuss and clarify their responses with the learning coach within 30 min of their respective regular class hours. Students will be invited to join the meeting by email.
- b) Instructor will post a self-recorded video or a youtube video to reinforce students' learning.
- c) A model answer will be posted to google classroom after the due date of assignment.

March 26, 2020: Thursday

- 5-CP: Students will model Coulomb's Law and relate it to effective nuclear charge (Zeff), and Nuclear Pull (NP).

Phet simulation link:

https://phet.colorado.edu/sims/html/coulombs-law/latest/coulombs-law_en.htm

- a) Simulate Coulomb's law by changing distance and charges and tabulate your findings how they affect the Effective Nuclear Charge (Zeff) and Nuclear Pull (NP).
- b) Explain how and why attractive and repulsive forces change when you change the distances.
- c) How do charges influence push and pull values and why?

- Clarification:

- a) All students will meet @google meet to discuss and clarify their responses with the learning coach within 30 min of their respective regular class hours. Students will be invited to join the meeting by email.
- b) Instructor will post a self-recorded video or a youtube video to reinforce students' learning.

- c) A model answer will be posted to google classroom after the due date of assignment.

March 27, 2020: Friday

- 2-AP, 4-CP, and 6-CP: Students will model Bond Polarity, and write a report on it.

Phet simulation link:

https://phet.colorado.edu/sims/html/molecule-polarity/latest/molecule-polarity_en.html

- a) Study the model with 2 atoms and view bond dipole, molecular dipole, partial charges, and changes in electron clouds with electric field off and on. Try to change bond angles and report your findings on a table.
 - b) Study the model with 3 atoms and view bond dipole, molecular dipole, partial charges and changes in electron clouds with electric field off and on. Try to change bond angles and report your findings on a table.
 - c) Explain in your own language what makes a bond polar, non-polar, and ionic.
 - d) Explain why H₂O is polar but CO₂, and SO₂ are non-polar.
 - e) Explain why CH₃Cl is polar but CCl₄ is nonpolar.
- Clarification:
 - a) A powerpoint slide will be posted by the instructor about bond polarity.
 - b) All students will meet @google meet to discuss and clarify their responses with the learning coach within 30 min of their respective regular class hours. Students will be invited to join the meeting by email.
 - c) Instructor will post a self-recorded video or a youtube video to reinforce students' learning.
 - d) A model answer will be posted to google classroom after the due date of assignment.

Additional learning for AP-students:

- AP-students will calculate dipole moment and percent ion character for a given set of compounds to be posted on google classroom.
- AP-students will extend their learning to explain various intermolecular forces.

March 30, 2020: Monday

- 5-CP: Students will model Bond Polarity, and write a report on it.

Phet simulation link:

https://phet.colorado.edu/sims/html/molecule-polarity/latest/molecule-polarity_en.html

- a) Study the model with 2 atoms and view bond dipole, molecular dipole, partial charges, and changes in electron clouds with electric field off and on. Try to change bond angles and report your findings on a table.
 - b) Study the model with 3 atoms and view bond dipole, molecular dipole, partial charges and changes in electron clouds with electric field off and on. Try to change bond angles and report your findings on a table.
 - c) Explain in your own language what makes a bond polar, non-polar, and ionic.
 - d) Explain why H₂O is polar but CO₂, and SO₂ are non-polar.
 - e) Explain why CH₃Cl is polar but CCl₄ is nonpolar.
- Clarification:
 - a) A powerpoint slide will be posted by the instructor about bond polarity.
 - b) All students will meet @google meet to discuss and clarify their responses with the learning coach within 30 min of their respective regular class hours. Students will be invited to join the meeting by email.
 - c) Instructor will post a self-recorded video or a youtube video to reinforce students' learning.
 - d) A model answer will be posted to google classroom after the due date of assignment.

March 31, 2020: Tuesday

- 2-AP, 4-CP, and 6-CP: Students will watch a video, identify and draw various intermolecular forces.

Video link: <https://youtu.be/QdwzMPwPA3I?t=11>

- a) List down different intermolecular forces that may exist in different types of molecules.
- b) Give an example and non-example for each type of forces.
- c) Depict each type of forces by drawing a suitable diagram.

d) Explain how intermolecular forces influence the melting and boiling points of various compounds.

- Clarification:

a) All students will meet @google meet to discuss and clarify their responses with the learning coach within 30 min of their respective regular class hours. Students will be invited to join the meeting by email.

b) Instructor will post a self-recorded video or a youtube video to reinforce students' learning.

c) A model answer will be posted to google classroom after the due date of assignment.

Additional learning for AP-students:

AP students will predict the relative melting and boiling points of a given set of compounds after watching the video: <https://youtu.be/eubN8DwUh48>

April 1, 2020: Wednesday

- 5-CP: Students will watch a video, identify and draw various intermolecular forces.

Video link: <https://youtu.be/QdwzMPwPA3I?t=11>

a) List down different intermolecular forces that may exist in different types of molecules.

b) Give an example and non-example for each type of forces.

c) Depict each type of forces by drawing a suitable diagram.

d) Explain how intermolecular forces influence the melting and boiling points of various compounds.

- Clarification:

a) All students will meet @google meet to discuss and clarify their responses with the learning coach within 30 min of their respective regular class hours. Students will be invited to join the meeting by email.

b) Instructor will post a self-recorded video or a youtube video to reinforce students' learning.

c) A model answer will be posted to google classroom after the due date of assignment.

April 2, 2020: Thursday

- 2-AP, 4-CP, and 6-CP: Students will take an open book online exam on bond polarity and intermolecular forces. The exam questions will be posted in the google classroom in the morning, and students will be given 24 hrs to submit their responses.
- A model answer on quiz questions will be posted within 7 days.

April 3, 2020: Friday

- 5-CP: Students will take an open book online exam on bond polarity and intermolecular forces. The exam questions will be posted in the google classroom in the morning, and students will be given 24 hrs to submit their responses.
- A model answer on quiz questions will be posted within 7 days.