Accompanying Questions
Topic 09: Chemical Equations and Chemical Reactions

Objective:

This is to provide guiding questions to help you comprehend the material we have covered in this section of the class. These questions or very similar questions have been answered within the video lecture and/or live class.

Instructions and Notes:

- Most of these questions/concepts are taken or derived from the chapters in the Chemistry: Atoms First 2e Online Textbook (OpenStax)
- Book sections covered: 1.3, 7.1, 7.2

Submission:

Students do not submit this and it is not graded.

Helpful Tips:

- These questions or very similar questions may appear on the exams so I strongly recommend that you complete them.
- Download the lectures and rewatch the lectures.
- Pause the lectures and rewind them through concepts you don't fully understand.
- Go to tutoring in the ASTC or MESA, ask your classmates in our Discord room, watch YouTube Videos, come to office hours, etc.

In-Lecture Questions

Lecture 1 of 4

1. Describe what reactants are. What separates reactants from each other?
2. Describe what products are. What separates products from each other?
3. What is a symbol for a reaction?
4. What are coefficients?
5. What has to be the same before and after a reaction?
6. What are the four (4) primary phase symbols?
7. Describe what aqueous means.
8. In my example, a ingredients list is similar to an _____ and a recipe is similar to a _____.
9. Chemical reactions are just _____ of atoms.
10. If a chemical is listed as a reactant or product, we must have at least _____ of those.
11. What do you call the ratio between products, between reactants, and/or between reactants and products?
12. A dozen is 12, a mole is _____?
13. In my example, balancing is equations is_____?
14. Write down the steps to balancing equations.
15. Balance this equation: $CH_4 + O_2 \rightarrow CO_2 + H_2O$

16. Balance this equation: N_2 (g) + O_2 (g) → N_2O_5 (s)
17. Balance this equation: NH_4NO_3 (s) → N_2 (g) + O_2 (g) + H_2O (l)
18. Balance this equation: $Ca_3(PO_4)_2$ (aq) + H_3PO_4 (aq) → $Ca(H_2PO_4)_2$ (aq)

Lecture 2 of 4

19. Describe what a phase change is.
20. Describe what a chemical change is.
21. List four (4) words that describe a chemical change.
22. List four (4) events that can tell you if a chemical reaction occurred.
23. List the steps in building a balanced molecular equation from words.
24. Describe how you would make a neutral compound from Na^{1+} and CO_3^{2-}.
25. Write a balanced equation describing each of the following chemical reactions: When carbon dioxide is dissolved in an aqueous solution of sodium hydroxide, the mixture reacts to yield aqueous sodium carbonate and liquid water.
26. Write a balanced equation describing each of the following chemical reactions: When solid sodium chloride is added to aqueous sulfuric acid, hydrogen chloride gas and aqueous sodium sulfate are produced.
27. What are spectator ions?
28. CO_2 (aq) + 2 NaOH (aq) → Na_2CO_3 (aq) + H_2O (l) -- Balance this equation and write the total ionic equation and net ionic equation.
29. Diatomic chlorine and sodium hydroxide (lye) are commodity chemicals produced in large quantities, along with diatomic hydrogen, via the electrolysis of brine (sodium chloride) in liquid water. Write the balanced molecular, complete ionic, and net ionic equations.
30. Write the total ionic equation and net ionic equation for the equation in #25.

Lecture 3 of 4

31. List three (3) different types of reactions and briefly describe them.
32. Describe and give specifics of what a precipitation reaction is.
33. List something that is always soluble.
34. List something that is usually soluble and a compound that forms when there is an exception.
35. List something that is usually insoluble and a cation that is an exception.
36. List the steps on figuring out precipitation reactions.
37. Which solution could be used to precipitate the barium ion, Ba2+, in a water sample: sodium chloride, sodium hydroxide, or sodium sulfate? What is the formula for the expected precipitate?
38. Predict the precipitate from mixing these solutions of ionic compounds and write a balanced net ionic equation for the reaction: potassium sulfate and barium nitrate
39. Predict the precipitate from mixing these solutions of ionic compounds and write a balanced net ionic equation for the reaction: lithium chloride and silver acetate
40. Predict the precipitate from mixing these solutions of ionic compounds and write a balanced net ionic equation for the reaction: lead(II) nitrite and ammonium carbonate
41. What defines an acid? List two (2) acids and their formulas.
42. What defines a base? List two (2) common bases.
43. What usually is the product of an acid-base reaction?
44. Write the net ionic equation representing the neutralization of H_2SO_4 with LiOH.

Lecture 4 of 4

45. What happens during an oxidation-reduction reaction?
46. What are four (4) types of redox reactions? How would you identify each?
47. List the three (3) rules for oxidation numbers.
48. What is the priority order for assigning oxidation numbers (groups, elements) from highest to lowest?
49. Explain this in your own words: “Oxidation numbers within a compound, element, or ion must add up to the net electric charge."
50. Assign oxidation numbers to the elements whose atoms are underlined in each of the following compounds: $K\underline{\mathbf{N}}O_3$, $\underline{\mathbf{N}}H_4^{1+}$, $H_2\underline{\mathbf{P}}O_4^{1-}$
51. $Sn\ (s) + 2HCl\ (g) \rightarrow SnCl_2\ (s) + H_2\ (g)$ Assign oxidation numbers to each element and determine if this is a redox reaction.