#4 - SELF-ASSESS: Practice Quiz to See What You Remember \*\*\*Turned in Monday of the 2nd Week of School!\*\*\*

**Directions**

1. **Print this document.** See Summer Assignment Cover Sheet for a tip on printing double sided if your printer doesn’t do it automatically!
2. Using **ONLY** a periodic table and a non-graphing scientific calculator, complete the following questions. Do NOT peek at the internet, your   
   Honors Chem notes, etc. See what you \*actually\* remember from Honors Chem!
3. **USE BINDER PAPER FOR ALL MATH PROBLEMS! STAPLE TO THE BACK OF THIS DOCUMENT!**
4. Once you have completed the questions, use the answer key at the end to check your work. Use a **GREEN PEN** to show your corrections.
5. For each topic, **WRITE DOWN** how many you got correct in the box for that topic.
6. Use the **“REVIEW TASK CHECKLIST”** to determine what review work needs to be completed for each of the topics. The class website will have   
   what you need to do the tasks. [**www.mychemistryclass.net**](http://www.mychemistryclass.net)
7. Use the **“Evidence of Self Study”** paper to show proof that you did the tasks. Show me **EVERYTHING** you did to review and get caught up!
8. **BE HONEST**…don’t say you did better than you actually did to get out of doing the review work. You should WANT to do anything and everything   
   possible to enter AP Chemistry on a strong foot. Cutting corners now will only cause you to struggle later! Make a grownup decision to set yourself   
   up for success. Show me you can do that.

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| **Review Task Checklist** | |  |
| **# Correct** | **Review Tasks to Accomplish** | **Some Useful Links to Help with Review Tasks** |
| 4 out of 4 | * Skim through the corresponding lecture PDF * Jot down a few reminders about the topic | * General class website:  [www.mychemistryclass.net](http://www.mychemistryclass.net) * Honors tab on class website: <http://mychemistryclass.net/honorschem.html> * PDFs of Lectures: <http://mychemistryclass.net/HCtableofcontents.html> * YouTube Links:  at the end of the Lecture PDFs  or on YouTube Channel directly if that is easier: <https://tinyurl.com/yc23pjmb> * Packets of Worksheet problems from Honors Chemistry: <http://mychemistryclass.net/HColdrainbowpackets.html> * OpenStax Textbook:  <https://tinyurl.com/5a8krxc4>   CK-12 Textbook: <https://tinyurl.com/5a8krxc4> |
| 3 out of 4 | * Skim through the corresponding lecture PDF * Jot down a few reminders about the topic * Find and do 3 practice problems  (from Honors Chem Worksheets, the internet, textbook, etc) |
| 2 out of 4 | * Watch the corresponding YouTube lecture video(s) * Jot down some notes from the video * Do 3 practice problems  (from Honors Chem Worksheets, the internet, textbook, etc) |
| 1 out of 4 | * Watch the corresponding YouTube lecture video(s) * Jot down some notes * Do 5 practice problems  (from Honors Chem Worksheets, the internet, textbook, etc) |
| 0 out of 4 | * Watch the corresponding YouTube lecture video(s) * Jot down some notes * Search the free “OpenStax” or “CK-12” textbooks for the topic and spend some time reading up about it. * Jot down some notes while reading * Do 5 practice problems  (from Honors Chem Worksheets, the internet, textbook, etc) |

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| **Topic Lecture Note Titles, Questions, and Score**  *Use binder paper to show your work for* ***ALL*** *math problems!* | | | | | | | | | |
| **N3 – Significant Figures** | | | | | | | | \_\_\_\_\_\_\_ / 4 | |
| |  |  |  | | --- | --- | --- | | 1. | Using the rules of significant figures, calculate the following:  6.167 + 70 = | | | A) | 76 | | B) | 80 | | C) | 76.167 | | D) | 77 | | | |  |  |  | | --- | --- | --- | | 2. | The number 14.809 rounded to three significant figures is | | | A) | 15.0 | | B) | 14.9 | | C) | 14.81 | | D) | 14.8 | | | | |  |  |  | | --- | --- | --- | | 3. | How many significant figures are there in the result of the calculation?  (4.321/2.8)  (6.9234  105) | | | A) | 1 | | B) | 2 | | C) | 3 | | D) | 4 | | | | |  |  |  | | --- | --- | --- | | 4. | The result of the calculation has how many significant figures?  (0.4333 J/g °C) (33.12°C – 31.12°C)(412.1 g) | | | A) | 1 | | B) | 2 | | C) | 3 | | D) | 4 | | |
| **N5 – Atomic Numbers and Isotopes** | | | | | | | | \_\_\_\_\_\_\_ / 4 | |
| |  |  |  | | --- | --- | --- | | 5. | How many electrons are present in a fluorine, F, atom? | | | A) | 9 | | B) | 10 | | C) | 11 | | D) | 18 | |  |  | | |  |  |  | | --- | --- | --- | | 6. | 54 p+, 54 e-, and 78 n0 is | | | A) |  | | B) |  | | C) |  | | D) |  | | | | |  |  |  | | --- | --- | --- | | 7. | How many protons, electrons, and neutrons, does  have? | | | A) | 13, 13, 14 | | B) | 13, 10, 14 | | C) | 13, 13, 27 | | D) | 13, 10, 27 | | | | |  |  |  | | --- | --- | --- | | 8. | An element's most stable ion forms an ionic compound with chlorine having the formula XCl2. If the ion of X has a mass of 89 and 36 electrons, what is the identity of X, and how many neutrons does it have? | | | A) | Kr, 53 neutrons | | B) | Kr, 55 neutrons | | C) | Se, 55 neutrons | | D) | Sr, 51 neutrons | | | |
| **N10 - Introduction to Electrons, N12 - Writing e- Configs, N13 - Configs of Ions & Noble Gas Configs** | | | | | | | | \_\_\_\_\_\_\_ / 4 | |
| |  |  | | --- | --- | | 9. | State the maximum number of electrons allowed in each.  a. 4th principal energy level \_\_\_\_\_\_\_  b. any *d* sublevel \_\_\_\_\_\_\_  c. a 2*p* orbital \_\_\_\_\_\_\_ | | | | |  |  |  | | --- | --- | --- | | 10. | The configuration for sulfur is | | | A) | 1*s*22*s*22*p*63*s*23*p*2 | | B) | 1*s*22*s*22*p*63*s*23*p*4 | | C) | 1*s*22*s*22*p*63*s*5 | | D) | 1*s*22*s*22*p*63*s*23*p*5 | | | | |  |  | | --- | --- | | 11. | Draw the orbital diagram for the ground state of oxygen. |   \_\_\_\_ \_\_\_\_ \_\_\_\_ \_\_\_\_ \_\_\_\_  1s 2s 2p | | | |  |  |  | | --- | --- | --- | | 12. | The electron configuration of Cr3+ is | | | A) | [Ar]4s23d1 | | B) | [Ar]4s13d2 | | C) | [Ar]3d3 | | D) | [Ar]4s23d4 | |
| **N15 - Periodic Trends** | | | | | | | | \_\_\_\_\_\_\_ / 4 | |
| |  |  |  |  |  | | --- | --- | --- | --- | --- | | 13. | | Which of the following exhibits the correct orders for both atomic radius and ionization energy, respectively? (smallest to largest) | | | | A) | | S, O, F, and F, O, S | | B) | | F, S, O, and O, S, F | | C) | | S, F, O, and S, F, O | | D) | | F, O, S, and S, O, F | | |  |  |  |  | | --- | --- | --- | --- | | 14. | | Which is **false**? | | | A) | Elements in the same column have similar reactivities since their valence e-‘s tend to be located in the same types of orbitals. | | | B) | Isoelectronic ions must have the same electron configuration. | | | C) | Atomic radius increases going across a period from left to right because the number of e-‘s increases, so they are located further from the nucleus. | | | D) | It takes more energy to remove an electron from Li than from Cs because the valence  e-‘s in Li are located closer to the nucleus. | | | | | | |  |  |  |  | | --- | --- | --- | --- | | 15. | | Order the following ions from **smallest to largest atomic size**.  As3–, Se2–, Sr2+, Rb+, Br– | | | A) | As3– < Se2– < Br– < Rb+ < Sr2+ | | | B) | Sr2+ < Rb+ < As3– < Se2– < Br– | | | C) | As3– < Se2– < Br– < Sr2+ < Rb+ | | | D) | Sr2+ < Rb+ < Br– < Se2– < As3– | | | | | |  |  |  |  | | --- | --- | --- | --- | | 16. | | Which is true? | | | A) | The Kr 1*s* orbital is smaller than the He 1*s* orbital because Kr’s *p* and *d* orbitals crowd the *s* orbitals. | | | B) | The Kr 1*s* orbital is larger than the He 1*s* orbital because Kr has more e-‘s. | | | C) | The Kr 1*s* orbital is smaller than the He 1*s* orbital because Kr’s nuclear charge draws the electrons closer. | | | D) | The Kr 1*s* orbital and He 1*s* orbital are the same size because both *s* orbitals can only have two electrons. | | | |

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| **N16 - Bonding and Naming, N17 - Writing Neutral Compounds** | | | | | | | | | | | | | | | | \_\_\_\_\_\_\_ / 4 | |
| |  |  |  | | --- | --- | --- | | 17. | The correct formula for ammonium sulfate | | | A) | NH4SO3 | | B) | NH4SO4 | | C) | (NH4)2SO3 | | D) | (NH4)2SO4 | | | | | |  |  |  | | --- | --- | --- | | 18. | The correct name for FeO is | | | A) | iron oxide | | B) | iron(II) oxide | | C) | iron(I) oxide | | D) | iron monoxide | | | | | 19. Give the formula for   mercury(II) sulfide. | | | | | |  |  |  | | --- | --- | --- | | 20. | The correct name for P2O5 is | | | A) | phosphorus(II) oxide | | B) | phosphorus(V) oxide | | C) | diphosphorus oxide | | D) | diphosphorus pentoxide | | | | | |
| **N18 - Lewis Structures, N19 – VSEPR** | | | | | | | | | | | | | | | \_\_\_\_\_\_\_ / 4 | | |
| |  |  |  | | --- | --- | --- | | 21. | Which of the following has a double bond? | | | A) | H2O | | B) | C2H2 | | C) | C2H4 | | D) | CN- | | 22. Draw the Lewis Structure for NH4+ | | | | | |  |  |  | | --- | --- | --- | | 23. | CBr2H2 BH3 XeCl4 SF4  Which has a see-saw shape? | | | A) | CBr2H2 | | B) | BH3 | | C) | XeCl4 | | D) | SF4 | | | | | | |  |  |  | | --- | --- | --- | | 24. | CBr2H2 BH3 XeCl4 SF4  Which has bond angles of 109.5˚ | | | A) | CBr2H2 | | B) | BH3 | | C) | XeCl4 | | D) | SF4 | | | | | | | |
| **N20 – Polarity, N21 – IMFs** | | | | | | | | | | | | | | \_\_\_\_\_\_\_ / 4 | | | |
| |  |  |  | | --- | --- | --- | | 25. | How many are nonpolar?  CO NH3 CO2 CH4 H2 | | | A) | 1 | | B) | 2 | | C) | 3 | | D) | 4 | | | | |  |  |  | | --- | --- | --- | | 26. | Order from weakest to strongest . | | | A) | dipole-dipole, London Dispersion, ionic, and hydrogen-bonding | | B) | London Dispersion, dipole-dipole, hydrogen-bonding, ionic | | C) | hydrogen-bonding, dipole-dipole, London Dispersion, and ionic | | D) | dipole-dipole, ionic, London Dispersion, and hydrogen-bonding | | | | | | | |  |  |  | | --- | --- | --- | | 27. | Which of the following substances would you expect to have the lowest boiling point? | | | A) | diamond | | B) | methane, CH4 | | C) | sodium nitrate, NaNO3 | | D) | glycerine, C3H5(OH)3 | | | | | | |  |  |  | | --- | --- | --- | | 28. | Which would you expect to have the highest boiling point? | | | A) | F2 | | B) | Cl2 | | C) | Br2 | | D) | I2 | | | | |
| **N22 - Balancing Equations, N23 - Types of Reactions** | | | | | | | | | | | | \_\_\_\_\_\_\_ / 4 | | | | | |
| |  |  |  | | --- | --- | --- | | 29. | All of the following are clues that a chemical rxn has taken place **except** | | | A) | A color change occurs. | | B) | A solid forms. | | C) | The reactant is smaller. | | D) | Bubbles form. | |  |  | | | |  |  |  | | --- | --- | --- | | 30. | Balance what is the number in front of the substance in bold type?  Pb(NO3)2 + K2CO3  PbCO3 + **KNO3** | | | A) | 5 | | B) | 4 | | C) | 3 | | D) | 2 | | | | | | |  |  |  | | --- | --- | --- | | 31. | Balance. Determine the sum of the coefficients. | | | A) | 3 | | | B) | 4 | | | C) | 6 | | | D) | 7 | | | | | | | 32. Sodium metal reacts with water to produce aqueous sodium hydroxide and hydrogen gas. Write the balanced equation for this reaction. | | | | | |
| **N24 - Predicting Products (and net ionic)** | | | | | | | | | | | | | | | | | \_\_\_\_\_\_\_ / 4 |
| 33. Write the balanced molecular equation for the reaction between aqueous solutions of lithium phosphate and sodium hydroxide. | | | | | |  |  | | --- | --- | | 34. | Which drawing **best** represents the mixing of aqueous calcium chloride with aqueous potassium sulfate when they are mixed in stoichiometric amounts (neither reactant is limiting)? | | | | | | | | | | | | | |
| |  |  | | --- | --- | | A) |  | | B) |  | | | | | | |  |  | | --- | --- | | C) |  | | D) |  | | | | | | | | |

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| 35. Predict the products and balance the equation  KI + Cl2 | | | | 36.Write the molecular equation, the complete ionic equation, and the net ionic equation for the following reaction: Aqueous solutions of copper(II) nitrate and sodium hydroxide are mixed to form solid copper(II) hydroxide and aqueous sodium nitrate. | | | | | | | | | | |
| **N25 - Molar Mass and Molar Conversions, N26 - Mole Ratio and Stoichiometry** | | | | | | | | | | | | | \_\_\_\_\_\_\_ / 4 | |
| |  |  |  | | --- | --- | --- | | 37. | Which represents the greatest number of atoms? | | | A) | 50.0 g Al | | B) | 50.0 g Cu | | C) | 50.0 g Zn | | D) | 50.0 g Fe | | | | |  |  |  | | --- | --- | --- | | 38. | The number of grams in 1.15 mol of sodium carbonate is | | | A) | 92.2 g | | B) | 0.0109 g | | C) | 95. g | | D) | 122. g | | | | |  |  |  |  | | --- | --- | --- | --- | | 39. | what number of grams of silver can be produced from the reaction of 33.9 g of copper? | | | | A) | 115 g Ag | | B) | 57.6 g Ag | | C) | 28.8 g Ag | | D) | 39.9 g Ag | | | | | | |  |  |  | | --- | --- | --- | | 40. | If 22.5 g of CO2 is produced in the reaction of C2H2 with O2 to form CO2 and H2O, how many grams of H2O are produced? | | | A) | 9.21 g | | B) | 4.61 g | | C) | 18.4 g | | D) | 3.07 g | | | | |
| **N27 - Limiting Reagent Stoichiometry** | | | | | | | | | | | | \_\_\_\_\_\_\_ / 4 | | |
| |  |  |  | | --- | --- | --- | | 41. | 2Na(s) + 2H2O(l) 🡪  2NaOH(aq) + H2(g) What number of moles of H2 will be produced when 4.0 mol Na is added to 1.4 mol H2O? | | | A) | 0.7 mol | | B) | 2.8 mol | | C) | 2.0 mol | | D) | 1.4 mol | | |  |  |  | | --- | --- | --- | | 42. | 2A + BC. In which case is B the limiting reactant? | | | A) | I C) III | | B) | II D) IV | | | | | | | |  |  |  |  | | --- | --- | --- | --- | | 43. | | Which of the following mixtures would produce the **greatest** amount of product, assuming all went to completion  N2*(g)* + 3H2*(g)*  2NH3*(g)* | | | A) | | 3 moles of N2 and 3 moles of H2 | | B) | | 1 mole of N2 and 6 moles of H2 | | C) | | 5 moles of N2 and 3 moles of H2 | | D) | | All would produce the same amount of product. | | | |  |  |  | | --- | --- | --- | | 44. | A 2.00 g sample of NH3 reacts with 4.00 g of O2  4 NH3 + 5 O2 🡪 4 NO + 6 H2O  If O2 is the limiting reactant how much excess reactant remains after the rxn is done? | | | A) | 0.30 g | | B) | 0.70 g | | C) | 0.55 g | | D) | 0.43 g | | | | | |
| **N31 - Basic Gas Laws, N32 - Ideal Gas Law, N33 - Dalton’s Law of Partial Pressures** | | | | | | | | | | \_\_\_\_\_\_\_ / 4 | | | | |
| |  |  |  | | --- | --- | --- | | 45. | Consider a gas at 1.00 atm in a 5.00-L container at 20.oC. What pressure does the gas exert when transferred to a volume of 2.30 L at 43oC? | | | A) | 4.67 atm | | B) | 2.02 atm | | C) | 0.371 atm | | D) | 2.34 atm | | | |  |  |  | | --- | --- | --- | | 46. | Determine the pressure exerted by 2.05 mol of gas in a 2.92-L container at 32oC. | | | A) | 1.84 atm | | B) | 51.3 atm | | C) | 17.6 atm | | D) | 5.38 atm | | | | |  |  |  | | --- | --- | --- | | 47. | The valve between a 5-L tank containing a gas at 9 atm and a 10-L tank containing a gas at 6 atm is opened. Calculate the final pressure in the tanks. | | | A) | 3 atm | | B) | 4 atm | | C) | 7 atm | | D) | 15 atm | | | | |  |  |  | | --- | --- | --- | | 48. | Which of the following is *not* a postulate of the kinetic molecular theory? | | | A) | Gas particles have most of their mass concentrated in the nucleus of the atom. | | B) | The moving particles undergo perfectly elastic collisions with the walls of the container. | | C) | The forces of attraction and repulsion between the particles are insignificant. | | D) | The average kinetic energy of the particles is directly proportional to the absolute temperature. | | | | | | | |

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| **N34 - Gas Stoichiometry** | | | | | | | | | | \_\_\_\_\_\_\_ / 4 | | | | |
| |  |  |  | | --- | --- | --- | | 49. | What volume of oxygen gas at STP is needed to react with 3.94 mol of C2H4? (Ignore signficant figures for this problem.) | | | A) | 11.8 L | | B) | 29.4 L | | C) | 265 L | | D) | 88.3 L | | | | |  |  |  | | --- | --- | --- | | 50. | It is found that 250. mL of a gas at STP has a mass of 1.36 g. What is the molar mass? | | | A) | 122 g/mol | | B) | 5.44 g/mol | | C) | 11.2 g/mol | | D) | 22.4 g/mol | | | |  |  |  | | --- | --- | --- | | 51. | You place 15.0 g of nitrogen gas and 15.0 g of hydrogen gas in a container fitted with a massless, frictionless piston. If the original volume of the container is 10.3 L, what is the volume after the reaction has run to completion? Assume constant temperature.  N2*(g)* + 3H2*(g)*  2NH3*(g)* | | | A) | 11.90 L | | B) | 1.38 L | | C) | 6.41 L | | D) | 8.92 L | | | | | | |  |  |  | | --- | --- | --- | | 52. | Suppose 143.0 g of hydrogen peroxide decomposes and all of the oxygen gas is collected in a balloon at 1.00 atm and 25oC. Determine the volume of the balloon. | | | A) | 4.31 L | | B) | 102.8 L | | C) | 51.4 L | | D) | 8.62 L | | | | | |
| **N35 - Specific Heat, N36 – Calorimetry** | | | | | | | | | | | | \_\_\_\_\_\_\_ / 4 | | |
| |  |  |  | | --- | --- | --- | | 53. | A 5.10-g sample of iron is heated from 36.0oC to 75.0oC. The amount of energy required is 89.51 J. The specific heat capacity of this sample of iron is | | | A) | 1.78  104 J/g oC | | B) | 2.22 J/g oC | | C) | 0.234 J/g oC | | D) | 0.450 J/g oC | | | |  |  |  | | --- | --- | --- | | 54. | Assume that 248.3 J of heat is added to 5.00 g of water originally at 23.0oC. What would be the final temperature of the water? (Specific heat capacity of water = 4.184 J/goC.) | | | A) | 11.9 oC | | B) | 49.9 oC | | C) | 62.9 oC | | D) | 34.9 oC | | | | | |  |  |  | | --- | --- | --- | | 55. | A 56.3-g sample of aluminum at 95.0oC is dropped into 35.0 g of water at 40.0oC. What is the final temperature of the mixture? (specific heat capacity of aluminum = 0.89 J/goC; specific heat capacity of water = 4.184 J/goC) | | | A) | 54oC | | B) | –5.6oC | | C) | 110oC | | D) | 23oC | | | | |  |  |  | | --- | --- | --- | | 56. | Two metals of equal mass with different heat capacities are subjected to the same amount of heat. Which undergoes the smallest change in temperature? | | | A) | The metal with the higher heat capacity. | | B) | The metal with the lower heat capacity. | | C) | Both undergo the same change in temperature. | | D) | You need to know the initial temperatures of the metals. | | | | | | |
| **N37 - Heating and Cooling Curves** | | | | | | | | | | | | | \_\_\_\_\_\_\_ / 4 | |
| |  |  |  | | --- | --- | --- | | 57. | As water freezes the energy in the reaction is | | | A) | released | | B) | Absorbed | | C) | neither | | D) | does not change | | |  |  |  | | --- | --- | --- | | 58. | During boiling which statements is true? | | | A) | The speed of the molecules is decreasing | | B) | The speed of the molecules is increasing | | C) | The distance between the molecules is decreasing | | D) | The distance between the molecules is increasing | | | | | | | | |  |  |  | | --- | --- | --- | | 59. | How much energy is absorbed when 18g ice at 0oC is heated to 75oC? | | | A) | 11655 J | | B) | 46328 J | | C) | 9778 J | | D) | 6012 J | | | | |  |  |  | | --- | --- | --- | | 60. | What is the energy involved when converting 10 grams of steam at 120 C into ice at -20 C? | | | A) | 2618 J | | B) | -2618 J | | C) | 30912 J | | D) | -30912 J | | | | |
| **N38 - Energy of Reactions** | | | | | | | | | | | | | | \_\_\_\_\_\_\_ / 4 |
| |  |  |  | | --- | --- | --- | | 61. | C2H5OH (l) + 3O2 (g) 🡪 2CO2 (g) + 3H2O (l)  ∆H = -1.37 x 103 kJ  When a 15.5-g sample of ethyl alcohol (molar mass = 46.1 g/mol) is burned, how much energy is released?? | | | A) | 3.36  10–1 kJ | | B) | 4.61  10–1 kJ | | C) | 4.61  102 kJ | | D) | 2.12  104 kJ | | | | | |  |  |  | | --- | --- | --- | | 62. | Breaking a bond is always \_\_\_\_\_, and making a bond is always \_\_\_\_\_. | | | A) | Endo, Exo | | B) | Endo, Endo | | C) | Exo, Endo | | D) | Exo, Exo | | | | |  |  |  | | --- | --- | --- | | 63. | Using the data below, what is ∆H° for the reaction: A + 2D 🡪 2E  *Rxn 1* A + 2B 🡪 2C ∆H° = 5 kJ *Rxn 2*  D + C 🡪 E + B ∆H° = 8 kJ | | | A) | 13 kJ | | B) | -11 kJ | | C) | -3 kJ | | D) | 21 kJ | | | | | | | | |  |  |  | | --- | --- | --- | | 64. | What is the ∆H°rxn for  CH4 + 2O2 🡪 CO2 + 2H2O ∆H°*formation* Values (kJ/mol) CH4 = -74.80 O2 = 0  CO2 = -393.50 H2O = -285.83 | | | A) | -604.53 | | B) | 604.53 | | C) | -890.36 | | D) | 890.36 | |

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| **N39 - Solutions Concepts, N40 - Solutions Calculations** | | | | | | | \_\_\_\_\_\_\_ / 4 | | |
| |  |  |  | | --- | --- | --- | | 65. | Determine the concentration of a solution made by dissolving 22.5 g of sodium chloride in 750.0 mL of solution. | | | A) | 0.289 *M* | | B) | 30.0 *M* | | C) | 0.385 *M* | | D) | 0.513 *M* | | | |  |  |  | | --- | --- | --- | | 66. | One mole of each of the following compounds is added to water in separate flasks to make 1.0 L of solution. Which solution has the largest **total** ion concentration? | | | A) | calcium carbonate | | B) | potassium phosphate | | C) | aluminum hydroxide | | D) | silver chloride | | | | |  |  |  | | --- | --- | --- | | 67. | What mass of solute is contained in 417 mL of a 0.157 *M* magnesium fluoride solution? | | | A) | 4.08 g | | B) | 65 g | | C) | 9.8 g | | D) | 1.05 g | | | | | |  |  |  | | --- | --- | --- | | 68. | What volume of 17.8 *M* H2SO4 is required to prepare 12.0 L of 0.156 *M* sulfuric acid? (Ignore significant figures for this problem.) | | | A) | 231 mL | | B) | 2.78 L | | C) | 114 mL | | D) | 105 mL | |
| **N41 - Kinetics, Rate Expressions, Average Rates** | | | | | | | \_\_\_\_\_\_\_ / 4 | | |
| |  |  |  | | --- | --- | --- | | 69. | 2H2 + O2  2H2O  What is the ratio of the initial rate of appearance of water to the initial rate of disappearance of oxygen? | | | A) | 1 : 1 | | B) | 2 : 1 | | C) | 1 : 2 | | D) | 2 : 2 | | |  |  |  | | --- | --- | --- | | 70. | 4NH3 + 7O2  4NO2 + 6H2O  At a certain instant the initial rate of disappearance of oxygen gas is X. What is the value of the appearance of water at the same instant? | | | A) | 1.2 X | | B) | 1.1 X | | C) | 0.86 X | | D) | 0.58 X | | | |  |  |  | | --- | --- | --- | | 71. | 2O3(g) 🡪 3O2(g)  The average rate of disappearance of ozone is 7.73  10-3 atm over an interval of time. What is the rate of appearance of O2 during this interval? | | | A) | 1.16  10-2 atm/s | | B) | 7.73  10-3atm/s | | C) | 5.15  10-3atm/s | | D) | 2.31  10-2atm/s | | | | | | |  |  |  | | --- | --- | --- | | 72. | B3O3- + 5Br- + 6H+ 🡪 3Br2 + 3H2O  At a particular instant in time, the value of -[Br-]/t is 3.5  10-3 mol/L s. What is the value of [Br2]/t in the same units? | | | A) | 2.1  10-3 | | B) | 3.5  10-3 | | C) | 5.8  10-3 | | D) | 1.8  10-3 | | |
| **N42 - Instantaneous Rates and Rate Laws** | | | | | | | \_\_\_\_\_\_\_ / 4 | | |
| |  |  |  | | --- | --- | --- | | 73. | Which best describes the condition(s) needed for a successful formation for a product according to the collision model? | | | A) | The collision must involve a sufficient amount of energy, provided from the motion of the particles, to overcome the activation energy. | | B) | The relative orientation of the particles has little or no effect on the formation of the product. | | C) | The relative orientation of the particles has an effect only if the kinetic energy of the particles is below some minimum value. | | D) | The energy of the incoming particles must be above a certain minimum value and the relative orientation of the particles must allow for formation of new bonds in the product. | | | | | | | |  |  |  | | --- | --- | --- | | 74. | Consider the following rate law: Rate = *k*[A]*n*[B]*m*  How are the exponents *n* and *m* determined? | | | A) | By using the balanced chemical equation | | B) | By using the subscripts for the chemical formulas | | C) | By using the coefficients of the chemical formulas | | D) | By experiment | | | | |
| |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  | | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | | 75. | The following data were obtained for the reaction of NO with O2. Concentrations are in molecules/cm3 and rates are in molecules/cm3  s.   |  |  |  | | --- | --- | --- | | [NO]o | [O2]o | Initial Rate | | 1  1018 | 1  1018 | 2.0  1016 | | 2  1018 | 1  1018 | 8.0  1016 | | 3  1018 | 1  1018 | 18.0  1016 | | 1  1018 | 2 1018 | 4.0  1016 | | 1  1018 | 3  1018 | 6.0  1016 |   What is the rate law? | | | A) | Rate = *k*[NO][O2] | | B) | Rate = *k*[NO][O2]2 | | C) | Rate = *k*[NO]2[O2] | | D) | Rate = *k*[NO]2 | | | | | |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  | | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | | 76. | 2Fe(CN)63– + 2I–  2Fe(CN)64– + I2   |  |  |  |  |  |  | | --- | --- | --- | --- | --- | --- | |  | | | | | | | Run | [Fe(CN)63–]0 | [I–]0 | [Fe(CN)64–]0 | [I2]0 | Rate (M/s) | | 1 | 0.01 | 0.01 | 0.01 | 0.01 | 1  10–5 | | 2 | 0.01 | 0.02 | 0.01 | 0.01 | 2  10–5 | | 3 | 0.02 | 0.02 | 0.01 | 0.01 | 8  10–5 | | 4 | 0.02 | 0.02 | 0.02 | 0.01 | 8  10–5 | | 5 | 0.02 | 0.02 | 0.02 | 0.02 | 8  10–5 |   What is the value of k? | | | A) | 107 M–5 s–1 | | B) | 103 M–3 s–1 | | C) | 10 M–2 s–1 | | D) | 50 M–2 s–1 | | | | | | |

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| **N43 - Le Chatelier’s Principle** | | | | | | | \_\_\_\_\_\_\_ / 4 | | | | |
| |  |  |  | | --- | --- | --- | | 77. | Which of the following is true about chemical equilibrium? | | | A) | It is microscopically and macroscopically static. | | B) | It is microscopically and macroscopically dynamic. | | C) | It is microscopically static and macroscopically dynamic. | | D) | It is microscopically dynamic and macroscopically static. | | | Use the following to answer Qs 78-80:  CaCO3*(s)*  CaO*(s)* + CO2*(g)*   |  |  |  | | --- | --- | --- | | 78. | What would happen to the system if more CaCO3 were added? | | | A) | More CaO would be produced. | | B) | The [CO2*(g)*] would decrease. | | C) | The amount of CaCO3 would decrease. | | D) | Nothing would change | |  |  | | | | |  |  |  | | --- | --- | --- | | 79. | What would happen to the system if the total pressure were increased by adding CO2*(g)*? | | | A) | Nothing would happen. | | B) | More CO2*(g)* would be produced. | | C) | The amount of CaO would increase. | | D) | The amount of CaCO3 would increase. | | | | | |  |  |  | | --- | --- | --- | | 80. | What would happen to the system if the total pressure were increased by adding Ar*(g)*? | | | A) | Nothing would happen. | | B) | More CO2*(g)* would be produced. | | C) | The amount of CaO would increase. | | D) | The amount of CaCO3 would increase. | | | |
| **N44 - Equilibrium Constant and Quotient** | | | | | | | \_\_\_\_\_\_\_ / 4 | | | | |
| |  |  |  | | --- | --- | --- | | 81. | For a particular system at a particular temperature there \_\_\_\_\_\_ equilibrium constant(s) and there \_\_\_\_\_\_\_ equilibrium position(s). | | | A) | are infinite; is one | | B) | is one; are infinite | | C) | is one; is one | | D) | are infinite; are infinite | | |  |  |  | | --- | --- | --- | | 82. | | A(g) + B(g) ⇌ C(g) + D(g). You have the gases A, B, C, and D at equilibrium. Upon adding gas A, the value of *K*: | | A) | increases because by adding A, more products are made, increasing the product to reactant ratio. | | | B) | decreases because A is a reactant o the product to reactant ratio decreases. | | | C) | does not change because A does not figure into the product to reactant ratio. | | | D) | does not change as long as the temperature is constant. | | | | | |  |  |  |  | | --- | --- | --- | --- | | 83. | | N2(g) + O2(g) ⇌ 2NO(g)  At 2000°C, K = 0.01  Predict the direction in which the system will move to reach equilibrium at 2000°C if 0.4 moles of N2, 0.1 moles of O2, and 0.08 moles of NO are placed in a 1.0-liter container. | | | A) | | The system remains unchanged. | | | B) | | The concentration of NO will decrease; the concentrations of N2 and O2 will increase. | | | C) | | The concentration of NO will increase; the concentrations of N2 and O2 will decrease. | | | D) | | The concentration of NO will decrease; the concentrations of N2 and O2 will remain unchanged. | | | | | | | | |  |  |  | | --- | --- | --- | | 84. | F2(*g*)  2F(*g*)  at a particular temperature, the concentrations at equilibrium are [F2] = 1.7  10–2 mol/L and [F] = 2.0  10–4 mol/L. Calculate the value of the equilibrium constant from these data. | | | A) | 3.4  10–2 | | B) | 1.8 | | C) | 4.2  105 | | D) | 2.4  10–6 | | |
| **N45 - ICE Tables** | | | | | | | | \_\_\_\_\_\_\_ / 4 | | | |
| |  |  |  |  |  |  |  |  |  | | --- | --- | --- | --- | --- | --- | --- | --- | --- | | 85. | | Consider the reaction:  2SO2(g) + O2(g) ⇌ 2SO3(g) at constant temperature. Initially a container is filled with pure SO3(g) at a pressure of 2 atm, after which equilibrium is reached. If *y* is the partial pressure of O2 at equilibrium, the value of *K*p is: | | | | | | | | A) |  | | | | C) | |  | | B) |  | | | D) | |  | | |  |  | | | | | | | | | |  |  |  | | --- | --- | --- | | 86. | 2N2O(g) + N2H4(g) ⇌ 3N2(g) + 2H2O(g)    Initially there are 0.10 moles of N2O and 0.25 moles of N2H4, in a 10.0-L container. If there are 0.064 moles of N2O at equilibrium, how many moles of N2 are present at equilibrium? | | | A) | 1.8  10-2 | | B) | 3.6  10-2 | | C) | 5.4  10-2 | | D) | 1.1  10-1 | | | | |  |  |  | | --- | --- | --- | | 87. | 2NOCl(g) ⇌ 2NO(g) + Cl2(g)  *K* = 1.6 x 10-5. 1.00 mole of pure NOCl and 0.927 mole of pure Cl2 are placed in a 1.00-L container. Calculate the equilibrium concentration of NO(g). | | | A) | 4.15  10-3 M | | B) | 9.27  10-1 M | | C) | 1.08 M | | D) | 5.88  10-3 M | | | | | | |  |  |  | | --- | --- | --- | | 88. | H2 + I2 ⇌ 2HI *K* = 40.8 at a high temperature. If an equimolar mixture of reactants gives the concentration of the product to be 0.50 M at equilibrium, determine the initial concentration of hydrogen. | | | A) | 3.28  10-1 M | | B) | 7.8  10-2 M | | C) | 3.9  10-2 M | | D) | 1.3  101 M | |

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| **N46 - Acids and Bases and pH Calculations** | | | | | | | | | | | | | | \_\_\_\_\_\_\_ / 4 | | | | | | |
| |  |  |  | | --- | --- | --- | | 89. | Calculate the [OH–] in a solution that has a pH of 3.65. | | | A) | 4.5  10–11 *M* | | B) | 1.0  10–7 *M* | | C) | 2.2  10–4 *M* | | D) | 2.7  10–15 *M* | | | | |  |  |  | | --- | --- | --- | | 90. | A solution has [H+] = 4.9 10–3 *M*. The [OH–] in this solution is | | | A) | 4.9 1011 *M* | | B) | 4.9 10–17 *M* | | C) | 2.0 10–12 *M* | | D) | 1.0 10–14 *M* | | | | | |  |  |  | | --- | --- | --- | | 91. | Calculate the [H+] in a 0.086 M solution of HCN, *K*a = 6.2 x 10-10. | | | A) | 1.0  10-7 M | | B) | 7.3  10-6 M | | C) | 5.3  10-11 M | | D) | 1.5  10-5 M | | | | |  |  |  | | --- | --- | --- | | 92. | Which of the species below, when dissolved in H2O, will not produce a basic solution? | | | A) | SO2 | | B) | NH3 | | C) | BaO | | D) | Ba(OH)2 | | | | | | | | | | | |
| **N48 - Weak Acids and Bases** | | | | | | | | | | | | | | \_\_\_\_\_\_\_ / 4 | | | | | | |
| |  |  |  |  |  | | --- | --- | --- | --- | --- | | 93. | | Identify the Bronsted acids and bases in the following equation (A = Bronsted acid, B = Bronsted base):  HSO3-  + CN-  HCN + SO32- | | | | A) | | B A B A | | B) | | B B A A | | C) | | A B A B | | D) | | A B B A | | | | | | |  |  |  | | --- | --- | --- | | 94. | For weak acid, HX, *K*a = 1.0  10-6. Calculate the pH of a 0.79 M solution of HX. | | | A) | 0.10 | | B) | 3.05 | | C) | 6.10 | | D) | 10.95 | | | | |  |  |  | | --- | --- | --- | | 95. | Saccharin is a monoprotic acid. If the pH of a 1.50 x 10-2 M solution of this acid is 5.53, what is the *K*a of saccharin? | | | A) | 2.0  10-4 | | B) | 1.5  10-2 | | C) | 5.8  10-10 | | D) | 2.9  10-6 | | | | | |  |  |  | | --- | --- | --- | | 96. | The pain killer morphine is a weak base when added to water. The reaction produces one mole of hydroxide ions for every one mole of morphine that dissolves. The *K*b is 1.6 x 10-6. What is the pH of a 3.56 x 10-3 M solution of morphine? | | | A) | 4.12 | | B) | 9.88 | | C) | 5.76 | | D) | 10.03 | | | | | | | | | |
| **N49 - Salts** | | | | | | | | | | | | | | | \_\_\_\_\_\_\_ / 4 | | | | | |
| |  |  |  |  |  |  | | --- | --- | --- | --- | --- | --- | | 97. | Which of the following correctly labels the salts?   |  |  |  | | --- | --- | --- | | HF  *K*a = 3.5 x10-4 | NH3  *K*b = 1.8 x 10-5 | HCN  *K*a = 4.9 x 10-10 | | | | A) | NaCN = acidic, NH4F = basic, KCN = neutral | | B) | NaCN = acidic, NH4F = neutral, KCN = basic | | C) | NaCN = basic, NH4F = basic, KCN= neutral | | D) | NaCN = basic, NH4F = acidic, KCN = basic | | | | | | | |  |  |  |  | | --- | --- | --- | --- | | 98. | | | True or false: The species Cl- is not a good base in aqueous solution. | | A) | True. This is because Cl- is the conjugate base of a weak acid. | | | B) | False. The species Cl- is a good base in aqueous solution because it is the conjugate base of a strong acid. | | | C) | True. This is because Cl- is a good proton donor. | | | D) | True. This is because water has a stronger attraction for protons than does Cl-. | | | | | | | |  |  |  | | --- | --- | --- | | 99. | Determine the pH of 0.03 M solution of NaOCl  (*K*a HOCl = 3.00  10-8) | | | A) | 4.00 | | B) | 6.25 | | C) | 10.0 | | D) | 4.69 | | | | | | | | |  |  |  | | --- | --- | --- | | 100. | Calculate the pH of a 0.05 M solution NH4Cl  Kb NH3 = 1.8 x 10-5 | | | A) | 5.28 | | B) | 8.72 | | C) | 7.0 | | D) | 3.44 | | | |
| **ANSWER KEY**   |  |  | | --- | --- | | 11. |  |   1s ↑↓  2s ↑↓  2px  ↑↓  2py ↑  2pz ↑   |  |  | | --- | --- | | 12. | C | | 13. | D | | 14. | C | | 15. | D | | 16. | C | | 17. | D | | 18. | B | | 19. | HgS | | 20. | D | | | | | | | | | | | | | | | | | | | | | |
| |  |  | | --- | --- | |  | 1. B  2. D  3. B  4. C  5. A  6. A  7. B  8. D  9.  a. 32  b. 10  c. 2  10. B | |  |  | |  |  | |  |  | |  |  | |  |  | |  |  | |  |  | |  |  | |  | |  |  | | --- | --- | |  |  | |  |  | |  |  | |  |  | |  |  | |  |  | |  |  | |  |  | |  |  |   A picture containing text, clock, antenna  Description automatically generated   |  |  | | --- | --- | | 21. | C | | 22. |  | | 23. | D | | 24. | A | | 25. | C | | 26. | B | | 27. | B | | 28. | D | | 29. | C | | 30. | D | | | |  |  | | --- | --- | |  |  | |  |  | |  |  | |  |  | |  |  | |  |  | |  |  | |  |  | |  |  |  |  |  | | --- | --- | | 31. | D | | 32. | 2Na*(s)* + 2H2O*(l)*  2NaOH*(aq)* + H2*(g)* | | 33. | Li3PO4*(aq)* + 3NaOH*(aq)*  Na3PO4*(aq)* + 3LiOH*(aq)* | | 34. | B | | 35. | 2KI*(aq)* + Cl2*(g)*  2KCl*(aq)* + I2*(s)* | | 36. | Cu(NO3)2*(aq)* + 2NaOH*(aq)*  Cu(OH)2*(s)* + 2NaNO3*(aq)*  Cu2+*(aq)* + 2NO3-*(aq)* + 2Na+*(aq)* + 2OH-*(aq)*  Cu(OH)2*(s)* + 2Na+*(aq)* + 2NO3-*(aq)*  Cu2+*(aq)* + 2OH-*(aq)*  Cu(OH)2*(s)* | | 37. | A | | 38. | D | | 39. | A | | 40. | B | | | | | | |  |  | | --- | --- | |  |  | |  |  | |  |  | |  |  | | |  |  | | --- | --- | | 41. | A | | 42. | B | | 43. | D | | 44. | A | | 45. | D | | 46. | C | | 47. | C | | 48. | A | | 49. | C | | 50. | A | |  | |  |  | |  |  | |  |  | | | | | |  |  | | --- | --- | |  |  | |  |  | |  |  | |  |  | |  |  | |  |  | |  |  | |  |  | |  |  | |  |  |  |  |  | | --- | --- | | 51. | D | | 52. | C | | 53. | D | | 54. | D | | 55. | A | | 56. | A | | 57. | A | | 58. | D | | 59. | A | | 60. | D | | | | |  |  | | --- | --- | |  |  | |  |  | |  |  | |  |  | |  |  | |  |  | |  |  | |  |  | |  |  | |  |  |  |  |  | | --- | --- | | 61. | C | | 62. | A | | 63. | D | | 64. | C | | 65. | D | | 66. | B | | 67. | A | | 68. | D | | 69. | B | | 70. | C | | |  |  | | --- | --- | |  |  | |  |  | |  |  | |  |  | | |  |  | | --- | --- | | 71. | A | | 72. | A | | 73. | D | | 74. | D | | 75. | C | | 76. | C | | 77. | D | | 78. | D | | 79. | D | | 80. | A | |  | |  |  | |  |  | |  |  | |  |  | |  |  | | | |  |  | | --- | --- | | 81. | B | | 82. | D | | 83. | B | | 84. | D | | 85. | D | | 86. | C | | 87. | A | | 88. | A | | 89. | A | | 90. | C | | |  |  | | --- | --- | | 91. | B | | 92. | A | | 93. | C | | 94. | B | | 95. | C | | 96. | B | | 97. | D | | 98. | D | | 99. | C | | 100. | A | |