#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.

**Name:                                                                             Period:                Seat #:**

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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)
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| 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)
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| 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)
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| 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 |
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| 1. | Using the rules of significant figures, calculate the following:6.167 + 70 = |
| A) | 76 |
| B) | 80 |
| C) | 76.167 |
| D) | 77 |

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| 2. | The number 14.809 rounded to three significant figures is |
| A) | 15.0 |
| B) | 14.9 |
| C) | 14.81 |
| D) | 14.8 |

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| 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 |

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| 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 |

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| **N5 – Atomic Numbers and Isotopes** | \_\_\_\_\_\_\_ / 4 |
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| 5. | How many electrons are present in a fluorine, F, atom? |
| A) | 9 |
| B) | 10 |
| C) | 11 |
| D) | 18 |
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| 6. | 54 p+, 54 e-, and 78 n0 is |
| A) |  |
| B) |  |
| C) |  |
| D) |  |

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| 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 |

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| 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 |

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| **N10 - Introduction to Electrons, N12 - Writing e- Configs, N13 - Configs of Ions & Noble Gas Configs** | \_\_\_\_\_\_\_ / 4 |
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| 9. | State the maximum number of electrons allowed in each.a. 4th principal energy level \_\_\_\_\_\_\_ b. any *d* sublevel \_\_\_\_\_\_\_c. a 2*p* orbital \_\_\_\_\_\_\_ |

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| 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 |

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| 11. | Draw the orbital diagram for the ground state of oxygen. |

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| 12. | The electron configuration of Cr3+ is |
| A) | [Ar]4s23d1 |
| B) | [Ar]4s13d2 |
| C) | [Ar]3d3 |
| D) | [Ar]4s23d4 |

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| **N15 - Periodic Trends** | \_\_\_\_\_\_\_ / 4 |
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| 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 |

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| 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. |

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| 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– |

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| 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 |
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| 17. | The correct formula for ammonium sulfate  |
| A) | NH4SO3 |
| B) | NH4SO4 |
| C) | (NH4)2SO3 |
| D) | (NH4)2SO4 |

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| 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.  |

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| 20. | The correct name for P2O5 is |
| A) | phosphorus(II) oxide |
| B) | phosphorus(V) oxide |
| C) | diphosphorus oxide |
| D) | diphosphorus pentoxide |

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| **N18 - Lewis Structures, N19 – VSEPR** | \_\_\_\_\_\_\_ / 4 |
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| 21. | Which of the following has a double bond? |
| A) | H2O |
| B) | C2H2 |
| C) | C2H4 |
| D) | CN- |

 | 22. Draw the Lewis Structure for NH4+ |

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| 23. | CBr2H2 BH3 XeCl4 SF4 Which has a see-saw shape? |
| A) | CBr2H2 |
| B) | BH3 |
| C) | XeCl4 |
| D) | SF4 |

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| 24. | CBr2H2 BH3 XeCl4 SF4 Which has bond angles of 109.5˚  |
| A) | CBr2H2 |
| B) | BH3 |
| C) | XeCl4 |
| D) | SF4 |

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| **N20 – Polarity, N21 – IMFs** | \_\_\_\_\_\_\_ / 4 |
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| 25. | How many are nonpolar?CO NH3 CO2 CH4 H2 |
| A) | 1 |
| B) | 2 |
| C) | 3 |
| D) | 4 |

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| 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 |

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| 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 |

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| 28. | Which would you expect to have the highest boiling point? |
| A) | F2 |
| B) | Cl2 |
| C) | Br2 |
| D) | I2 |

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| **N22 - Balancing Equations, N23 - Types of Reactions** | \_\_\_\_\_\_\_ / 4 |
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| 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. |
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| 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 |

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| 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. |

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| 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)? |

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| A) |  |
| B) |  |

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| 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 |
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| 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 |

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| 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 |

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| 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 |

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| 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 |

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| **N27 - Limiting Reagent Stoichiometry** | \_\_\_\_\_\_\_ / 4 |
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| 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 |

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| 42. | 2A + BC. In which case is B the limiting reactant? |
| A) | I C) III |
| B) |  II D) IV |

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| 43. | Which of the following mixtures would produce the **greatest** amount of product, assuming all went to completionN2*(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. |

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| 44. | A 2.00 g sample of NH3 reacts with 4.00 g of O2 4 NH3 + 5 O2 🡪 4 NO + 6 H2OIf 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 |

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| **N31 - Basic Gas Laws, N32 - Ideal Gas Law, N33 - Dalton’s Law of Partial Pressures** | \_\_\_\_\_\_\_ / 4 |
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| 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 |

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| 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 |

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| 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 |

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| 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 |
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| 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 |

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| 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 |

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| 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 |

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| 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 |

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| **N35 - Specific Heat, N36 – Calorimetry** | \_\_\_\_\_\_\_ / 4 |
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| 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 |

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| 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 |

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| 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 |

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| 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. |

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| **N37 - Heating and Cooling Curves** | \_\_\_\_\_\_\_ / 4 |
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| 57. | As water freezes the energy in the reaction is |
| A) | released |
| B) | Absorbed |
| C) | neither |
| D) | does not change |

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| 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 |

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| 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 |

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| 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 |

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| **N38 - Energy of Reactions** | \_\_\_\_\_\_\_ / 4 |
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| 61. | C2H5OH (l) + 3O2 (g) 🡪 2CO2 (g) + 3H2O (l) ∆H = -1.37 x 103 kJWhen 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 |

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| 62. | Breaking a bond is always \_\_\_\_\_, and making a bond is always \_\_\_\_\_. |
| A) | Endo, Exo |
| B) | Endo, Endo |
| C) | Exo, Endo |
| D) | Exo, Exo |

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| 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 |

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| 64. | What is the ∆H°rxn for CH4 + 2O2 🡪 CO2 + 2H2O∆H°*formation* Values (kJ/mol) CH4 = -74.80 O2 = 0CO2 = -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 |
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| 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* |

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| 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 |

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| 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 |

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| 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 |

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| **N41 - Kinetics, Rate Expressions, Average Rates** | \_\_\_\_\_\_\_ / 4 |
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| 69. | 2H2 + O2  2H2OWhat 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 |

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| 70. | 4NH3 + 7O2  4NO2 + 6H2OAt 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 |

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| 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 |

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| 72. | B3O3- + 5Br- + 6H+ 🡪 3Br2 + 3H2OAt 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 |

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| **N42 - Instantaneous Rates and Rate Laws** | \_\_\_\_\_\_\_ / 4 |
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| 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. |

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| 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 |

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| 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.

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| [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 |

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| 76. |  2Fe(CN)63– + 2I–  2Fe(CN)64– + I2

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| 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 |
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| 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)*

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| 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 |
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| 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. |

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| 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. |

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| **N44 - Equilibrium Constant and Quotient** | \_\_\_\_\_\_\_ / 4 |
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| 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 |

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| 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. |

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| 83. | N2(g) + O2(g) ⇌ 2NO(g) At 2000°C, K = 0.01Predict 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. |

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| 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 |

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| **N45 - ICE Tables** | \_\_\_\_\_\_\_ / 4 |
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| 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) |  |
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| 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 |

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| 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 |

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| 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 |
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| 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* |

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| 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* |

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| 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 |

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| 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 |

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| **N48 - Weak Acids and Bases** | \_\_\_\_\_\_\_ / 4 |
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| 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 |

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| 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 |

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| 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 |

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| 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 |

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| **N49 - Salts**  | \_\_\_\_\_\_\_ / 4 |
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| 97. | Which of the following correctly labels the salts?

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|  HF *K*a = 3.5 x10-4 |  NH3  *K*b = 1.8 x 10-5 |  HCN  *K*a = 4.9 x 10-10 |

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| 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 |

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| 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-. |

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| 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 |

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| 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 |

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| **ANSWER KEY**

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| 11. |  |

1s ↑↓ 2s ↑↓2px  ↑↓ 2py ↑ 2pz ↑

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| 12. | C |
| 13. | D |
| 14. | C |
| 15. | D |
| 16. | C |
| 17. | D |
| 18. | B |
| 19. | HgS |
| 20. | D |

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|  | 1. B2. D3. B4. C5. A6. A7. B8. D9.  a. 32 b. 10 c. 210. B |
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| 21. | C |
| 22. |  |
| 23. | D |
| 24. | A |
| 25. | C |
| 26. | B |
| 27. | B |
| 28. | D |
| 29. | C |
| 30. | D |

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| 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 |

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| 41. | A |
| 42. | B |
| 43. | D |
| 44. | A |
| 45. | D |
| 46. | C |
| 47. | C |
| 48. | A |
| 49. | C |
| 50. | A |

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| 51. | D |
| 52. | C |
| 53. | D |
| 54. | D |
| 55. | A |
| 56. | A |
| 57. | A |
| 58. | D |
| 59. | A |
| 60. | D |

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| 61. | C |
| 62. | A |
| 63. | D |
| 64. | C |
| 65. | D |
| 66. | B |
| 67. | A |
| 68. | D |
| 69. | B |
| 70. | C |

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| 71. | A |
| 72. | A |
| 73. | D |
| 74. | D |
| 75. | C |
| 76. | C |
| 77. | D |
| 78. | D |
| 79. | D |
| 80. | A |

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| 81. | B |
| 82. | D |
| 83. | B |
| 84. | D |
| 85. | D |
| 86. | C |
| 87. | A |
| 88. | A |
| 89. | A |
| 90. | C |

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| 91. | B |
| 92. | A |
| 93. | C |
| 94. | B |
| 95. | C |
| 96. | B |
| 97. | D |
| 98. | D |
| 99. | C |
| 100. | A |

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