**\*NOTE\***

**Another teacher made this – I have no idea if it is duplicate questions from the one I already gave you, I did not have time to check it! I thought I would give it to you anyway, just in case. I also have not checked to see if the answer key is correct. Let me know if you notice duplicates or any typos and I can try and update them if possible.**

Dougherty Valley HS

Chemistry – Sol-Kin-Equal Review

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| 1. | A sample of a substance burns more rapidly in pure oxygen than in air. Which factor is most responsible for this high rate of reaction? | |
| A) | temperature |
| B) | Surface area exposed to air |
| C) | Catalyst |
| D) | concentration of the substance |
| E) | the properties of the reactants |

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| 2. | For the reaction A + B  2C. if we start with 3.2E-2M of A and B. What is the concentrations of C at equilibrium given that Keq = 5.2E-9? | |
| A) | 6.92E-21M |
| B) | 7.39E-11M |
| C) | 2.08E-11M |
| D) | 4.16E-11M |
| E) | 8.32E-11M |

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| 3. | What volume of 16.3 *M* H2SO4 is required to prepare 12.0 L of 0.156 *M* sulfuric acid? | |
| A) | 1.25 L |
| B) | 115 mL |
| C) | 2.54 L |
| D) | 212 mL |
| E) | 104 mL |

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| 4. | At a certain temperature *K* for the reaction 2NO2 <-->N2O4 is 7.5 liters/mole. If 2.0 moles of NO2 are placed in a 2.0-liter container and permitted to react at this temperature, calculate the concentration of N2O4 at equilibrium. | |
| A) | 7.5 moles/liter |
| B) | 0.82 moles/liter |
| C) | 0.39 moles/liter |
| D) | 0.65 moles/liter |
| E) | none of these |

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| 5. | Write the equilibrium expression for the following reaction:  S*(s)* + O2*(g)*  SO2*(g)* | |
| A) | *K* = |
| B) | *K* = |
| C) | *K* = |
| D) | *K* = |
| E) | none of these |

Use the following to answer questions 6-7:

The following questions refer to the equilibrium shown here: CaCO3*(s)*  CaO*(s)* + CO2*(g)*

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| 6. | What would happen to the system if the total pressure were increased by adding CO2*(g)*? | |
| A) | The amount of CaO would increase. |
| B) | Nothing would happen. |
| C) | Equilibrium would shift to the right. |
| D) | More CO2*(g)* would be produced. |
| E) | The amount of CaCO3 would increase. |

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| 7. | What would happen to the system if the total pressure were increased by adding Ar*(g)*? | |
| A) | The amount of CaCO3 would increase. |
| B) | Nothing would happen. |
| C) | Equilibrium would shift to the right. |
| D) | The amount of CaO would increase. |
| E) | More CO2*(g)* would be produced. |

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| 8. | Determine the equilibrium constant for the system  N2O4 <--> 2NO2 at 25°C. The concentrations are shown here: [N2O4] = 3.63  10-2 M, [NO2] = 1.41  10-2 M. | |
| A) | 5.48  10-3 |
| B) | 0.151 |
| C) | 0.388 |
| D) | 1.83  102 |
| E) | 2.57 |

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| 9. | An oven-cleaning solution is 40.0% (by mass) NaOH. If one jar of this product contains 468 g of solution, how much NaOH does it contain? | |
| A) | 187 g |
| B) | 1.17  103 g |
| C) | 18.7 g |
| D) | 11.7 g |
| E) | none of these |

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| 10. | Consider the reaction X  Y + Z  Which of the following is a possible rate law? | |
| A) | Rate = *k*[X][Y] |
| B) | Rate = *k*[Z] |
| C) | Rate = *k*[Y] |
| D) | Rate = *k*[Y][Z] |
| E) | Rate = *k*[X] |

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| 11. | The correct equilibrium expression for the rxn of sulfur dioxide gas with oxygen gas to produce sulfur trioxide gas is | |
| A) |  |
| B) |  |
| C) |  |
| D) |  |
| E) | none of these |

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| 12. | Equilibrium is reached in chemical reactions when: | |
| A) | all chemical reactions stop. |
| B) | the temperature shows a sharp rise. |
| C) | the rates of the forward and reverse rxns become equal. |
| D) | the forward reaction stops. |
| E) | the [ ]s of reactants and products become equal. |

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| 13. | Catalysts generally affect chemical reactions by | |
| A) | lowering the reaction rate |
| B) | providing an alternate pathway with a higher activation energy |
| C) | increasing the surface area of teh reactants |
| D) | increasing the temperature of the system |
| E) | providing an alternate pathway with a lower activation energy |

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| 14. | A 34.9-g sample of SrCl2 is dissolved in 112.5 mL of solution. Calculate the molarity of this solution. | |
| A) | 0.0248 *M* |
| B) | 3.28 *M* |
| C) | 1.96 *M* |
| D) | 0.220 *M* |
| E) | none of these |

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| 15. | The rate law for a particular reaction is rate = *k*[A][B]2. If the initial concentration of B is increased from 0.1 M to 0.3 M, the initial rate will increase by which of the following factors? | |
| A) | 9 |
| B) | 3 |
| C) | 2 |
| D) | 12 |
| E) | 6 |

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| 16. | Calculate the molarity of the following aqueous solution 54g MgCl2 in 250ml of solution | |
| A) | 3.21M |
| B) | 1.25M |
| C) | 2.27M |
| D) | 0.216M |
| E) | 216M |

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| 17. | Consider the reaction: 4NH3 + 7O2  4NO2 + 6H2O  At a certain instant the initial rate of disappearance of the oxygen gas is X. What is the value of the appearance of water at the same instant? | |
| A) | 1.1 X |
| B) | 0.58 X |
| C) | 1.2 X |
| D) | cannot be determined from the data |
| E) | 0.86 X |

Use the following to answer question 18:

Consider the following equilibrium: H2(g) + I2(s) <-->2HI(g)

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| 18. | The proper *K*eq expression is: | |
| A) |  |
| B) |  |
| C) |  |
| D) |  |
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| 19. | Tabulated below are initial rate data for the reaction  2Fe(CN)63– + 2I–  2Fe(CN)64– + I2   |  |  |  |  |  |  | | --- | --- | --- | --- | --- | --- | |  |  |  |  |  | Initial | | 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 |   The experimental rate law is: | |
| A) | = *k*[Fe(CN)63–)]2[I–] |
| B) | = *k*[Fe(CN)63–]2[I–]2[Fe(CN)64–]2[I2] |
| C) | = *k*[Fe(CN)63–][I–]2 |
| D) | = *k*[Fe(CN)63–][I–] [Fe(CN)64–] |
| E) | = *k*[Fe(CN)63–]2[I–][Fe(CN)64–][I2] |

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| 20. | What volume of 12.0 *M* nitric acid is required to prepare 4.82 L of 0.100 *M* nitric acid? | |
| A) | 24.9 L |
| B) | 0.482 L |
| C) | 2.49 L |
| D) | 0.249 L |
| E) | 0.0402 L |

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| 21. | CaCl2(s) + 2H2O(g) <--> CaCl2·2H2O(s) The equilibrium constant for the reaction as written is | |
| A) |  |
| B) | *K* = [H2O]2 |
| C) |  |
| D) | *K* = |
| E) | *K* = |

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| 22. | As ice melts the energy in the reaction is | |
| A) | released |
| B) | Absorbed |
| C) | does not change |
| D) | neither |
| E) | Both a and b |

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| 23. | Consider a system of four gases. The equilibrium concentration of each product is 1.8 *M*. The equilibrium concentrations of the reactants are equal. The equilibrium is shown here:  A + B <--> C + D *K* = 2.6  What is the equilibrium concentration of gas A? | |
| A) | 1.1 *M* |
| B) | 1.2 *M* |
| C) | 8.4 *M* |
| D) | 0.90 *M* |
| E) | 4.7 *M* |

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| 24. | The average rate of disappearance of ozone in the reaction is found to be 8.12  10-3 atm over a certain interval of time. What is the rate of appearance of O2 during this interval? | |
| A) | 268  10-3atm/s |
| B) | 5.41  10-3atm/s |
| C) | 22.0  10-3atm/s |
| D) | 8.12  10-3atm/s |
| E) | 12.2  10-3 atm/s |

Use the following to answer questions 25-26:

Consider the following data concerning the equation:

H2O2 + 3I- + 2H+  I3- + 2H2O

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|  | [H2O2] | [I-] | [H+] | rate |
| I | 0.100 M | 5.00 10-4 M | 1.00  10-2 M | 0.137 M/sec |
| II. | 0.100 M | 1.00  10-3 M | 1.00  10-2 M | 0.268 M/sec |
| III. | 0.200 M | 1.00  10-3 M | 1.00  10-2 M | 0.542 M/sec |
| IV. | 0.400 M | 1.00  10-3 M | 2.00  10-2 M | 1.084 M/sec |

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| 25. | The average value for the rate constant k (without units) is | |
| A) | 2.74  104 |
| B) | 137 |
| C) | 108 |
| D) | 2710 |
| E) | none of these |

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| 26. | The rate law for this reaction is | |
| A) | rate = k[I-][H+] |
| B) | rate = k[H2O2][H+] |
| C) | rate = k[H2O2][I-] |
| D) | rate = k[H2O2][I-][H+] |
| E) | rate = k[H2O2]2[I-]2[H+]2 |

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| 27. | Which of the following processes is exothermic? | |
| A) | reacting hydrogen and oxygen gases to make water |
| B) | allowing meat to thaw after taking it out of the freezer |
| C) | rolling a ball up a hill |
| D) | a popsicle melting on a warm summer day |
| E) | boiling water in a beaker to make steam |

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| 28. | A 108.7-g sample of nitric acid solution that is 70.0% HNO3 (by mass) contains | |
| A) | 4.80  103 mol HNO3 |
| B) | 1.72 mol HNO3 |
| C) | 76.1 mol HNO3 |
| D) | 1.21 mol HNO3 |
| E) | none of these |

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| 29. | In a KCl Solution, water is the \_\_\_\_\_\_\_\_\_\_\_\_\_\_, and Potassium Chloride is the \_\_\_\_\_\_\_\_\_\_\_\_\_\_. | |
| A) | Solution, Solute |
| B) | Solute, Solution |
| C) | Solute, Solvent |
| D) | Solvent, Solute |
| E) | Solvent, Solution |

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| 30. | For a reaction in which A and B react to form C, the following initial rate data were obtained:   |  |  |  | | --- | --- | --- | | [A] | [B] | Initial Rate of Formation of C | | (mol/L) | (mol/L) | (mol/L·s) | | 0.10 | 0.10 | 1.00 | | 0.10 | 0.20 | 4.00 | | 0.20 | 0.20 | 8.00 |   What is the rate law? | |
| A) | Rate = *k*[A]3 |
| B) | Rate = *k*[A][B] |
| C) | Rate = *k*[A]2[B] |
| D) | Rate = *k*[A][B]2 |
| E) | Rate = *k*[A]2[B]2 |

Use the following to answer questions 31-32:

Given the equation A*(g)*  B*(g)* + 2C*(g)*. At a particular temperature, *K* = 1.4  105.

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| 31. | Raising the P by decreasing the V of the container | |
| A) | will have no effect |
| B) | cannot be determined |
| C) | will cause [B] to increase |
| D) | will cause [A] to increase |
| E) | none of the above |

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| 32. | If you mixed 1.2 mol B, 0.050 mol C, and 0.003 mol A in a 1-L container, in which direction would the reaction initially proceed? | |
| A) | to the right |
| B) | The mixture is in the equilibrium state. |
| C) | to the left |
| D) | cannot tell from the information given |

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| 33. | You have two solutions of sodium chloride. One is a 2.00 *M* solution, the other is a 4.00 *M* solution. You have much more of the 4.00 *M* solution, and you add the solutions together. Which of the following could be the concentration of the final solution? | |
| A) | 7.20 *M* |
| B) | 2.60 *M* |
| C) | 6.00 *M* |
| D) | 3.00 *M* |
| E) | 3.80 *M* |

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| 34. | Which factor below will allow you to dissolve a great amount of solute and fast? | |
| A) | agitate |
| B) | surface area |
| C) | stir |
| D) | heat |
| E) | cool |

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| 35. | Which solute below will conduct electricity? | |
| A) | Sugar |
| B) | oil |
| C) | water |
| D) | electrolyte |
| E) | non-electrolyte |

**Answer Key**

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| 1. | D |
| 2. | E |
| 3. | B |
| 4. | C |
| 5. | D |
| 6. | E |
| 7. | B |
| 8. | A |
| 9. | A |
| 10. | E |
| 11. | C |
| 12. | C |
| 13. | E |
| 14. | C |
| 15. | A |
| 16. | C |
| 17. | E |
| 18. | C |
| 19. | A |
| 20. | E |
| 21. | C |
| 22. | B |
| 23. | A |
| 24. | E |
| 25. | D |
| 26. | C |
| 27. | A |
| 28. | D |
| 29. | D |
| 30. | D |
| 31. | D |
| 32. | A |
| 33. | E |
| 34. | D |
| 35. | D |