

Quiz 10 – Due at the start of class Monday, December 3, 2018

Complete the following problems. Write your final answers in the blanks provided. You must show your work to receive full credit. Show your answers to the correct number of significant figures with the correct units.

Rules for this take-home quiz.

DO NOT OPEN THE QUIZ UNTIL YOU ARE READY TO TAKE IT!

- You may allocate a maximum of **50 continuous minutes** for this quiz, split in to two 25-minute segments.
- For the first 25-minute segment, you will take the quiz using only the materials on these pages, a calculator and a **pencil**. Treat this time as though you were taking the quiz in the classroom. You may not use your book, notes, electronic sources or anyone else to help. Record the start and end of the first 25 minutes below.
- For the second 25 minutes, you may use your book, notes or electronic resources to make any corrections to your work. **Make these corrections in blue or red pen.** You **MAY NOT** ask anyone else for help. Record the end of the second 25 minute block below.
- Once you have completed the quiz, sign below to affirm that the quiz was taken following the rules above. This signature is your pledge that the quiz was completed in an ethical manner!

Start time: _____ End of 1st 25 minutes: _____ End of 2nd 25 minutes: _____

Signature _____ Date _____

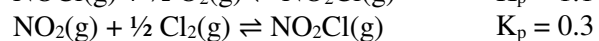
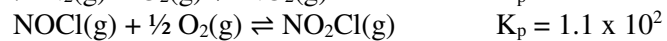
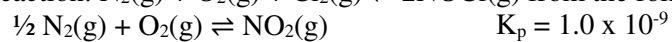
Periodic Table of the Elements																																															
1 IA H Hydrogen 1.008																	2 VIIIA He Helium 4.003																														
3 IIA Li Lithium 6.941	4 IIA Be Beryllium 9.012											5 IIIA B Boron 10.811	6 IVA C Carbon 12.011	7 VA N Nitrogen 14.007	8 VIA O Oxygen 15.999	9 VIIA F Fluorine 18.998	10 VIIA Ne Neon 20.180																														
11 IA Na Sodium 22.990	12 IIA Mg Magnesium 24.305	13 IIIB Al Aluminum 26.982	14 IIIB Si Silicon 28.086	15 IIIB P Phosphorus 30.974	16 IIIB S Sulfur 32.066	17 IIIB Cl Chlorine 35.453	18 IIIB Ar Argon 39.948											19 IB K Potassium 39.098	20 IIA Ca Calcium 40.078	21 IIIB Sc Scandium 44.956	22 IVB Ti Titanium 47.867	23 VB V Vanadium 50.942	24 VIB Cr Chromium 51.996	25 VIIB Mn Manganese 54.938	26 VIII Fe Iron 55.845	27 VIII Co Cobalt 58.933	28 VIII Ni Nickel 58.693	29 IB Cu Copper 63.546	30 IIB Zn Zinc 65.38	31 IIB Ga Gallium 69.723	32 IIB Ge Germanium 72.631	33 IIB As Arsenic 74.922	34 IIB Se Selenium 78.971	35 IIB Br Bromine 79.904	36 IIB Kr Krypton 83.798												
37 IA Rb Rubidium 85.468	38 IIA Sr Strontium 87.62	39 IIIB Y Yttrium 88.906	40 IIIB Zr Zirconium 91.224	41 IIIB Nb Niobium 92.906	42 IIIB Mo Molybdenum 95.95	43 IIIB Tc Technetium 98.907	44 VIII Ru Ruthenium 101.07	45 VIII Rh Rhodium 102.906	46 VIII Pd Palladium 106.42	47 IB Ag Silver 107.868	48 IIB Cd Cadmium 112.414	49 IIB In Indium 114.818	50 IIB Sn Tin 118.711	51 IIB Sb Antimony 121.760	52 IIB Te Tellurium 127.6	53 IIB I Iodine 126.904	54 IIB Xe Xenon 131.294																														
55 IA Cs Cesium 132.905	56 IIA Ba Barium 137.328	57-71 Lanthanide Series	72 IIIB Hf Hafnium 178.49	73 IIIB Ta Tantalum 180.948	74 IIIB W Tungsten 183.84	75 IIIB Re Rhenium 186.207	76 VIII Os Osmium 190.23	77 VIII Ir Iridium 192.217	78 VIII Pt Platinum 195.085	79 IB Au Gold 196.967	80 IIB Hg Mercury 200.592	81 IIB Tl Thallium 204.383	82 IIB Pb Lead 207.2	83 IIB Bi Bismuth 208.980	84 IIB Po Polonium [208.982]	85 IIB At Astatine 209.987	86 IIB Rn Radon 222.018																														
87 IA Fr Francium 223.020	88 IIA Ra Radium 226.025	89-103 Actinide Series	104 IIIB Rf Rutherfordium [261]	105 IIIB Db Dubnium [262]	106 IIIB Sg Seaborgium [266]	107 IIIB Bh Bohrium [264]	108 VIII Hs Hassium [269]	109 VIII Mt Meitnerium [278]	110 VIII Ds Darmstadtium [281]	111 IB Rg Roentgenium [280]	112 IIB Cn Copernicium [285]	113 IIB Nh Nihonium [286]	114 IIB Fl Flerovium [289]	115 IIB Mc Moscovium [289]	116 IIB Lv Livermorium [293]	117 IIB Ts Tennessine [294]	118 IIB Og Oganesson [294]																														
<table border="1"> <tbody> <tr> <td>57 Lanthanide Series La Lanthanum 138.905</td> <td>58 Ce Cerium 140.116</td> <td>59 Pr Praseodymium 140.908</td> <td>60 Nd Neodymium 144.243</td> <td>61 Pm Promethium 144.913</td> <td>62 Sm Samarium 150.36</td> <td>63 Eu Europium 151.964</td> <td>64 Gd Gadolinium 157.25</td> <td>65 Tb Terbium 158.925</td> <td>66 Dy Dysprosium 162.500</td> <td>67 Ho Holmium 164.930</td> <td>68 Er Erbium 167.259</td> <td>69 Tm Thulium 168.934</td> <td>70 Yb Ytterbium 173.055</td> <td>71 Lu Lutetium 174.967</td> </tr> <tr> <td>89 Actinide Series Ac Actinium 227.028</td> <td>90 Th Thorium 232.038</td> <td>91 Pa Protactinium 231.036</td> <td>92 U Uranium 238.029</td> <td>93 Np Neptunium 237.048</td> <td>94 Pu Plutonium 244.064</td> <td>95 Am Americium 243.061</td> <td>96 Cm Curium 247.070</td> <td>97 Bk Berkelium 247.070</td> <td>98 Cf Californium 251.080</td> <td>99 Es Einsteinium [254]</td> <td>100 Fm Fermium 257.095</td> <td>101 Md Mendelevium 258.1</td> <td>102 No Nobelium 259.101</td> <td>103 Lr Lawrencium [262]</td> </tr> </tbody> </table>																		57 Lanthanide Series La Lanthanum 138.905	58 Ce Cerium 140.116	59 Pr Praseodymium 140.908	60 Nd Neodymium 144.243	61 Pm Promethium 144.913	62 Sm Samarium 150.36	63 Eu Europium 151.964	64 Gd Gadolinium 157.25	65 Tb Terbium 158.925	66 Dy Dysprosium 162.500	67 Ho Holmium 164.930	68 Er Erbium 167.259	69 Tm Thulium 168.934	70 Yb Ytterbium 173.055	71 Lu Lutetium 174.967	89 Actinide Series Ac Actinium 227.028	90 Th Thorium 232.038	91 Pa Protactinium 231.036	92 U Uranium 238.029	93 Np Neptunium 237.048	94 Pu Plutonium 244.064	95 Am Americium 243.061	96 Cm Curium 247.070	97 Bk Berkelium 247.070	98 Cf Californium 251.080	99 Es Einsteinium [254]	100 Fm Fermium 257.095	101 Md Mendelevium 258.1	102 No Nobelium 259.101	103 Lr Lawrencium [262]
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Possibly Useful Information

$(a + b)(c + d) = ac + ad + bc + bd$	$x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$	$R = 0.08206 \text{ L atm mol}^{-1} \text{ K}^{-1}$ $R = 8.314 \text{ J mol}^{-1} \text{ K}^{-1}$
$pV = nRT$	$\Delta G = -RT \ln K$	$K_p = K_c(RT)^{\Delta n}$

1. Determine K_p for the reaction: $\text{N}_2(\text{g}) + \text{O}_2(\text{g}) + \text{Cl}_2(\text{g}) \rightleftharpoons 2\text{NOCl}(\text{g})$ from the following data at 298K: (8 pts)



Answer _____

2. Consider the equilibrium below. At a certain temperature, 0.740 mol of SO_3 is placed in a 2.00-L container. At equilibrium, 0.180 mol of O_2 is present. Calculate K_c . (8 pts)



Answer _____

3. Consider the reaction below. If the initial concentrations of H_2 , F_2 , and HF are 0.100M, 0.250 M, and 2.20 M, respectively, is the system at equilibrium? If not, which way will the reaction go to achieve the equilibrium condition? Set up, but do not complete the calculation you would use to determine the equilibrium concentrations of each of the species in the reaction. You DO NOT need to arrive at a numerical answer, just get to the point where you have one algebraic expression you could solve, given additional time. **Be sure to tell me what you would do with the result of your calculation.** (9 pts)

