

Quiz 6 – Due at the start of class Monday, October 8, 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	3 IIIB Sc Scandium 44.956	4 IVB Ti Titanium 47.867	5 VB V Vanadium 50.942	6 VIB Cr Chromium 51.996	7 VIIB Mn Manganese 54.938	8 VIII Fe Iron 55.845	9 VIII Co Cobalt 58.933	10 VIII Ni Nickel 58.693	11 IB Cu Copper 63.546	12 IIB Zn Zinc 65.38	13 IIIA Al Aluminum 26.982	14 IVA Si Silicon 28.086	15 VA P Phosphorus 30.974	16 VIA S Sulfur 32.066	17 VIIA Cl Chlorine 35.453	18 VIIA Ar Argon 39.948
19 IA 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 IIIA Ga Gallium 69.723	32 IVA Ge Germanium 72.631	33 VA As Arsenic 74.922	34 VIA Se Selenium 78.971	35 VIIA Br Bromine 79.904	36 VIIA Kr Krypton 83.798
37 IA Rb Rubidium 85.468	38 IIA Sr Strontium 87.62	39 IIIB Y Yttrium 88.906	40 IVB Zr Zirconium 91.224	41 VB Nb Niobium 92.906	42 VIB Mo Molybdenum 95.95	43 VIIB 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 IIIA In Indium 114.818	50 IVA Sn Tin 118.711	51 VA Sb Antimony 121.760	52 VIA Te Tellurium 127.6	53 VIIA I Iodine 126.904	54 VIIA Xe Xenon 131.294
55 IA Cs Cesium 132.905	56 IIA Ba Barium 137.328	57-71 Lanthanide Series	72 IVB Hf Hafnium 178.49	73 VB Ta Tantalum 180.948	74 VIB W Tungsten 183.84	75 VIIB 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 IIIA Tl Thallium 204.383	82 IVA Pb Lead 207.2	83 VA Bi Bismuth 208.980	84 VIA Po Polonium [208.982]	85 VIIA At Astatine 209.987	86 VIIA Rn Radon 222.018
87 IA Fr Francium 223.020	88 IIA Ra Radium 226.025	89-103 Actinide Series	104 IVB Rf Rutherfordium [261]	105 VB Db Dubnium [262]	106 VIB Sg Seaborgium [266]	107 VIIB 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 IIIA Nh Nihonium [286]	114 IVA Fl Flerovium [289]	115 VA Mc Moscovium [289]	116 VIA Lv Livermorium [293]	117 VIIA Ts Tennessine [294]	118 VIIA Og Oganesson [294]
		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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TABLE 5.1 Solubility Guidelines for Common Ionic Solids

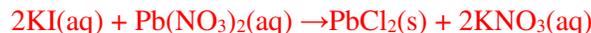
Follow the lower-numbered guideline when two guidelines are in conflict. This leads to the correct prediction in most cases.

- Salts of group 1 cations (with some exceptions for Li^+) and the NH_4^+ cation are soluble.
- Nitrates, acetates, and perchlorates are soluble.
- Salts of silver, lead, and mercury(I) are insoluble.
- Chlorides, bromides, and iodides are soluble.
- Carbonates, phosphates, sulfides, oxides, and hydroxides are insoluble (sulfides of group 2 cations and hydroxides of Ca^{2+} , Sr^{2+} , and Ba^{2+} are slightly soluble).
- Sulfates are soluble except for those of calcium, strontium, and barium.

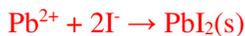
1. Write balanced overall reactions and net ionic equations for each of the following: Indicate the state (*s*, *l*, *g*, *aq*) of each of the reactants and products. (9 pts)



Balanced Reaction:



Net Ionic Equation:



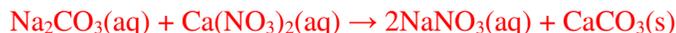
Balanced Reaction:



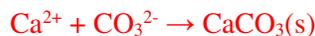
Net Ionic Equation:



Balanced Reaction:



Net Ionic Equation:



2. Your lab partner has prepared a dilute solution by pipetting 5.00 mL of an iron solution of unknown concentration into a 100.0 mL volumetric flask and diluting it to the mark with water to prepare solution A. She then pipets 3.00 mL of solution A into a 50.0 mL volumetric flask and dilutes to the mark to prepare solution B. You measure the concentration of iron in solution B to be 0.000264 M. What was the iron concentration in the original unknown solution? (8 pts)

Two dilutions to account for:

Last dilution: $M_A V_A = M_B V_B$

$$M_B = \frac{M_A V_A}{V_B} = \frac{0.000264 \text{ M} \times 50.00 \text{ mL}}{3.00 \text{ mL}} = 0.00440 \text{ M}$$

Last dilution: $M_{\text{Stock}} V_{\text{Stock}} = M_A V_A$

$$M_{\text{Stock}} = \frac{M_A V_A}{V_{\text{Stock}}} = \frac{0.00440 \text{ M} \times 100.00 \text{ mL}}{5.00 \text{ mL}} = \mathbf{0.0880 \text{ M}}$$

Answer 0.0880 M

3. Consider the precipitation reaction that occurs when aqueous calcium chloride and aqueous silver (I) nitrate are mixed. If 25.0 mL of 0.325 M calcium chloride is mixed with 50.0 mL of 0.225 M silver nitrate, what mass of precipitate will form, assuming the reaction produces 75.0% yield? (8 pts)



$$0.0250 \text{ L} \times \frac{0.325 \text{ mol CaCl}_2}{1 \text{ L}} \times \frac{2 \text{ mol AgCl}}{1 \text{ mol CaCl}_2} \times \frac{143.32 \text{ g AgCl}}{1 \text{ mol AgCl}} = 2.329 \text{ g AgCl}$$

$$0.0500 \text{ L} \times \frac{0.225 \text{ mol AgNO}_3}{1 \text{ L}} \times \frac{2 \text{ mol AgCl}}{2 \text{ mol AgNO}_3} \times \frac{143.32 \text{ g AgCl}}{1 \text{ mol AgCl}} = 1.612 \text{ g AgCl}$$

Therefore, AgNO_3 is the limiting reactant and the theoretical yield (assuming 100% yield) is 1.61 g AgCl. Since the reaction produces 75.0% yield, the actual yield will be $0.750(1.61\text{g}) = \mathbf{1.21 \text{ g AgCl}}$

Answer 1.21 g AgCl