

# Chem 10113, Quiz 7

December 11, 2019

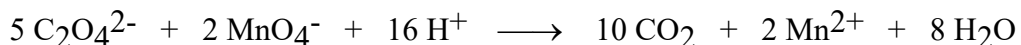
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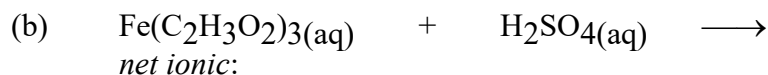
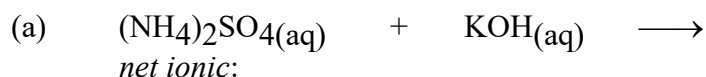
	IA (1)																	VIIIA (18)	
1	1 <b>H</b> 1.0080																		2 <b>He</b> 4.0026
2	3 <b>Li</b> 6.9410	4 <b>Be</b> 9.0122										5 <b>B</b> 10.811	6 <b>C</b> 12.011	7 <b>N</b> 14.007	8 <b>O</b> 15.999	9 <b>F</b> 18.998	10 <b>Ne</b> 20.179		
3	11 <b>Na</b> 22.990	12 <b>Mg</b> 24.305	IIIB (3)	IVB (4)	VB (5)	VIB (6)	VIIIB (7)	VIIIB (8)	VIIIB (9)	VIIIB (10)	IB (11)	IIB (12)	13 <b>Al</b> 26.982	14 <b>Si</b> 28.086	15 <b>P</b> 30.974	16 <b>S</b> 32.066	17 <b>Cl</b> 35.453	18 <b>Ar</b> 39.948	
4	19 <b>K</b> 39.098	20 <b>Ca</b> 40.078	21 <b>Sc</b> 44.956	22 <b>Ti</b> 47.880	23 <b>V</b> 50.942	24 <b>Cr</b> 51.996	25 <b>Mn</b> 54.938	26 <b>Fe</b> 55.847	27 <b>Co</b> 58.933	28 <b>Ni</b> 58.690	29 <b>Cu</b> 63.546	30 <b>Zn</b> 65.380	31 <b>Ga</b> 69.723	32 <b>Ge</b> 72.610	33 <b>As</b> 74.922	34 <b>Se</b> 78.960	35 <b>Br</b> 79.904	36 <b>Kr</b> 83.800	
5	37 <b>Rb</b> 85.468	38 <b>Sr</b> 87.620	39 <b>Y</b> 88.906	40 <b>Zr</b> 91.224	41 <b>Nb</b> 92.906	42 <b>Mo</b> 95.940	43 <b>Tc</b> 98.907	44 <b>Ru</b> 101.07	45 <b>Rh</b> 102.91	46 <b>Pd</b> 106.42	47 <b>Ag</b> 107.87	48 <b>Cd</b> 112.41	49 <b>In</b> 114.82	50 <b>Sn</b> 118.71	51 <b>Sb</b> 121.75	52 <b>Te</b> 127.60	53 <b>I</b> 126.90	54 <b>Xe</b> 131.29	
6	55 <b>Cs</b> 132.91	56 <b>Ba</b> 137.33	57 <b>La</b> 138.91	72 <b>Hf</b> 178.49	73 <b>Ta</b> 180.95	74 <b>W</b> 183.85	75 <b>Re</b> 186.21	76 <b>Os</b> 190.20	77 <b>Ir</b> 192.22	78 <b>Pt</b> 195.09	79 <b>Au</b> 196.97	80 <b>Hg</b> 200.59	81 <b>Tl</b> 204.38	82 <b>Pb</b> 207.20	83 <b>Bi</b> 208.98	84 <b>Po</b> 208.98	85 <b>At</b> 209.99	86 <b>Rn</b> 222.02	
7	87 <b>Fr</b> 223.02	88 <b>Ra</b> 226.03	89 <b>Ac</b> 227.03	104 Unq 261.11	105 Unp 262.11	106 Unh 263.12	107 Uns 262.12												

- (2 points) Among the following substances: HBr, Al<sub>2</sub>O<sub>3</sub>, HClO<sub>2</sub>, Ba(OH)<sub>2</sub>, As<sub>2</sub>O<sub>5</sub>, HONH<sub>2</sub>, KNO<sub>3</sub>, SiH<sub>4</sub> which one best matches each description?  
strong base: \_\_\_\_\_ acidic anhydride: \_\_\_\_\_ weak acid: \_\_\_\_\_
- (2 points) Molybdenum hexafluoride, MoF<sub>6</sub>, is a liquid at room temperature that does not conduct electricity and boils at 34 °C. In the solid state, it forms colorless crystals that melt at 17 °C. The most likely crystal type (i.e., ionic, metallic, etc.) for solid MoF<sub>6</sub> is \_\_\_\_\_.
- (2 point) Boron carbide (B<sub>4</sub>C) is a hard, ceramic material that melts above 2700 °C and does not conduct electricity as a solid or when melted. The most likely crystal type (i.e., ionic, metallic, etc.) for B<sub>4</sub>C is \_\_\_\_\_.
- (6 points) **SHOW ALL WORK.** The element silicon (Si) crystallizes in a "diamond" cubic unit cell in which there are eight Si atoms per unit cell. The edge dimension (*l*) of the unit cell is 543.1 pm (*picometers*) and the specific gravity of Si is 2.329. **Determine** (i.e., calculate) the value of Avogadro's number using any information in this problem and/or the periodic table.

5. (6 points) **SHOW ALL WORK.** A 50.00 mL portion of a solution containing  $\text{La}^{3+}$  was treated with excess sodium oxalate to precipitate  $\text{La}_2(\text{C}_2\text{O}_4)_3$  (molar mass = 541.9). The precipitate was carefully collected by filtration, re-dissolved in acid, and then titrated with 41.15 mL of 0.0825 M  $\text{KMnO}_4$  according to the following balanced redox equation. Determine the molarity of  $\text{La}^{3+}$  in the original solution.



6. (4 points) For each of the following aqueous-solution reactions, **complete and balance the molecular equation** and also write the **balanced, net ionic equation**. Use appropriate subscripts [(s), (aq), (g), etc.] to indicate the phase of each compound or ion.



7. Tantalum (Ta) crystallizes in a body-centered cubic lattice in which the edge dimension ( $l$ ) of the unit cell is 0.3306 nm (*nanometers*).

(a) (4 points) **SHOW ALL WORK.** Determine the atomic radius ( $r$ ) of Ta in pm (*picometers*).

(b) (4 points) **SHOW ALL WORK.** Determine the specific gravity of Ta.