### Chemistry 221 Exam I Review Chapters 1, 2 and 3.1 - 3.2



Chemistry 221 **Professor Michael Russell** 



M. DCC. LXXXVII. Sous le Privilige de l'Académie des 1787 Nomenclature book by Lavoisier

MAR

A piece of metal with a mass of 33.2 g is immersed in 10.0 mL of water in a graduated cylinder. Determine the identity of the metal.

		Water	Levels	
		Without Metal	With Metal	
		10.0 cm <sup>3</sup> 40	22.3 cm <sup>3</sup>	
	Density			
Cu	8.96 g/cm <sup>3</sup>			
Mg	1.74 g/cm <sup>3</sup>			
Fe	7.87 g/cm <sup>3</sup>	20		
Ag	10.5 g/cm <sup>3</sup>		_	
AI	2.70 g/cm <sup>3</sup>	10		
-				
A. (	Cu. 8.96 a	/cm <sup>3</sup>		
B. Mg, 1.74 g/cm <sup>3</sup>				
$C = 7.97 \text{ g/om}^3$				
C. Fe, 7.87 g/cm <sup>3</sup>				
D Ag 10.5 g/cm <sup>3</sup>				
D. 7.9, 10.0 9,011				
E. Al, 2.70 g/cm <sup>3</sup>				
	, 5			

You are given temperature readings at three locations on Earth: 29 °C, 45 °F, and 256 K. What is the order of increasing temperature?

A. 29 °C < 45 °F < 256 K B. 45 °F < 29 °C < 256 K C.256 K < 29 °C < 45 °F D.256 K < 45 °F < 29 °C E.45 °F < 256 K < 29 °C

#### MAR

MAR

#### Place the following in order of increasing size: 215 mm, 9 cm, 2.3 m, and 0.125 m

A.215 mm < 9 cm < 2.3 m < 0.125 m B.215 mm < 9 cm < 0.125 m < 2.3 m C.9 cm < 215 mm < 0.125 m < 2.3 m D.9 cm < 0.125 m < 215 mm < 2.3 m E.0.125 m < 9 cm < 215 mm < 2.3 m

MAR

Which of the following is NOT an isotope of element X (Z = 9)?	Which statement describes the composition of a neutral atom of iron-58?
	A. 26 neutrons, 32 protons, and 26 electrons
A 19 <sub>0</sub> X	B. 32 neutrons, 26 protons, and 26 electrons
	C. 26 neutrons, 26 protons, and 32 electrons
B. <sup>20</sup> 10X	D. 26 neutrons, 26 protons, and 26 electrons
C. <sup>18</sup> <sub>9</sub> X	E. Not enough information
D. <sup>21</sup> 9X	
E. <sup>22</sup> 9X	

MAR

An element (E) has several naturally occurring isotopes, with the following abundances: <sup>72</sup>E, 54.5% <sup>73</sup>E, 15.6% <sup>74</sup>E, 29.9%

The most reasonable atomic weight for this element would be

A. 72.1
B. 72.8
C. 73.4
D. 73.8
E. 74.0

MAR

### Which ion in the following list is NOT likely to form?

A.Na<sup>+</sup> B.Mg<sup>3+</sup> C.Al<sup>3+</sup> D.Fe<sup>2+</sup> E.Zn<sup>2+</sup>

MAR

### When the ion Sr<sup>2+</sup> forms,

- A. the Sr atom loses 1 electron and now has the same number of electrons as Kr
- B. the Sr atom loses 1 electron and now has the same number of electrons as Xe
- C. the Sr atom loses 2 electrons and now has the same number of electrons as Kr
- D. the Sr atom gains 2 electrons and now has the same number of electrons as Kr
- E. the Sr atom loses 3 electrons and now has the same number of electrons as Kr

MAR

# Which compound formula and name in the list is NOT correct?

A. CaSO<sub>4</sub>, calcium sulfate B. NaNO<sub>3</sub>, sodium nitrate C. MgI<sub>2</sub>, magnesium iodide D. NH<sub>4</sub>PO<sub>4</sub>, ammonium phosphate E. Ca(ClO)<sub>2</sub>, calcium hypochlorite

MAR

#### Which compound in the list is NOT ionic?

A. LiCl, lithium chloride B. SO<sub>2</sub>, sulfur dioxide C.AlF<sub>3</sub>, aluminum fluoride D.Ba $(NO_3)_2$ , barium nitrate E. NaHCO<sub>3</sub>, sodium hydrogen carbonate Sodium oxalate has the formula  $Na_2C_2O_4$ . Based on this information, the formula for iron(III) oxalate is

A.FeC<sub>2</sub>O<sub>4</sub> B.Fe(C<sub>2</sub>O<sub>4</sub>)<sub>2</sub> C.Fe(C<sub>2</sub>O<sub>4</sub>)<sub>3</sub> D.Fe<sub>2</sub>(C<sub>2</sub>O<sub>4</sub>)<sub>3</sub> E.Fe<sub>3</sub>(C<sub>2</sub>O<sub>4</sub>)<sub>2</sub>

MAR

MAR

All of the following statements concerning ionic compounds are correct EXCEPT	You have 0.25 mol of each of the following elements. Which one has the largest mass?
<ul> <li>A. as the ion charges increase, the attraction between the ions increases.</li> <li>B. ionic compounds form extended 3-dimensional networks called crystal lattices.</li> <li>C. ionic crystals tend to be rigid, and they cleave along planes.</li> <li>D. positive and negative ions are attracted to each other by electrostatic forces.</li> <li>E. the electrostatic forces are weaker in CaO than in NaCl.</li> </ul>	A.Fe B.Al C.Zn D.Ca E.C
	MAR

Calculate the average mass	of	one
chromium atom.		

- A. 8.634 x 10<sup>-23</sup> g B. 6.626 x 10<sup>-34</sup> g
- C. 6.022 x 10<sup>-23</sup> g
- D. 51.996 g
- E. too small to calculate accurately

## Which answer best represents the percent composition of the compound $\text{CO}_2$ ?

A. 50.0% C & 50.0% O B. 12.0% C & 88.0% O C.27.3% C & 72.7% O D.12.0% C & 32.0% O E. 64.0% C & 36.0% O

MAR

Nitrogen and oxygen form a series of oxides with the general formula $N_xO_y$ . One of them has 46.67% N. The empirical formula for this oxide is	Combining 6.54 g of Zn with oxygen gives a white powder, $Zn_xO_y$ , with a mass of 8.14 g (all of the Zn reacts.) The empirical formula is:	
A. N <sub>2</sub> O	A. ZnO	
B.NO	B Zn <sub>o</sub> O	
C.NO <sub>2</sub>	0.7.0	
D.N <sub>2</sub> O <sub>3</sub>	$C.2nO_2$	
E. N <sub>2</sub> O <sub>5</sub>	$D.Zn_2O_3$	
	E.Zn <sub>3</sub> O <sub>4</sub>	

MAR

Glyceraldehyde has an empirical formula of  $CH_2O$  and a molar mass is 90.08 g/mol. The *molecular formula* is:

A.CH <sub>2</sub> O
$B.C_2H_4O_2$
$C.C_3H_6O_3$
$D.C_4H_8O_4$
$E.C_4H_4O_4$

MAR

A compound with P and F is 75.41% F with a molar mass of 251.94 g/mol. What is the molecular formula?

What is the molar mass of nickel(II) nitrate

 $\begin{array}{l} A. P_2 F_2 \\ B. P_{10} F_2 \\ C. PF_5 \\ D. P_2 F_5 \\ E. P_2 F_{10} \end{array}$ 

hexahydrate?

MAR

Which compound below represents iodous
acid?

A. HI	A. 139 g/mol
B. HIO	B.201 g/mol
C.HIO₂	C.228 g/mol
D.HIO₃	D.291 g/mol
E.HIO4	E. 539 g/mol

You Must Know ...

Oxidation Numbers
 Covalent Compounds
 Ionic Compounds
 The Periodic Table

HO

MAR

MAR



Need more practice?

- Practice Problem Sets (online)
- Concept Guides (Companion and online)
- Chapter Guides (online)
- End of Chapter Problems in Textbook (every other question has answer at end)
- Good luck with your studying!

