## Sample Exam 1 – Chapters 1-3 SHOW ALL WORK FOR FULL CREDIT!!!!

1. Give the symbol for each of the following ele	ments:
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- a. The semimetal in group IIIA.
- b. The noble gas in period 6.
- c. The halogen touching two semimetals.
- 2. A piece of turquoise is a blue-green solid; it has a density of 0.0957 lb/in³ and a mass of 2.5 g. Calculate the volume of the turquoise in mL.
- 3. Venus has a surface temperature of 730 K. What is this temperature in degrees Fahrenheit?
- 4. The following are examples of chemical changes *except*:
  - a. Solid iron forms rust when combined with water and oxygen.
  - b. Butane burns with air at 1970°C.
  - c. Sodium bicarbonate reacts with vinegar to form carbon dioxide gas.
  - d. Sodium chloride dissolves in water at room temperature.
- 5. What is the correct term for a gas turning into a solid?
- 6. What is the physical state for elemental chlorine, Cl<sub>2</sub>, at room temperature and normal pressure?
  - a. solid
- b. liquid

- c. gas
- 7. An oxygen molecule travels at 975 mph at room temperature. What is the de Broglie wavelength, in m, for an oxygen molecule if the mass of one oxygen molecule is  $5.31 \times 10^{-23}$  g? (1 mi = 1.6093 km)

8. Calculate the mass in grams of  $4.73 \times 10^{25}$  formula units of calcium phosphate,  $Ca_3(PO_4)_2$ .

	a. Which color has the higher energy, yellow or red?					
b.	b. Which color has the lower frequency, violet or green?					
c.	What is the frequence	ey, in Hz, for orange ligh	nt at 618 nm?			
10. When	the Sojourner spacec	raft landed on mars in 1	997, the planet w	as approximately		
a.	$7.8 \times 10^7 \text{ km from}$ How many minutes of	earth. did it take for the televis	sion signal (EM ra	adiation) to reach I	Earth from Mars?	
	,		•	,		
b.	Calculate the energy 71 m.	, in kJ, of this transmiss	ion if the waveler	ngth of the transmi	ssion was	
	h of the following is a boiling point	n extensive property: b. density	c. heat	d. color		
	oog pov	C. <b>GC</b> 11010y	•• H•••	<b>u. c</b> 0101		
12. Determine if the following are homogeneous or heterogeneous mixtures (circle one):						
12. Deter	mine if the following	are homogeneous or het	erogeneous mixt	ures (circle one):		
	mine if the following soil					
a.		are homogeneous or het homogeneous homogeneous	heteroger	neous		
a.	soil	homogeneous	heteroger	neous		
a. b.	soil	homogeneous homogeneous	heteroger	neous		
<ul><li>a.</li><li>b.</li><li>13. Comp</li><li>Isotope</li></ul>	soil brass	homogeneous homogeneous	heteroger	neous	Protons, p <sup>+</sup>	
a. b. 13. Comp	soil brass slete the following tab	homogeneous homogeneous le:	heteroger heteroger	neous	Protons, p <sup>+</sup>	
<ul><li>a.</li><li>b.</li><li>13. Comp</li><li>Isotope</li></ul>	soil brass slete the following tab	homogeneous homogeneous le:	heteroger heteroger	neous neous  Electrons, e	Protons, p <sup>+</sup>	
<ul><li>a.</li><li>b.</li><li>13. Comp</li><li>Isotope</li></ul>	soil brass  lete the following tab  Mass Number, A	homogeneous homogeneous le:	heterogen heterogen Neutrons, n°	neous  Electrons, e  51	Protons, p <sup>+</sup>	
<ul><li>a.</li><li>b.</li><li>13. Comp</li><li>Isotope</li></ul>	soil brass  lete the following tab  Mass Number, A	homogeneous homogeneous le:  Atomic Number, Z	heterogen heterogen Neutrons, n°	Electrons, e 51	Protons, p <sup>+</sup>	
a. b.  13. Comp  Isotope  117Sb  14. The e	soil brass  blete the following tab  Mass Number, A  42  lement copper, Cu, is	homogeneous homogeneous le:  Atomic Number, Z  3  a	heterogen heterogen heterogen heterogen heterogen services and services are services as a service service services and services are services as a service service service service services are services as a service service service service services are services as a service service service service services are services as a service service service service services are services as a service service service service services are services as a service service service services are services as a service service service service services are services as a service service service service service service services are services as a service service service service service service services are services as a service	Electrons, e 51 18 3		
a. b.  13. Comp  Isotope  117Sb  14. The e	soil brass  lete the following tab  Mass Number, A  42	homogeneous homogeneous le:  Atomic Number, Z	heterogen heterogen Neutrons, n°	Electrons, e 51 18 3	Protons, p <sup>+</sup> d. gas	
a. b.  13. Comp  Isotope  117Sb  14. The e	soil brass  blete the following tab  Mass Number, A  42  lement copper, Cu, is	homogeneous homogeneous le:  Atomic Number, Z  3  a	heterogen heterogen heterogen heterogen heterogen services and services are services as a service service services and services are services as a service service service service services are services as a service service service service services are services as a service service service service services are services as a service service service service services are services as a service service service service services are services as a service service service services are services as a service service service service services are services as a service service service service service service services are services as a service service service service service service services are services as a service	Electrons, e 51 18 3		
a. b.  13. Comp  Isotope  117Sb  14. The e a.	soil brass  blete the following tab  Mass Number, A  42  lement copper, Cu, is	homogeneous homogeneous le:  Atomic Number, Z  3  a b. metalloid	heterogen heterogen heterogen heterogen heterogen services and services are services as a service service services and services are services as a service service service service services are services as a service service service service services are services as a service service service service services are services as a service service service service services are services as a service service service service services are services as a service service service services are services as a service service service service services are services as a service service service service service service services are services as a service service service service service service services are services as a service	Electrons, e 51 18 3		

9. Consider the colors of the visible spectrum.

16. Match the scienti	st to their discovery Dalton	JJ Thomson	I	Rutherford
particles dispe	a. Identified the at rsed throughout.	tom as a sphere of	mainly positive ch	narge with negatively charged
	_ b. An element is c	composed very ting	y particles that are	indivisible called atoms.
the mass resid		sts of a tiny, dense	e, positively charge	ed nucleus where nearly all of
17. If white and grey elements?	spheres represent ator	ms of different ele	ments, which repre	esents a mixture of diatomic
			0 8 co	00° 000
a	b		c	d
18. What is the symbo	ol of the atom with th	e following short-	hand electron conf	igurations?
a. [Kr] $5s^24d$	<sup>10</sup> 5p <sup>2</sup>			
b. [Ar] 4s <sup>1</sup> 3d	10			
c. [Xe] 6s <sup>1</sup>	_			
19. Correctly complet	e the orbital filling di	agram for a neutra	al aluminum atom:	
1s	2s	2p	3s	3p

20. Write the <u>full</u> electron configuration from the ground state for the following:

a. Se
b. V
c. Ni<sup>2+</sup>

21. Which set of quantum numbers is **NOT** allowed?

c. 
$$n = 4$$
,  $l = 2$ ,  $m_l = 2$ ,  $m_s = -\frac{1}{2}$ 

d. 
$$n = 2$$
,  $l = 1$ ,  $m_l = 0$ ,  $m_s = -\frac{1}{2}$ 

e. 
$$n = 3$$
,  $l = 2$ ,  $m_l = -3$ ,  $m_s = -\frac{1}{2}$ 

f. 
$$n = 5$$
,  $l = 0$ ,  $m_l = 0$ ,  $m_s = +\frac{1}{2}$ 

23.	Which a.	-	ber repre	esents the shap b. <i>l</i>	e of an	atomic orbital? c. m <sub>l</sub>		$d. m_s$	
24.		one of the foll Rb <sup>+</sup>	owing a	lkali metal ion b. K <sup>+</sup>	s has th	e largest atomic c. Na <sup>+</sup>		d. Li <sup>+</sup>	
25.		of the followingsr	ng has th	ne highest meta b. Te	ıllic cha	racter? c. Mo		d. Rb	
26.	Which a.		ne lowes b. Cl	t ionization end	ergy? c. Br		d. I		
27.	Which a.	ion is isoelect Cr <sup>3+</sup>	ronic to b. Sc <sup>2+</sup>	a noble gas?	c. Ga <sup>3</sup>	+	d. Ti <sup>4+</sup>		
28.	Which a.		nigher io b. O	nization energ	y, N or	O?			
29.		isabsorbed				iges from n = 5 ligible	to n = 2 d. destr	-	rogen atom.
30.		s the molar ma 430.42 g/mol		cium phospha b. 278.18 g/m			).18 g/mc	ol d. 2	279.21g/mol
31.		value remains of protons	constant	between differ b. electrons	ent isot	opes of the san		nt? d. mass nu	mber
32.		s the phase cha sublimation	ange asso	ociated with a b. freezing	substan	ce changing fro	_	liquid? d. condens	sation
33.	How m	nany carbon at	oms are	the in 10.0 g or	f propar	ne, C <sub>3</sub> H <sub>8</sub> ?			
34.	What r	mass of oxyger	n gas occ	cupies a 2.50 L	contair	er at STP?			
35.	How m	nany potassiun	n ions ar	e there in 8.99	moles o	of potassium ni	tride, K <sub>3</sub> 1	N?	

22. When n=5 and l = 3, what are the possible values for  $m_l$ ?