(4f) (5f)				% by mass = $\frac{\text{g component}}{100 \text{ g mixture}}$				
3d 4d) (5d) (6d)				d = m/v			
2p 3p 4p 1s 2s 3s 4s	5p 6p 5s 6s	7p (7s)		-	Avogadro's number: $N_A = 6.022 \times 10^{23} \text{ mol}^{-1}$			
© 2010 P	rearson Education, Inc.	/2/	•) /			K =	°C + 273.1	5
18 VIIIA 8A 8A 103 10	Neon 20,180 Ar 39,248 39,248	36 Krypton 83.798	54 Xenon 131.294	86 Radon 222.018	118 Oganesson [294]	etium 4.967	encium 562) sciencenotes org	
9 7 A 17	17 Chlorine 35.453	35 Bromine 79.904	53 Iodine 126.904	85 At Astatine 209.987	117 Tennessime [294]	bium 7		
8 6 A A 8	Oxygen 15.999 Sulfur 32.066	34 Selenium 78.971	52 Tellurium 127.6	Polonium [208.982]	116 LV Livermorium [293]	20 V M Vtter 173	evium Nob	
5 A S S S S S S S S S S S S S S S S S S	Nitrogen 14.007 Phosphorus 30.974	B AS Arsenic 74.922	S1 Sb Antimony 121.760	Bi ^{208.980}	I15 Moscovium [289]			
14 114 44	Carbon Carbon Silicon Silicon	² Germanium 72.631	Sh 118.711		14 Flerovium [289]	68 68 Erbiu 167.2	Land Land Land Land Land Land Land Land	
3 A B B B B B B B B B B B B B B B B B B	Beron Boron aluminum 26.982	Gallium Gallium 69.723	9 Indium 114.818	Thalium 204.383		Length Le	um Einsteini [254]	
nts	5882	2 Zinc 65.38	Cadmium Cadmium 112.414	Mercury 200.592	2 Cu [285]	Dysprosii 162.50	251.001 Z51.001	
leme	8 8	CC Copper 63:546	Age 107.868		entgenium 280] 0	65 Terbium 158.925	97 Berkeliur 247.070	
the P	م 9	Nickel S8.693	alladium 106.42	73 Natinum 195.085	DS mstadtium [281]	64 Gadoliniu 157.25	e Curium 247.070	
ole of	6 日 8	28 Cobalt 58.933	Rh hodium 02.906	Ir idium 92.217	Vt Mt Intremium [278]	63 Eu Europium 151.964	95 Americium 243.061	
ic Tal		Fe 27 Iron 27 5.845	45 henium 01.07	7 SO 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1		62 Samarium ^{150.36}	94 Plutonium 244.064	
eriod	78 78	1 ²⁶ ^{ganese} ⁵	LT 44	76 76 (international contents)	108 Haium Ha 164]	61 Promethium 144.913	P3 Neptunum 237.048	
E	9 B 8	Cr 25 ^{mium} Mar	denum Tech 13 13 13 13 13 13 13 13 13 13	75 75 384 884 18 18		60 Neodymium 144.243	92 Uranium 238.029	
	. a a	dium Chic	⁴² Molyt ⁹⁶	248 Tun 18 18 18	nium b Seab Z2 Z2 Z2	59 Praseodymium 140.908	91 Protactinium 231.036	
	. 8 m	23 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1	r ¹ 24 92.9	73 180 180	II Dubi	58 Cerium 140.116	90 Thorum 232.038	
	4 F 1 Vi	22 22 Im Titani 47.8(64 40 2/1.22	7 Hafhii 178.4	104 Rutherfo [261	57 Lanthanum 138.905		
Γ		21 Scandii 44.95	m 39 Yttriu 88.90	57-71	89-105	thanide Series	Actinide Series	
2 A 2 A 2 A 2 A 2 A 2 A 2 A 2 A 2 A 2 A	Berylliu 9.012 12 Magnesit	20 Calciur 40.078	38 Strontiun 87.62	56 Barium 137.326	88 Radiurr 226.025	E E	۹	
	Lithium 6.941 11 Sodium 222990	19 Potassium 39.098	37 Rb ^{Rubidium} 85.468	55 Cesium 132.905	87 Fr Francium 223.020			

You May Remove this page from the front of the exam

	Please write legibly	! If I can't read it, I can't	grade it!		Form B
Na	me:			Score:	/100
Pa	rt I. Multiple choice. Write the le	etter of the correct answ	ver for each pr	oblem. 3 poir	nts each
1.	The element tin (Sn) occurs natura	llly as ten isotopes. Ea	ich of these iso	topes has	
	A) 50 electrons.B) 50 protons.	C) a different numD) all of the above	nber of neutron e	ns. Answer	
2.	A ring that is 18-karat gold, contai an 18-karat gold ring weighing 6.0	ns 75.0 % gold by ma) grams?	ss. What mass	of gold is pre	esent in
	A) 1.5 g B) 3.0 g	C) 4.5 g	D) 6.0 g	Answer	
3.	Covalent bonds generally form be	tween			
	A) non-metals.B) metals and non-metals.	C) ions.D) metals.		Answer	
4.	3.2×10^5 nm is equivalent to	mm.			
	A) 3.2×10^2 B) 3.2×10^{-1}	 C) 3.2 x 10⁻⁴ D) 3.2 		Answer	
5.	In the hydrogen chloride molecule than the hydrogen end because	, HCl, the chlorine end	l of the molecu	lle is more neg	gative
6.	 A) hydrogen is more electronega B) hydrogen and chlorine have the comparison of the comparison of the following is a membra of the following is	tive than chlorine. he same electronegativ ive than hydrogen. n to chlorine. er of the group of elen	'ity. nents called the	Answer	
0.	A) potassium	C) bromine	ionits curica the	nano genis i	
	B) calcium	D) argon		Answer	
7.	When beryllium forms an ion, what	at charge will the ion h	ave?		
	A) +1 B) -1	C) +2 D) -2		Answer	
8.	The electron configuration for man	nganese is:			
	 A) 1s²2s²2p⁶3s²3p⁶4s² B) 1s²2s²2p⁶3s²3p⁶3d⁵4s² 	 C) 1s²2s²2p⁶3s²3] D) 1s²2s²2p⁶3s² 	p ⁶ 3d ⁷	Answer	
9.	Below are four statements about p	rotons, only one is true	e. Identify the	true statemen	t.
	 A) Protons have about the same a B) Protons have about the same a C) Some atoms don't have any p D) Protons have the same magning opposite sign 	mass as electrons. mass as neutrons. protons. tude of charge as neutr	rons, but	Answer	
10	Which of these hands to you area	at to be the most polor	າ		
10	A) F-F	C) N-F	:		
	B) O-F	D) C-F		Answer	

11. Which of the following is a **physical** change? A) Water is decomposed by electricity into hydrogen and oxygen. B) A red substance is decomposed by heat to mercury and oxygen. Answer _____ C) Ice melts at 0° C. D) Carbon combines with oxygen to form carbon dioxide. 12. The observation that 20 g of hydrogen gas always combines with 160 g of oxygen gas to form 180 g of water, even when there is more than 160 g of oxygen present in the reaction container, illustrates the law of A) excess reactants. C) ideal gases. D) multiple proportions. B) definite proportions. Answer 13. The **maximum** number of electrons that may reside in the n=3 energy level is A) 8. B) 18. C) 2. D) 3. Answer _____ 14. If a central atom has a total of three groups and no lone pairs attached to it, the electron pair geometry about the central atom is A) linear. C) triangular (aka trigonal planar). D) pyramidal (aka trigonal pyramidal). B) tetrahedral. Answer _____ 15. Mg^{2+} has the same electronic structure as B) C. A) Mg. C) Ne. D) Ar. Answer

Part II. Complete each of the following. Point values are noted by each question.

16. Complete the following table. (5 points)

symbol	# protons	# neutrons	# electrons	charge	mass #	atomic #
¹⁶ ₈ 0						
				+1	65	29

17. Complete the table below: (8 points)

Formula	Name		
	phosphorous hexafluoride		
N ₂ O ₅			
	iron (III) carbonate		
K ₂ O			

18. Outline three of the main points of Dalton's atomic theory. Identify one area of his theory that we now understand to be incorrect and required modification. (8 points)

19. Describe what an individual helium-4 atom $\binom{4}{2}$ He) looks like. Be as detailed as you can. You may wish to include a sketch. (6 points)

20. Complete the following table for the element argon. (6 points)

g Ar = 8.14 mol A	Ar =atoms Ar
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Part III. <u>Complete 3 of the following 4 problems.</u> Clearly mark the problem you do not want graded. Each problem is worth eight (8) points. You must show you work on calculations to receive partial credit. Report numerical results to the correct number of significant figures and with the appropriate units.

- 21. In a butane lighter, 9.7 g of butane react completely with 34.7 grams of oxygen to form carbon dioxide and water. (4 points each part)
 - a. If 29.3 grams of carbon dioxide are produced, how many grams of water are formed?

b. How many grams of carbon dioxide would be produced if 15.6 grams of butane were allowed to react with 34.7 grams of oxygen?

22. Below are three potential Lewis structures for the compound CHF₃. Identify the correct structure and explain why the other structures are incorrect.

23. Describe the similarities and differences in the electronic structures of fluorine and bromine. Include an electron configuration for each of the atoms. Why do both atoms tend to form anions with a charge of negative one (1-)?

24. Valence shell electron pair repulsion theory (VSEPR) predicts that the molecule NF₃ would have a trigonal pyramidal shape. Why is this so?