The Periodic Table

IA																	VIIIA
H 1 1.01	IIA											IIIA	IVA	VA	VIA	VIIA	He 2 4.00
Li 3 6.94	Be 4 9.01											B 5 10.81	C 6 12.01	N 7 14.01	O 8 16.00	F 9 19.00	Ne 10 20.18
Na 11 22.99	Mg 12 24.31	IIIB	IVB	VB	VIB	VIIB	VIIIB	VIIIB	VIIIB	IB	IIB	Al 13 26.98	Si 14 28.09	P 15 30.97	S 16 32.07	Cl 17 35.45	Ar 18 39.95
K 19 39.10	Ca 20 40.08	Sc 21 44.96	Ti 22 47.88	V 23 50.94	Cr 24 52.00	Mn 25 54.94	Fe 26 55.85	Co 27 58.93	Ni 28 58.69	Cu 29 63.55	Zn 30 65.39	Ga 31 69.72	Ge 32 72.61	As 33 74.92	Se 34 78.96	Br 35 79.90	Kr 36 83.80
Rb 37 85.47	Sr 38 87.62	Y 39 88.91	Zr 40 91.22	Nb 41 92.91	Mo 42 95.94	Tc 43 (97.9)	Ru 44 101.07	Rh 45 102.91	Pd 46 106.42	Ag 47 107.87	Cd 48 112.41	In 49 114.82	Sn 50 118.71	Sb 51 121.76	Te 52 127.60	I 53 126.90	Xe 54 131.29
Cs 55 132.91	Ba 56 137.33	La 57 138.91	Hf 72 178.49	Ta 73 180.95	W 74 183.85	Re 75 186.21	Os 76 190.2	Ir 77 192.22	Pt 78 195.08	Au 79 197.97	Hg 80 200.59	Tl 81 204.38	Pb 82 207.2	Bi 83 208.98	Po 84 (209)	At 85 (210)	Rn 86 (222)
Fr 87 223.02	Ra 88 226.03	Ac 89 227.03	Rf 104 (261)	Db 105 (262)	Sg 106 263)	Bh 107 (262)	Hs 108 (265)	Mt 109 (266)	Ds 110 (271)	Rg 111 (272)	Uub 112 (285)	Uut 113 (284)	Uuq 114 (289)	Uup 115 (288)			

Ce 58 140.12	Pr 59 140.91	Nd 60 144.24	Pm 61 (145)	Sm 62 150.36	Eu 63 152.97	Gd 64 157.25	Tb 65 158.93	Dy 66 162.50	Ho 67 164.93	Er 68 167.26	Tm 69 168.93	Yb 70 173.04	Lu 71 174.97
Th 90 232.04	Pa 91 231.04	U 92 238.03	Np 93 237.05	Pu 94 (240)	Am 95 243.06	Cm 96 (247)	Bk 97 (248)	Cf 98 (251)	Es 99 252.08	Fm 100 257.10	Md 101 (257)	No 102 259.10	Lr 103 262.11

Some Useful And Not So Useful Information:

$N = 6.023 \times 10^{23}$ mol^{-1} $c = 2.998 \times 10^{8}$ m.s^{-1} $h = 6.626 \times 10^{-34}$ J.s.

Energy

7s
6p
6d
5d
5f
4f
6s
5p
5s
4p
4d
3d
4s
3p
3s
2p

Orbital Energies

2s
1s
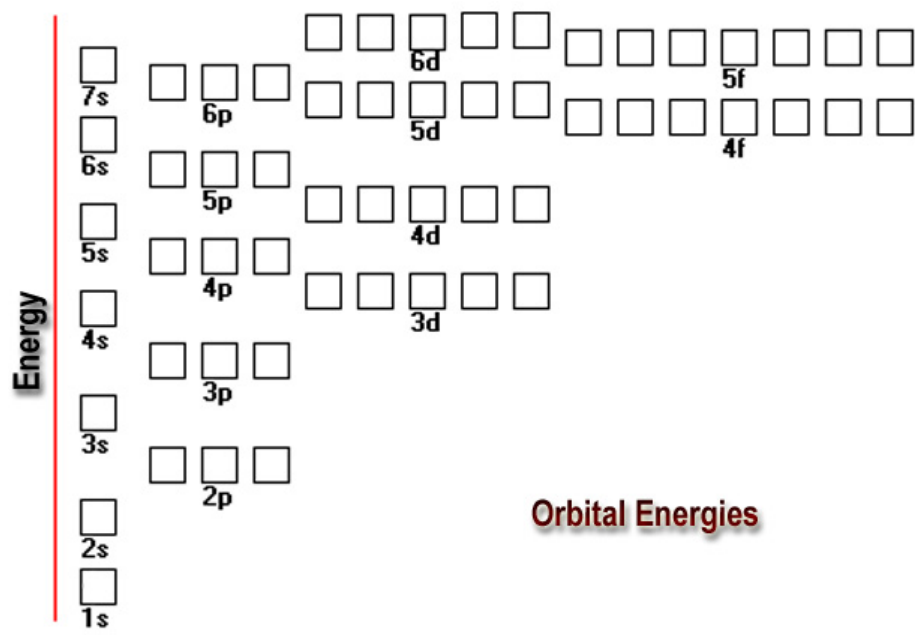
Question 1
6 Points

1. Give the **number** of significant figures in: **1600**   _____

2. **[23.56-2.3]/1.248x10³**
   Report the answer in the **correct number of significant figures**:   _____

3. Diamond has a density of **3.513 g/cm³**. If a carat equals **0.200g**.
   What is the **volume in cm³** of a 1.32-carat diamond?   _____

Question 2
6 Points

A neutral atom has 92 **protons** and 146 **neutrons**. Fill in the three
blanks to complete the atomic symbol

Question 3
6 Points

Which if any of the following species has the same number of **neutrons** as it does **electrons**?
Circle the correct answer(s).

$^{47}_{24}Cr^+$ ^{24}Mg $^{59}Co^{2+}$ $^{35}Cl^-$ $^{125}_{50}Sn$
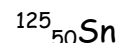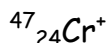
Question 4
10 Points

Use the Periodic Table accompanying this exam to answer the following questions:

1. <u>Name</u> the only **diatomic gas** in **Period 4**   _____

2. Symbol for the **heaviest Alkali Earth** element.   _____

3. Symbol for **transition metal** in **Group VIB**, **Period 6**.   _____

4. The **Actinides** belong to what Period?   _____

5. Group **VIIIA** are collectively referred to as: _____

Question 6
8 Points

Give the **sign** and **magnitude** of the charge associated with the following:

1. Hydrogen sulfate ion   _____

2. Selenide ion   _____

3. Chromate ion   _____

4. Group VIA elements   _____

Question 7
4 Points

Sb has two naturally occurring isotopes:

Isotope	Exact Mass	Natural Abundance
^{121}Sb	120.904	57.30%
^{123}Sb	122.904	42.70%

What is the average atomic mass of Sb? (Give your answer to **3 decimal places**)

Question 8
6 Points

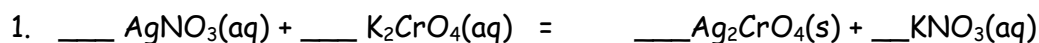1. What amount in **moles**, is represented by **3.00g** of P_2F_4? **[Show Work]**

2. What is the **percent** carbon in CCl_4?   _____

Question 9
6 Points

Mesitylene is composed of **carbon** and **hydrogen** only. It is **89.93% C** and its molar mass is **120.19 g/mol**. What is the molecular formula of mesitylene?
[Show All Work]

Question 10
4 Points

Using the **smallest whole number integers** possible, balance the following chemical equations.

1. ____ $AgNO_3(aq)$ + ____ $K_2CrO_4(aq)$ = ____$Ag_2CrO_4(s)$ + __$KNO_3(aq)$

2. ____ $C_2H_6(g)$ + ____ $O_2(g)$ = ____ $H_2O(g)$ + ____ $CO_2(g)$

Question 11
4 Points

Give the **correct name** for each of the following ionic compounds.

1. $Ca(NO_2)_2$ _____

2. Na_2S _____

3. $Fe(OH)_3$ _____

4. K_2CrO_4 _____

Question 12
4 Points

Give the **correct formula** for each of the following ionic compounds.
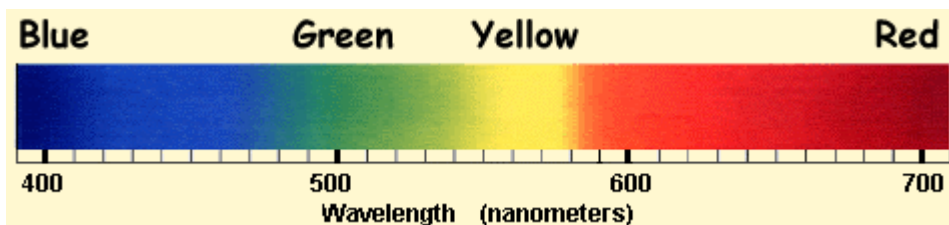
1. Ammonium carbonate   _____

2. Potassium chlorite   _____

3. Aluminum oxide   _____

4. Perchloric acid   _____

Question 13
6 Points

| Blue | Green | Yellow | Red |

400   500   600   700
Wavelength   (nanometers)

The yellow region has greater energy than the _____ region while the green

region has a _____ frequency than the yellow region. The blue region has the

_____ frequency of all the regions depicted.

Question 14
6 Points

A chemical reaction can be initiated by light that carries energy of 5.34×10^5 J.mol^{-1}. Only light less than a certain wavelength will initiate the reaction.
What is the longest wavelength, in meters, that can deliver the required energy?
[Show All Work]

Question 15
4 Points

1. Potassium has three naturally occurring isotopes (^{39}K, ^{40}K, ^{41}K). ^{40}K has a very low natural abundance. Which of the other two is the more abundant?   _____

2. Circle the expected approximate abundance of the more abundant isotope?

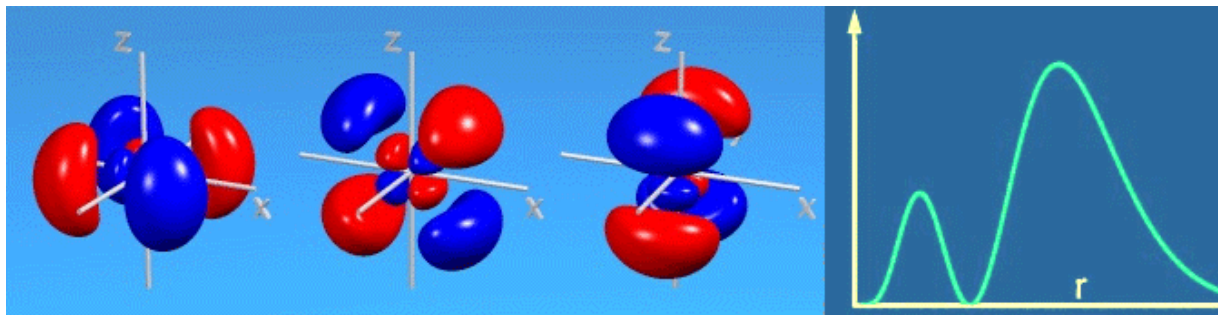   <30%   >30%   <60%   >60%   <90%   >90%

Question 16
6 points

1. How many orbitals are there with an **n** value equal to 3?   _____

2. How many **nodal** surfaces are associated with a **4s** orbital?   _____

3. One of the following wave functions (orbitals) is not a solution of the Schrodinger Equation. Circle the one that is not.

    2s   2p   7s   3d   4f   5g   2d   9p

Question 17
4 points

1. The orbitals depicted above are what type: _____

2. The n value of these orbitals is: _____

Question 18
10 Points

1. Give the **complete electronic configuration** for:

   Cl: _____

   Ca: _____

2. Give the **Noble Gas** (Valence) configuration for

   S: _____

   K: _____

3. Give the **symbol(s)** of the **Period 4** transition metals (elements 21-30) that is/are

   diamagnetic: _____

Do Not Write Below This Line

Exam I Score