HONORS CHEM General Info Reference Sheets

Please be understanding if any of these reference sheets change, I am attempting to predict what we will cover and use for the entire school year...this is my best guess!

Contains General Reference Sheets for the front of the Reference Section of the 3-Ring Binder

18 84 84 84 84 84 84 84 84 84 84 84 84 84	18 Argon 39.95 36	Krypton 83.80	54 Xenon 131.29	86 Pn Radon (222)	118 Oganesson (294)	71 Lutetium 174.97 103 Lawrenciur (262)
19.00	17 Chlorine 35.45 35.45	Bromine 79.90	53 lodine 126.90	85 At Astatine (210)	117 Ts Tennessine (294)	70 Ytterbium 173.04 102 Nobelium (259)
00 8 8 16.00 16.00	16 Sultur 32.07	Selenium 78.96	52 Te Tellurium 127.60	84 Po lonium (209)	116 Lv Livermorium (293)	69 101 101 (258) (258)
15 5A Nitrogen 14.01	15 Phosphorus 30.97	AS Arsenic 74.92	51 Sb Antimony 121.76	83 Bi Bismuth 208.98	115 Noscovium (289)	68 Erbium 167.26 100 100 (257)
44 Catbon 12.01	14 Sili con 28.09	Germanium 72.61	50 Sn ^{Tin} 118.71	82 Pb ^{Lead} 207.2	114 Flerovium (289)	67 Holmium 164.93 99 99 Einsteinium (252)
13 3A Boron 10.81	13 Aluminum 26.98 31	Gallium 69.72	49 Indium 114.82	81 Thallium 204.38	113 Nihonium (286)	66 Dysprosium 162.50 98 98 08 (251)
	12 2B 30	Zinc 2100 65.39	48 Cd Cadmium 112.41	80 Hg ^{Mercury} 200.59	112 Copernicium (285)	65 Terbium 158.93 97 97 86rkelium (247)
	두면	Copper 63.55	47 Ag Silver 107.87	79 Au Gold 196.97	111 Rg Roentgenium (280)	64 Gadolinium 157.25 96 Cm Curium (247)
	10 80	Nickel S8.69	46 Pd Palladium 106.42	78 Pt Platinum 195.08	110 DS Darmstadtium (281)	63 Eu 151.96 95 95 Americium (243)
e <mark>2</mark> e	ic mass* 9 8B	Cobalt 58.93	45 Rh Rhodium 102.91	77 Ir Iridium 192.22	109 Mt Meitherium (268)	62 Samarium 150.36 94 Putenium (244)
.ev mic numb ment sym	erage aton 8 26	55.85	44 Ruthenium 101.07	76 OS 05mium 190.23	108 HS Hassium (269)	61 Promethium (145) 93 93 Neptumium (237)
	AVE 7B	Mn Manganese 54.94	43 Tc (98)	75 Re Rhenium 186.21	107 Bh Bohrium (264)	60 Neodymium 144.24 92 0 Uranium 238.03
Solution Solution	6B 6B 22.95	Chromium 52.00	42 Mo 95.94	74 W Tungsten 183.84	106 Sg Seaborgium (266)	59 Pr 140.91 91 Protactinium 231.04
	28 28 29	Vanadium 50.94	41 Niobium 92.91	73 Ta Tantatum 180.95	105 Db Dubnium (262)	58 58 140.12 90 90 232.04
	4 4B	Titanium 47.87	40 Zr 21.22 91.22	72 Hf Hafnium 178.49	104 Rutherfordium (261)	hen
	3 <mark>3</mark> 8 0	Scandium 44.96	39 Yttrium 88.91	57 La Lanthanum 138.91	89 Ac (227)	entheses, t nass of the
2 2 Beryllium 9.01	12 Magnesium 24.31	Calcium Calcium 40.08	38 Strontium 87.62	56 Ba Barium 137.33	88 Radium (226)	ber is in par the atomic r a isotope.
Hydrogen 1.01 6.94	11 Sodium 22.99	Potassium 39.10	37 Rubidium 85.47	55 CS Cesium 132.91	87 Fr (223)	If this num it refers to most stable
7 7	3	4	ŝ	9	2	*

Chemistry Reference Sheet

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Memorize this stuff NOW! Pop quizzes all year long!

Ion Sheet

+++ Positive Ions +++

1+	2+	3+	4+
Ammonium, NH_4^+	Cadmium(II), Cd ²⁺	Chromium(III), Cr ³⁺	Lead(IV), Pb ⁴⁺ (<i>Plumbic</i>)
Copper(I), Cu ⁺ (<i>Cuprous)</i>	Chromium(II), Cr ²⁺	Cobalt(III), Co ³⁺	Manganese(IV), Mn4+
Silver, Ag⁺	Cobalt(II), Co ²⁺	Gold(III), Au ³⁺	Silicon(IV), Si ⁴⁺
Gold (I), Au ⁺	Copper(II), Cu ²⁺ (<i>Cupric</i>)	Iron(III), Fe ³⁺ (<i>Ferric</i>)	Tin(IV), Sn ⁴⁺ (<i>Stannic</i>)
	Iron(II), Fe ²⁺ (<i>Ferrous</i>)	Manganese(III), Mn ³⁺	
And all elements in	Lead(II), Pb ²⁺ (<i>Plumbous</i>)	Nickel(III), Ni ³⁺ Boron,	And Group 4A can
Group IA	Manganese(II), Mn ²⁺	B ³⁺ Aluminum, Al ³⁺	potentially make 4+ if
-	Mercury(II), Hg ²⁺ (<i>Mercuric</i>)	Gallium, Ga ³⁺ Indium,	under right
	Nickel(II), Ni ²⁺	In ³⁺	circumstances
	Tin(II), Sn ²⁺ (Stannous)		
	Zinc, Zn ²⁺		
	Mercury(I), Hg ₂ ²⁺ (<i>Mercurous</i>)		
	And all elements in Group 2A		

--- Negative lons ----

1-	2-	3-	4-
Acetate, $C_2H_3O_2^-$	Carbonate, CO_3^{2-}	Phosphate, PO4 ³⁻	Carbide, C ⁴⁻
Bicarbonate, HCO_3^-	Peroxide, O_2^{2-}	Phosphide, P ³⁻	
Chlorate, CIO_3^-	Sulfate, SO ₄ ²⁻	Phosphite, PO ₃ ^{3–}	And Group 4A can
Chlorite, CIO_2^-	Sulfite, SO_3^2 -Chromate,	Arsenate, AsO ₄ ^{3–}	potentially make 4- if
Cyanide, CN⁻	CrO_4^{2-} Dichromate, $Cr_2O_7^{2}$		under right
Hydroxide, OH [−]	$^{-}$ Oxalate, C ₂ O ₄ ²⁻	And all	circumstances
Hypochlorite, CIO [−]	Thiosulfate, $S_2O_3^{2-}$	elements in	
Nitrate, NO ₃ ⁻		Group 5A	
Nitrite, NO_2^-	And all elements in		
Perchlorate, CIO_4^-	Group 6A		
Permanganate, MnO ₄ ⁻			
Thiocyanate, SCN⁻			
And all elemens in Group 7A (Halogens)			

Pre	fixes	Common Molecular Gases	Common A	cids	Diatomic I	Elements
One- mono Two- di Three- tri Four – tetra Five- penta	Six – hexa Seven – hepta Eight – octa Nine – nona Ten - deca	F ₂ , Cl ₂ , H ₂ , N ₂ , O ₂ , SO ₂ , SO ₃ , CO, CO ₂ , H ₂ S, NO, NO ₂ , NH ₃ , P ₂ O ₃ , P ₂ O ₅ , SiF ₄ , HCl, HBr,	Hydrochloric acid Sulfuric acid Nitric Phosphoric Acetic	HCI H ₂ SO ₄ HNO ₃ H ₃ PO ₄ HC ₂ H ₃ O ₂	Hydrogen Nitrogen Oxygen Flourine Chlorine	$\begin{array}{c} H_2\\ N_2\\ O_2\\ F_2\\ Cl_2 \end{array}$
		HI, HF, N ₂ O ₅ , N ₂ O ₃ ,	Common E	Base	Bromine	Br ₂
		N ₂ O	Ammonia	NH ₃	lodine	I ₂

Polyatomic	Ions Containing Oxygen**	Acid Nomenclature*		
Perate	Greatest number of oxygens	Peric	Greatest number of oxygen atoms	
ate	Greater	ic	Greater	
ite	Smaller	- ous	Smaller	
Hypoite	Smallest number of oxygens	Hypoous	Smallest number of oxygen atoms	

*Acids- Acids are molecular compounds that contain hydrogen bonded to a nonmetal to a group of atoms that behave like a nonmetal. Acids can be either binary or ternary compounds. The names of binary acids have the form Hydro-.....ic acids. The names of ternary acids use a series of prefixes and suffixes to specify the relative number of oxygen atoms in the molecule.

**Names of polyatomic ions containing oxygen- some elements form several polyatomic ions with oxygen. A series of suffixes and prefixes is used to specify the relative number of oxygen atoms.

Common lons

Memorize this stuff NOW! Pop quizzes all year long!

+++ Positive Ions +++

1+	2+	3+	4+
Ammonium, NH ₄ ⁺ Copper(I), Cu ⁺ (<i>Cuprous</i>)	Cadmium, Cd ²⁺ Chromium(II), _Cr ²⁺	Chromium(III), Cr ³⁺ Cobalt(III), Co ³⁺	Lead(IV), Pb ⁴⁺ (<i>Plumbic</i>) Manganese(IV), Mn ⁴⁺
Silver, Ag ⁺ Gold (I), Au ⁺	Cobalt(II), Co^{2+} Copper(II), Cu^{2+} (<i>Cupric</i>)	Gold(III), Au ³⁺ Iron(III), Fe ³⁺ (<i>Ferric</i>)	Silicon(IV), Si ^{⁴+} Tin(IV), Sn ⁴⁺ (<i>Stannic</i>)
And all elements in	Lead(II), Fe (<i>Ferrous</i>) Lead(II), Pb ²⁺ (<i>Plumbous</i>)	Nickel(III), Ni ³⁺	And Group 4A can
	Manganese(II), Min Mercury(II), Hg ²⁺ (<i>Mercuric</i>) Nickel(II) Ni ²⁺	Aluminum, Al ³⁺	under right circumstances
	Tin(II), Sn^{2+} (<i>Stannous</i>) Zinc. Zn^{2+}	Indium, In ³⁺	
	Mercury(I), Hg_2^{2+} (<i>Mercurous</i>)		
	And all elements in Group 2A		

--- Negative lons ---

1-	2-	3-	4-
Acetate, $C_2H_3O_2^-$ Bicarbonate, HCO_3^- Chlorate, CIO_3^- Chlorite, CIO_2^- Cyanide, CN^- Hydride, H^- Hydroxide, OH^- Hypochlorite, CIO^- Nitrate, NO_3^- Nitrite, NO_2^- Perchlorate, CIO_4^- Permanganate, MnO_4^- Thiocyanate, SCN ⁻ And all elemens in Group 74 (Halogens)	Carbonate, CO_3^{2-} Peroxide, O_2^{2-} Sulfate, SO_4^{2-} Sulfite, SO_3^{2-} Chromate, CrO_4^{2-} Dichromate, $Cr_2O_7^{2-}$ Oxalate, $C_2O_4^{2-}$ Thiosulfate, $S_2O_3^{2-}$ And all elements in Group 6A	Phosphate, PO ₄ ^{3–} Phosphide, P ^{3–} Phosphite, PO ₃ ^{3–} Arsenate, AsO ₄ ^{3–} And all elements in Group 5A	Carbide, C ^{4–} And Group 4A can potentially make 4- if under right circumstances

Pre	fixes	Common Molecular Gases	Common A	cids	Diatomic I	Elements
One- mono Two- di Three- tri Four – tetra Five- penta	Six – hexa Seven – hepta Eight – octa Nine – nona Ten - deca	F ₂ , Cl ₂ , H ₂ , N ₂ , O ₂ , SO ₂ , SO ₃ , CO, CO ₂ , H ₂ S, NO, NO ₂ , NH ₃ , P ₂ O ₃ , P ₂ O ₅ , SiF ₄ , HCl, HBr,	Hydrochloric acid Sulfuric acid Nitric Phosphoric Acetic	HCI H ₂ SO ₄ HNO ₃ H ₃ PO ₄ HC ₂ H ₃ O ₂	Hydrogen Nitrogen Oxygen Flourine Chlorine	$\begin{array}{c} H_2\\ N_2\\ O_2\\ F_2\\ Cl_2 \end{array}$
		HI, HF, N ₂ O ₅ , N ₂ O ₃ ,	Common E	Base	Bromine	Br ₂
		N ₂ O	Ammonia	NH ₃	lodine	I ₂

Polyatomic	Ions Containing Oxygen**	Acid Nomenclature*		
Perate	Greatest number of oxygens	Peric	Greatest number of oxygen atoms	
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Hypoite	Smallest number of oxygens	Hypoous	Smallest number of oxygen atoms	

*Acids- Acids are molecular compounds that contain hydrogen bonded to a nonmetal to a group of atoms that behave like a nonmetal. Acids can be either binary or ternary compounds. The names of binary acids have the form Hydro-.....ic acids. The names of ternary acids use a series of prefixes and suffixes to specify the relative number of oxygen atoms in the molecule.

**Names of polyatomic ions containing oxygen- some elements form several polyatomic ions with oxygen. A series of suffixes and prefixes is used to specify the relative number of oxygen atoms.

Dougherty Valley HS Honors Chemistry Strong Acid, Strong Base Handout

7 Strong Acids (H ⁺) All other acids are weak		8 Strong Bases (OH ⁻) All other bases are weak		
Hydrochloric acid	HCI	Lithium hydroxide	LiOH	
Hydrobromic acid	HBr	Sodium hydroxide	NaOH	
Hydroiodic	HI	Potassium hydroxide	KOH	
Perchloric acid	HCIO ₄	Rubidium hydroxide	RbOH	
Chloric acid	HCIO ₃	Cesium hydroxide	CsOH	
Nitric acid	HNO ₃	Calcium hydroxide	Ca(OH) ₂	
Sulfuric acid	H_2SO_4	Strontium hydroxide	Sr(OH) ₂	
		Barium hydroxide	Ba(OH) ₂	

Memorize these 15, ALL ELSE ARE considered WEAK

How to Set Up Your Warm-ups in Honors Chem



pen! ALWAYS! Highlighter to show end! ALWAYS! New work under highlighter! ALWAYS! Cross out with single line! ALWAYS!

Warm-up slip glued

in! ALWAYS!

Copy down your HW! ALWAYS!

Show all

your work! ALWAYS!

> Include Units!

ALWAYS!

Box your #

answers! ALWAYS!

Correct in

GREEN

- Warmups are graded assignments.
- If you are absent you are required to make up the missed Warmups.
- You are responsible for knowing, understanding, and following the formatting requirements.
- If you have questions about the formatting requirements it is your responsibility to ask.
- See the back of this paper for more details.

More Details about WARMUPS

- 1) Warmups are to be completed in your composition book only. No paper(s) can be stapled, taped, etc. into the book and receive credit.
- 2) Student may only receive up to FULL credit if the work is done in the composition book on that date.
- 3) Composition books will be graded in class the same day whenever possible. You may sometimes leave them in class to be graded. Sometimes they will be graded later, or not at all.
- 4) When graded they may be graded for completion and/or accuracy. Sometimes part of the grade will be whether or not you finished your notes from the previous lesson.
- 5) Following instructions regarding formatting is not optional. If you do not follow the instructions you will not receive full credit.

Possible Situations:

- 1) **ABSENT**:
 - You can find the warmups on the class website. If possible, please print at home and glue into your notebook and complete at home before returning to school so you are not behind.
 - If you cannot print at home as described above, then you must get the warmup slip from the absent bin and do the warmup
 - SHOW me that it was completed according to the standard absent procedure you get the number of days as you were absent. Absent one day, you get one day. Absent two days, you get two days.
 - o If shown to me within the allotted number of days, I will stamp it.
 - If there is no stamp for being absent, the students will earn no more than 50% of the points possible.

2) FORGOT TO BRING COMPOSITION BOOK TO CLASS:

- If a Warmup is completed on paper other than in the composition book, you cannot receive full credit.
- When a Warmup is transferred into your composition book (as in written in), there will be no handwritten grade, but there will be a Transfer Stamp, therefore they may earn up to 75% of possible points for that specific Warmup.
- You must show me your original graded Warmup in order to get a Transfer stamp to show that you have transferred the Warmup from binder paper into your composition book.
- If there is no stamp for the transfer, you will only be eligible to earn 50% of the points possible.
- Transfer of work into the composition book must occur by the **NEXT** school day.
- Transfer. Means to re-write the information in the composition book, not staple, tape, etc... the paper into the composition book

3) LOST COMPOSITION BOOK:

- Don't lose your composition book...
- If you lose your composition book you will not have any of the handwritten grades, so there is no record of your scores. Therefore, your redone work will only be eligible to earn up to 50% of the points possible.
- I strongly suggest you scan or take pictures of your composition book to keep a record of your scores just in case you may have lost it.
 - If you do this, YOUR FULL NAME and THE DATE in INK must be written on each page so I know it is your work.

*Requirements, formatting instructions, grading procedures, etc are subject to change at teacher's discretion. If changes are made you will be notified in class.

* If a situation arises that is not discussed above, it is your responsibility to bring it to the teacher's attention immediately. If you have questions it is your responsibility to bring it to the teacher's attention immediately.

How to Set Up Your Notes in Honors Chem



- Notes are graded assignments.
- If you are absent you are required to make up the missed Notes.
- Your notes need to look readable to another person, and should not be cramped together. Use space!
- KCQ Boxes are required to be finished by the start of the next class period. All efforts will be made to post this on School Loop each day, but it is expected and required even if something happens and it is not posted. You now know it is a daily requirement!

KCQ Boxes

at the end

of the set

of notes

- You are responsible for knowing, understanding, and following the formatting requirements.
- If you have questions about the formatting requirements it is your responsibility to ask.
- Notes should reflect effort, thought, detail, reflection, and should demonstrate processing and learning taking place.

EXAMPLE GRADING RUBRIC

This example gives you an idea of the types of things I look for when grading notebooks. This is not a guaranteed format or amount of points, it is simply an example to help guide you into doing complete and quality work. Notebook checks will be announced and unannounced. No points will be awarded if you fail to have your notebook on a collection day, either announced or unannounced.

Chapter 14 Composition Notebook Grade Sheet						
Name:				Period:	Seat #:	
ITENA					SCOPE	
Acids and Bases and nH		No title		Min. Color &/or not used meaningfully	10	
calculations		Non-descriptive/obvious title		No KCQ boxes		
pH Calculations Chart		Incomplete notes lacking info		KCQ incomplete/lacking effort/detail		
pH Square x 2		No color		Other		
N47		No title		Min. Color &/or not used meaningfully	10	
Nomenclature, Strong		Non-descriptive/obvious title		No KCQ boxes		
Acids/Bases, Ionization		Incomplete notes lacking info		KCQ incomplet /lacking effort/detail		
of Water Naming Glue In		No color		Other		
		Missing	50	And the stamp	5	
Warmup #22		Not graded	5/1	Other		
N48		No title		Min. Co r & r ot used meaningfully	10	
Weak Acids and Bases		Non-docrission obvious title	Π.	NCCO boxes		
Glue In		Incom ete tes lacking info	a ('	20 incomplete/lacking effort/detail		
Practice Problems x 2		No color	Ð,	Other		
		Missing Missing		No transfer stamp	5	
Warmup #223		Not gra		Other		
Warmun #24		Missing		No transfer stamp	5	
wainiup #24		Not graded		Other		
N49		No title		Min. Color &/or not used meaningfully	10	
Salts		Non-descriptive/obvious title		No KCQ boxes		
Steps Glue In		Incomplete notes lacking info		KCQ incomplete/lacking effort/detail		
Chart Glue in x 2		No color		Other		
N/49		No title		Min. Color &/or not used meaningfully	10	
Titrations Hands On		Non-descriptive/obvious title		No KCQ boxes		
		Incomplete notes lacking info		KCQ incomplete/lacking effort/detail		
		No color		Other		
			<u>Tot</u>	<u>al_</u> 65		

Dougherty Valley High School Chemistry Pre-Lab Assignment and Post-Lab Assignment

ONLY BLACK OR BLUE PEN

GENERAL GUIDELINES

- All sections must be clearly labeled.
- Sections must be done in the order listed here.
- Headers must be filled out at the top of every page used in your lab notebook.
- This will be collected prior to the beginning of lab (except the data tables which are made before the lab, but on a separate page in your lab notebook so you can fill them out during lab).
- You may not participate in a lab without having it completed.
- Will sometimes be graded for completion and/or accuracy. Not all completed sections will necessarily be graded every time, one section might be chosen, or all might be chosen for grading.
- Professionalism matters If I can't read it, if it looks like you did it last minute walking to class, if it looks like you put no thought, effort, care, detail into your work, that will be reflected in your score.
- You must use adequate spacing between sections to keep your work clear and understandable. Do NOT try to save space. You have plenty of pages in your lab notebook. Clearly communicating your work matters more than saving a few pages in your lab notebook.

PURPOSE OF THE EXPERIMENT

- a. State the general principle being studied
- b. State any specific results to be obtained

REAGENTS TABLE

Nama	Formula	Molecular	Physicals Properties			State @ Boom Tomp	Safaty Concorne	
Iname	Formula	(g/mol)	B.P. (°C)	M.P (°C)	Density (g/cm ³)	(°C)	Safety Concerns	
				DIE				
			SAM					

- a. Provide the above info for the state (s, l, g, aq) that is being used in the lab.
- b. Note safety/cleanup points (if provided, all should be BE DESCRIPTIVE)
- c. Googling MSDS is how to do this! We don't really use physical MSDS books anymore.

MATERIALS

a. List all needed chemicals, materials, and equipment in a bullet list.

PROCEDURE

- a. Rewrite the procedure in your own words and in FLOW CHART STYLE!
- b. Do not copy directly from lab handout!
- c. Full sentences not needed.
- d. Do not combine steps. Keep the original numbering system in the lab handout. This is important in case we need to make changes before the lab, or if you need help you can tell me what step you are on.
- e. Included drawings of lab setups when applicable. Label the drawings with equipment names.
- f. Add reminders, equations, notes to yourself etc.
- g. The intention of this section is to get you to *think about* the steps by putting it in your own shortened version.
- h. You should be able to do the lab with nothing but your notebook!



PRE-LAB QUESTIONS

- a. Complete any listed pre-lab questions.
- b. Number all questions.
- C. Must show all work for calculations.
- d. Do not recopy the question. Paraphrase it into your answers so a reader can infer what the question was.
- e. Full sentence answers are not needed, but complete and detailed answers and thoughts are required!
- f. Box any final numerical or short phrase like answers.

DATA SECTION

- a. Must be done on a <u>NEW</u> sheet of paper in your lab notebook! It cannot be on the same page as the rest of your pre-lab because you will be tearing out the carbon copy pages of your pre-lab and turning that in before you start the lab.
- b. Set up your data table(s) BEFORE the lab starts. This is part of your pre-lab assignment even though it is not turned in with the rest of the sections. It may be checked even though it is not turned in until after the lab.
- c. Must include sections for QUANTATATIVE and QUALITATIVE data.
- d. Make it large does not have to be an entire page, but needs to be sufficiently large. You will be docked points for any work that is "squished," as that is not professional work and hinders the reader's ability to learn from it.
- e. You must give your data table(s) a descriptive title. It should specifically mention any reaction(s) that is/are occurring as part of the title.
 - a. Bad titles Data Table, Table for My Lab, Table of Lab Numbers, Lab Data, etc.
 - b. Better titles Effect of Concentration on Absorbance, pH of Common Household Substances, etc.
- f. You must have units in the headers of the columns/rows.
- g. Your data collection should reflect the significant figures that are appropriate for each piece of equipment you are using. Remember that our equipment is inherently limited in precision!
- h. Your qualitative observations must be descriptive and detailed. It is not sufficient to say "it changed colors," or "it reacted." Qualitative data is as important as quantitative data!

CALCULATIONS SECTION

- a. Must show ANY calculation or manipulation of numbers done during and/or after the lab. If it is not a direct measurement, there should be evidence of it in the calculation section.
- b. Sometimes results of calculations are put into your data tables. You still need to show the calc's here!
- c. Even "simple" calculations need to be shown. This includes subtracting, adding, metric conversions, etc.
- d. Number and label all calculations. Make sure to give short label so people know what the calculation is.
- e. Make sure you include units everywhere!

POST LAB

- a. Post Lab Questions in lab notebook.
 - a. Number all questions.
 - b. Do not recopy the question. Paraphrase in your answers so a reader can infer what the question was.
 - c. Complete sentences not needed unless asked for. Complete thoughts and answers ARE needed!
- b. Post Lab Two Pager worksheet given to you.
 - a. Summarizes what you learned.
 - b. Imagine you are making a "cheat sheet" for a lab quiz! You may or may not be allowed to use these Two Pagers on Post Lab Quizzes. It will be announced at the start of the quiz if you can use it or not.
- c. Formal Lab Report Sections
 - a. Not always given. You will be told if/when to do one or more of these formal sections.
 - b. Expectations will be given to you at the time. General expectations are on the Lab Guidelines Check List.
- d. Post Lab Quiz
 - a. Pop quizzes that can happen any time after a quiz.
 - b. Will assess whether you actually *learned* from the lab. It is imperative that you do not just copy lab work from classmates. Lab questions may appear on pop quizzes, chapter quizzes, tests, finals etc.

The lab assignments and expectations can change at teacher's discretion

Dougherty Valley HS Chemistry Post Lab Two Pager

Worksheet #____

Name:

Period:

Seat#:

Lab Title		Торіс
Purpose/Question/Problem/Goal/Hypothesis	5	
Key Vocab Terms	Key Equati	ions
Key Concept Explained		
Important or Unique Lab Equipment, Set Up	, or Named Lab Te	echniques Sig Figs Related to
		Lab Equipment
Your Experimental Results		
Accepted Value/Results	Percent Erro	or Calculation

Sample Calculations for Each Type of Calculation	n Done
Possible Lab Errors	Mathematical Impact of Lab Errors on Results
Example Test Question on this Topic	Solved Example Test Question on this Topic

Things to Turn In

- **Prelab** Done in lab notebook, carbon papers turned in *before* the lab. •
 - Post Lab Turned in after the lab. Due dates will be told to you in class.
 - 0
 - Page 1 Post Lab Two Pager Done on this template. Page 2 Data Tables Done in lab notebook, carbon papers turned in. 0
 - Page 3 Calculation Section Done in lab notebook, carbon papers turned in. 0
 - Page 4 Post Lab Questions Questions on lab sheet, answers done in lab notebook, carbon papers turned in. 0
 - Page 5 Formal Post Lab Section If asked for. Will be given specific instructions at the time.
- Post Lab Quiz Will be done and turned in during class.

Make-up Lab Sheet for Missed Lab Assignment

You can print copies of this on the "Labs" tab of the class website. You have one day longer than you were gone to complete this assignment. Gone one day, then you get two days to complete. Gone two days, then you get three days. If you were present for the lab but did not participate then it is due the next day.

Name: Period: Seat #:

Write the name of the missed lab here: _

Write the date that the lab was originally performed here:

Instructions:

Interview at least three (3) students who were present for the lab activity and have them orally answer the questions listed below. <u>Take notes while discussing the lab and staple them to this paper</u>. Please have your interviewees provide their names ad signatures in the table below.

Name (Printed)	Period/Teacher	Signature

Now, YOU answer the following questions on this sheet:

- 1. What was the main idea that this lab activity was trying to demonstrate?
- 2. How did the lab activity demonstrate this idea (i.e., what did people do to find out the main idea?)
- 3. How does the information from questions 1 and 2 relate to what we are currently studying?

4. Identify at least one applicable (or use) for the information presented in the lab; that is, how could the information relate to you own personal use, an industrial use, or a societal application?

5. Write two test questions that would be fair to ask about this lab on a unit test or a quiz.

Generic Chemistry Lab Report Guidelines – Specifics given in class supersede these generic guidelines!								
Please Note: Labs grades are based on quality not just com	pletion! Articulating ideas clearly is key to science!							
REQUIREMENTS	AREAS TO IMPROVE UPON							
Format	Formatting 1 2 3 4							
□ 10pt Times New Roman or Arial font ONLY	10pt correct font \Box Yes \Box No							
\square 1.5 spaced	0.5-in margins 🛛 Yes 🗌 No							
Bold section headings for everything	1.5-in spacing 🛛 Yes 🗌 No							
\square 8.5"x11" white paper	Stapled In Order							
\Box 0.5" margins on all sides	3 rd Person Yes No							
\Box Abstract has 2" margins on each side and is single-spaced.	Past Tense 🗌 Yes 🗌 No							
Stapled in following order:	Section Headings 🗌 Yes 🗌 No							
o Title page o Lab report	Abstract Format							
o Carbon Copy pages used during lab (Must have	Justified both sides							
HEADER filled out on every page) o Carbon Copy pages used for lab report and post lab O's	2-in margins 🛛 Yes 🗌 No							
THIPD DEDSON DAST TENSE DASSIVE VOICEIIII	Single Spaced Yes No							
• OWe know you wrote ityour name is on the								
frontuse third person								
o You already finished the lab before you did your								
o I know your English teachers don't like passive voice								
but it is appropriate for lab reports!								
• Active voice: The hot plate stirred the								
 Passive voice: The reaction was stirred by 								
the hot plate for three minutes								
Title Page								
☐ It gets its own page!								
\Box Title of lab								
Abstract (see below)								
Group members and how they contributed	Abstract presentYes No							
(Name, section worked on)	Group members Ves No							
□ Date of lab experiment	Date 🗌 Yes 🗌 No							
\Box Class and period	Class and period 🗌 Yes 🗌 No							
Abotroat								
$\frac{\text{Abstract}}{\text{On Title Pose (2 in mersing)}}$	Abstract 1 2 3 4							
On The Page (2-in margins)	Purpose Percent error*							
U Justified on both sides, do not center on page!								
☐ The following is to be articulated concisely in no more than 3-5 sentence sin the order below	Results							
 Sentence 1: What was the purpose of the 	Yes No. Conclusions made							
experiment? The question or statement. Do not copy								
 Sentence 2: What you found out (the results – the 	How results were found							
silver alloy beads were found to contain X% of								
 Sentence 3: How the results were determined (Brief) 	Named techniques* Short, concise and clear							
Specific names of lab techniques if applicable)								
• Sentence 4: Report accepted value (if applicable)	□ No							
 Sentence 5: Conclusions made (if applicable), what 	Accepted value*							
you drew from the experiment	│							

Background – part of prelab if required	Background 1 2	3 4				
Do NOT copy info from lab worksheet!	In Own Words	Defined Vocab				
Summary/explanation of the important chemistry topics covered in lab						
\Box Explain how the topics relate directly to the lab	🗌 No	Some				
What will your lab be discovering/testing related to the	Chem Topics Explained	□ None				
		Chem Rxns*				
what is your experimental question/variables	Some	All balanced w/ states				
☐ Include relevant chemistry vocabulary	□ None or incorrect	Some or not bal/states				
☐ Include relevant chemical equations	Connection to Lab	None or wrong				
\Box Include balancing and states for chemical equations		Hypothesis*				
\square Number each equation to make referencing easier	Some	Yes and correct format				
 Hypothesis if applicable If, then, BECAUSE 	 None or incorrect 	Yes but lacking				
Everyone forgets the BECAUSE portion!Relate it back to the topics covered	Exp. Q/Variables	□ Not included				
\Box Be sure to site any references used including textbook,	All identified	References*				
website, lab manual, etc. Below is a good explanation of ACS formatting	□ Some identified	Yes and ACS format				
 https://libguides.williams.edu/citing/acs 	□ None	Yes but lacking				
	*if applicable	□ Not included				
Observations/Data	Data Table 1 2 3	4				
☐ Qualitative and quantitative! Must have both!	Observations	Professionalism				
Lab notebook paper only, with data tables and graphs made/collected DURING the lab	Significant, detailed,	Total pro, ruler used readable etc.				
Professional appearance						
 Clear, large, not squished! Black or blue ink ONLY 						
Descriptive titles						
\Box Sig figs for measurements and calculations	Strong descriptive clear					
\Box Label graphs/tables with name of measurement and units						
Calculations	Calculations 1 2	3 🗌 4 🗌				
☐ Work shown completely	Work Shown	<u>Units</u>				
☐ Flow of work is clear	Significant, detailed,					
\Box Work set up correctly to solve actual problem	thorough	Some				
Correct numbers used in work	Sufficient	None or wrong				
□ Units provided everywhere	Lacking					
□ Correct answer	Organization of Work					
	☐ Hazy					
	Correctly Set Up					
	I ⊔ All ⊔ Most ⊔ Some	□ None				

Γ	1				
Data Analysis	Data Analysis 1 2	3 🗌 4 🗌			
☐ Include table and graph of anything you calculated,	Data/Granhs	% Error			
and graphs are labeled correctly					
Explain data that you collected					
Include a few sentences explaining what the graphs/tables	□ Not included				
Mention any errors and how they affect your data analysis	l abels	Sample Calculations			
Remember "human error" is not an acceptable phrase.					
☐ Include percent errors if applicable					
☐ Include one sample calculation for each type of calculation performed	□ None or wrong	□ None or wrong			
☐ Include equations, reactions, units, work, etc.	Explain Data/Graphs	<u>Eq's, Rxns, Units, etc</u>			
Define symbols/variables used					
\Box You may be graded on the accuracy of your lab data and/or	□ Some	□ Some			
whether your calculations are correct or not	□ None	None or wrong			
	Errors	Accuracy			
	□ Not significant ones	□ Ok			
	☐ Did not explain impact	☐ Poor			
	☐ Not included				
	Discussion Questions 1				
calculations with work shown and units when appropriate.	Questions	Calculations w/ Work			
Each Q is numbered and answered in complete sentences.	All included				
\Box Restate the question in your answer, do not just copy the Q!	☐ Missing some	□ Some			
\square Will sometimes be done as part of a formal report as a group, or	Not included	□ None			
done individually on the carbon copy paper in your notebook.		Correct Answer			
• If done on carbon copy paper but a formal lab report is also typed up, then you must include this section					
heading in the report but simply say "refer to carbon		☐ Most			
copy pages at the end of the report."		□ Few			
Will sometimes be graded for completion, and sometimes		□ None			
will be graded for accuracy.	Questions Restated				
	All Some None	e			
<u>Conclusion</u>	Conclusion 1 2	3 🗌 4 🗌			
Complete sentences, paragraph form	Complete Sentences	Relate to Chem Topics			
□ Report your final results	☐ Yes ☐ No	☐ Yes ☐ No			
\Box Include accepted value and % error if applicable	Desults Denerted	Furth on Furn online on to			
Explain why it turned out the way it did – sources of error, limits in lab design, etc.	Yes No	Yes No			
\Box Relate findings back to basic principles of chemistry	Accepted Value / % Error	Relates to Real Life			
\Box What further experiments might you do to keep studying this?		Yes No			
☐ How does it relate to real life if applicable?					
\Box How could you make improvements to the lab?	Errors Yes No	Improvements □ Yes □ No			
	Level of Detail	t 🗌 Sufficient 🗌 Lacking			

General Feedback about Pre-Labs

- Read ALL of R-5...not just the first page!
 - There are entire check lists and examples of how things are graded! Look at them!
- Fill out headers and footers
- Stop squishing things
- Include ALL asked for parts
 - Don't include things that weren't asked for
- DON'T COPY!
 - o That means don't copy background info, procedures, etc
- Shorten procedures
 - Get right to the point! Just enough to jog your memory! Stop writing so much!
 - A Flow Chart is meant to be partially visual! Not just drawing boxes around a bunch of writing!
- Reagent tables need to be filled out!
 - Writing "don't eat it" in every safety concern box is not going to get you points...obviously don't eat ANYTHING in the lab. List things like flammability, skin irritant, etc. Actually look it up!
- Don't leave pre-labs until the very last minute...

Satisfied with your pre-lab score?

- Do not get complacent!
 - \circ $\,$ We need to show growth, improvement, and refinement as the year goes on.
 - Expectations do not remain stagnant they grow as our skills should be growing as the year goes on!

Not satisfied with your pre-lab score?

- Rewrite the ENTIRE thing on binder paper
 - \circ $\;$ Not just the parts you lost points on
- Use homework pass to resubmit it
 - o Don't forget to fill out Gold Form to attach to homework pass and redone pre-lab
 - You must staple the original to the back of your new one
 - Original may NOT leave the classroom you may come in during brunch/lunch/access to look at it and to get it out of your folder to staple to the back of your new one before turning in.

Need help?

- Ask BEFORE the day it is due!
- Come see me during brunch/lunch/access or email me!
- Don't email me at a crazy hour of the night the day before it is due...that is not being responsible...

Add this to your R-5 lab info Reference Sheets!

Solubility of Some Ionic Compounds in Water						
Always Soluble						
Alkali metals =	Li⁺, Na⁺, K⁺, Rb⁺, Cs⁺					
Ammonium =	NH ₄ ⁺	AAA				
Acetate =	$C_2H_3O_2$ -	CNP				
Chlorate =						
Nitrate =	NO_3^-					
Perchlorate =						
Generally Solu	ble					
Cl⁻, Br⁻-, I⁻	Soluble <u>except</u> : Ag ⁺ , Pb ²⁺ , Hg ₂ ²⁺	AP-H				
F⁻	Soluble <u>except</u> : Ca ²⁺ , Ba ²⁺ , Sr ²⁺ , Pb ²⁺ , Mg ²⁺	CBS-PM				
Sulfate = SO4 ²⁻	Soluble <u>except</u> : Ca ²⁺ , Ba ²⁺ , Sr ²⁺ , Pb ²⁺	CBS-P				
Generally Insol	uble					
O²−, OH−	Insoluble <i>except</i> : Alkali metals and NH ₄ +	AA				
	Somewhat soluble: Ca ²⁺ , Ba ²⁺ , Sr ²⁺	CBS				
CO ₂ ²⁻ , CO ₃ ²⁻						
S ²⁻ , SO ₃ ²⁻	Insoluble except. Alkali metals and NH4 ⁺	AA				
PO4 ³⁻						
CrO ₄ ²⁻ , Cr ₂ O ₄ ²⁻						
Not Soluble = forms precip	itate Soluble = dissolves in wate	r (aqueous)				

Activity Series Chart

Metals

Non-Metals

Most <u>Nam</u>		<u>ie</u>	<u>Symbol</u>	<u>Name</u>	<u>Symbol</u>
Active	1:46		. :	Elucrino	F
1	Dota	ium		Chlorino	F Cl
	Pola Pori	1551U111	R D	Bromino	Ci Br
	Stro	um ntium	Da Sr	Indine	Bi T
	Calc	ium	51 Ca	Ioume	1
	Sodi	ium	Ca Na		
	Maa	nesium	Na Ma		
	Δlun	ninum	ΔΙ		
	Man	nanese	Ai Mn		
	Zinc	ganese	Zn		
	Iron	,	En Fe		
	Cadr	nium	Cd		
	Coba	alt	Co		
	Nick	el	Ni		
	Tin	-	Sn		
	Lead	1	Pb		
	Hydı	rogen	Н		
	Сор	per	Cu		
	Silve	er	Ag		
	Merc	cury	Hg		
. 🗶	Gold	1	Au		
Least Active					
Active					
			•	***	
		Elements (The reacti	CANNOT replace on DOES NOT	ce anything ABOVE t OCCUR in this situa	hem. tion.
			,	***	
	Examples:	ZnCl₂ + Mg → Magnesium i	MgCl₂ s above Zinc so the second	he reaction happens	
		ZnCl₂ + Cu → Copper is bel	No Reaction ow Zinc so no rea	nction happens	

Useful and Necessary Formulas http://www2.ucdsb.on.ca/tiss/stretton/Database/formulas_content.html

1.	Ele	ctromagnetic Radiation	
	a)	Speed of Light	$c = \lambda * v$
	b)	Wavelength	$\lambda = c / v$
	c)	Frequency	$v = c / \lambda$
	d)	Energy in a photon	$E = h^* v$
2.	Со	ncentration and Molar Mass	
	a)	Density (D)	D = m / V
	b)	Moles (n)	n = g / mm
	c)	Moles (# of particles)	n = number of particles / Avogadro's number
	d)	Moles (solution)	n = concentration • volume
	e)	Moles (gas equation)	n = PV / RT
	f)	Molarity (M)	M = n / volume
	g)	Molar mass (mm)	mm = m / n
3.	Gas	ses	
	a)	Boyle's Law	$\mathbf{P}_1 \bullet \mathbf{V}_1 = \mathbf{P}_2 \bullet \mathbf{V}_2$
	b)	Charles' Law	$V_1 \bullet T_2 = V_2 \bullet T_1$
	c)	Combined Gas Law	$P_1 \cdot V_1 / T_1 = P_2 \cdot V_2 / T_2$
	d)	Ideal Gas Law	PV = nRT
	e)	Dalton's Law of Partial Pressures	$P_T = P_1 + P_2 + P_3 + \dots + P_n$
4.	Aci	ds and Bases	
	a)	рН	pH = -log[H ⁺¹]
	b)	рОН	pOH = -log[OH ⁻¹]
	c)	[H ₃ O ⁺¹]	$[H_3O^{+1}] = 10^{-pH}$
	d)	[OH ⁻¹]	$[OH^{-1}] = 10^{-pOH}$
5.	Hea	at	
	a)	Quantity of Heat (Q)	$\mathbf{Q} = \mathbf{m} \cdot \mathbf{c} \cdot \Delta \mathbf{t}$
	b)	Quantity of Heat (fusion)	Q = m • L _f
	C)	Quantity of Heat (vaporization)	$Q = m \cdot L_v$
	d)	Celsius to Kelvin	K = °C + 273.15
	e)	Kelvin to Celcius	°C = K - 273.15
6.	Mat	thematics	
	a)	Quadratic Equation	x = -b <u>+</u> (b ² - 4ac) ⁻² / 2a

Common Physical and Chemical Constants

http://www2.ucdsb.on.ca/tiss/stretton/Database/constants.htm

Avogadro's Number Planck's Constant 1 atmosphere (atm)

1 mole of any gas at STP 1 mole of any gas at SATP Ideal Gas Law Constant (R)

1 calorie (cal) 1 Cal 1 atomic mass unit (amu) 1 tonne(t) Speed of light in a vacuum Rest mass of an electron (m_e) Rest mass of a proton (m_p) Rest mass of a neutron (m_n) 1 kiloWattHour(kWh) 1 Joule (J) 1 Coulomb(C) Electronic charge on an electron 1 Ampere(A) 1 Volt(V) 1 electron volt (eV) **Faraday's Constant**

6.02217 X 10²³ things/mole 6.6260755 X 10⁻³⁴ Js 101,325 Pascals (Pa) = 101.325 kPa = 760 mm of Hg = 760 Torr = 1.01325 bar 22.4 L (0°C, 1 atm) 24.8 L (25°C, 1 atm) 0.0821 L atm mol⁻¹ K⁻¹ = 8.31430 L kPa mol⁻¹ K⁻¹ $= 8.31441 \text{ J mol}^{-1} \text{ K}^{-1}$ 4.184 J 1 kcal = 1000 calories 1.6605665 X 10⁻²⁴ a 1000 kg = 1 Mg 299792458 m s⁻¹ (3.0 X 10⁸ m s⁻¹) $0.000548712 \text{ u} = 9.1093897 \text{ X} 10^{-28} \text{ g}$ $1.00727605 \text{ u} = 1.67262305 \text{ X} 10^{-24} \text{ g}$ $1.008665 \text{ u} = 1.674954 \text{ X} 10^{-24} \text{ g}$ 3.6 MJ $1 \text{ kg m}^2 \text{ s}^{-2} = 1.0 \text{ X} 10^7 \text{ erg}$ 6.24 x 10¹⁸ e⁻ 1.60217733 X 10⁻¹⁹ C 1 Coulomb/s 1 J/C = 96.5 kJ/mole 1.60219 x 10⁻¹⁹ J 96,486.7 C/mole e⁻

		a a	cetate rsenate	C e A	CH ₃ COO ⁻ sO ₄ ³⁻	TAI	<u>BLE OF</u> ydroge	F POLY/	ATOM phate	IC ION H ₂ PO ₄	S c	oxalate perchlora	te	$\frac{C_2O_4^2}{ClO_4}$	-	PE	[RIO]	DIC	TABI	E OF	ION	S
		a h	rsenite	A	.sO3 ³⁻ 5-H-COO	hy b	drogen	carbo	nate	HCO ₃ HC ₂ O		periodate	nato	IO ₄ ⁻ MnO		а	tomic_→	KEY	ion	đρ		
1		b	orate	B	O_3^{3-}	hy	drogen	sulfat	е е	HSO ₄	* ŀ T	peroxide	mate	O_2^{2-}	1	nı	umber	Fe'	$1 \rightarrow 1$ ion	ge	17	19
1	1	b	romate	e B	rO_3^-	hy	drogen	sulfide	9	HS ⁻	I I	ohosphat	е	PO ₄ ³⁻			symbol –		2+ nam))	11	
' _{Н+}		C	arbona	te C	20_3^{2-}	hy	drogen	sulfite	•	HSO ₃	- I	oyrophos	phate	$P_2O_7^4$	-		5	iron (I	I)	,	Н-	He
hydrogen	2	C	hlorate	C	CIO ₃ ⁻	hy	droxide	e rito			S	sulfate		SO_4^{2-}		1	у	1/		16	hydride	helium
3	4		nioriae hlorite		1 '102-	ioc	pociiio Iate	rite		IO_2^-		suifite biocyana	to	SCN-		5	5	14	7	8	9	10
Li ⁺	Be ²⁺		hromat	e C	2^{10_2}	mo	nohvdro	gen phos	phate	HPO ₄	2-1 t	hiosulfat	e	$S_2O_3^{2}$	-	Ŭ	B	С	N ³⁻	02-	F-	Ne
lithium	beryllium	C	yanate	C	NO-	nit	rate	0 F	r	NO ₃ ⁻	F	POSITIVE PO)LYAT(OMIC IONS	5	bo	oron	carbon	nitride	oxide	fluoride	neon
11	12	C	yanide	C	N⁻	nit	rite			NO_2^-	6	ammoniu	m	$\mathbf{NH_4}^+$		13	14	l .	15	16	17	18
Na ⁺	Mg ²⁺	d	ichrom	ate C	$2r_2O_7^{2-}$	or	hosilic	ate		SiO ₄ ⁴⁻	ł	ıydroniuı	n	H_3O^+			13+	Si	P3-	S2-	Cl-	Ar
sodium	magnesium	3	4	1	5	6		7	8		9	10		11	12	alun	ninum s	silicon	phosphi	le sulfiid	e chloride	argon
19	20	21	22	т;4+	²³ V3+	²⁴ Cr ²	8+ 25 N	/n2+	²⁶ Fo	3+ 27	C_{0}^{2+}	28 Ni ²	29	Cu2+ 3	0	31	32	2	33	34	35	36
K ⁺	Ca^{2+}	Sc ³⁺	- titaniu	11 1m (IV)	vanadium(III)	chromium	(III) manga	anese(II)	iron (I	I) cob	alt (II)	nickel (II)	cop	oper (II)	Zn ²⁺	G	a^{3+}	Ge^{4+}	As ³	· Se ²	Br ⁻	Kr
potassium	calcium	scandiu	m [''''	Ti^{3+}	V ⁵⁺	Cr ²	2+ N	$/\ln^{4+}$	Fe	2+	Co ³⁺	Ni ³⁻	-	Cu ⁺	zinc	ga	llium ge	rmanium	arsenid	e selenid	e bromide	krypton
	20	20	titaniu	ım (III) v	/anadium (V)	chromium	(II) manga	anese(IV)	iron (l	I) coba	alt (III)	nickel (III)	C0	pper (I)	0	40			54 0	50	52	51
	o 0 2⊥	39 V3+	40	1	$\frac{1}{Nb^{5+}}$	42 N.C. 6	43 1	r 7⊥ [t Ru	3+ 4 5	<u>1</u> 2⊥	40 Pd ²⁺	. 41	· 4	0 12	49	3+	Sn^{4+}	$\begin{bmatrix} 5^{T} \mathbf{S} \mathbf{b}^{3} \end{bmatrix}$	+ 52 m m 2.	роз т-	04 V
	Sr ²⁺	Y		r + r	NL3+	MO	/ ⁻				ⁿ ,		<u> </u>	Ag ⁺	Cd~		n ^{o+}	$\frac{\tan(iv)}{\mathbf{Cm}^{2+}}$	ch 5			xe
rubidium	strontium	yttrium	ZIFCO	nium 1	niobium(III)	molybden	im techi	netium r	KU utheniun	n(IV) rho	odium	paladium(I) s	ilver	cadmiun	ind	lium	50~ ' tin (II)	antimony	V)	e iodide	xenon
55	56	57	72		73	74	75	~	76	77		⁷⁸ Pt ⁴⁺	79	Au^{3+}	⁶⁰ Hg ²⁻	+ 81	Tl+ 82	2 Pb ²⁺	⁸³ Bi ³	$+ \frac{84}{Po^2}$	+ 85	86
Cs ⁺	$ Ba^{2+} $	La ³⁺	· H	$[f^{4+}]$	Ta ⁵⁺	W^{6}	+]	Re^{7+}	Os	⁴⁺]	r^{4+}	platinum(IV) go	ld (III) m	ercury (l	I) thalli	um (l)	lead (II)	bismuth(II) polonium	∎ At⁻	Rn
cesium	barium	lanthanu	m hafn	nium	tantalum	tungste	n rhe	nium	osmiur	n irid	lium	Pt ²⁺		Au^+	Hg ⁺	[' Nthalli	[] ³⁺ um(III) 1	Pb^{4+}	Bi ⁵		+ astatide	radon
87	88	89										piamiani	9 8		iciculy (" [ulain			Distituti	v) poloinum	')	
Fr ⁺	Ra ²⁺	Ac ³⁺	+																			
francium	radium	actinium	1 [58	59	60		61	62	Sm ³⁺	⁶³ Eı	1 ³⁺ 64		65	66		67	68	69	70	Yb ³⁺	71
				Ce	³⁺ Pr	3+]	Nd^{3+}	Pm	3+ san	narium(III)	europiu	m (III) C	d^{3+}	Tb ³	+ D)y ³⁺	Ho ³	+ Er	.3+ [m^{3+}	erbium(III)	Lu ³⁺
				ceriu	m praseody	mium neo	lymium	promethi	ium sar	Sm ²⁺ narium(II)	Eu europiu	$ ^{2+}$ gado	linium	terbiun	n dyspi	rosium	holmium	erbi	um th	ulium yti	Yb ³⁺ erbium(II)	lutetium
			9	90 mi	₄ ⁹¹ Pa	5+ 92	U ⁶⁺	93 ът	5_ 94	Pu^{4+}	⁹⁵ Ar	n^{3+}	Q ,	97 Bk	3+ 98	13	99	100	31 101	Md^{2+}	$^{2}No^{2+1}$	03
				Th	⁺ ⊤ protactini	um(V) uran	ium (VI)	Np		tonium(IV)	americiu	$\lim_{n \to \infty} \mathbb{C}$	m ³⁺	berkelium		/Î ³ ⊤	ES ³⁺	Fr	n ³⁺ mend	levium (II) no	belium(II)	Lr ⁵⁺
				thoriu	protactini	t≭+ 1m(IV) uran	U ⁴⁺ ium (IV)	neptuni	um plu	Pu ⁰⁺	Ar americiu	n ⁺⁺ cu 1m(IV)	num	BK' berkelium	(\mathbf{N})	ornium	einsteiniu	in ierm	mende	VICI levium (III) no	INO ³⁺ ^{1a} belium(III)	wrencium

Common Laboratory Equipment									
Safety Splash Goggles	Beaker	Erlenmeyer Flask	Graduated Cylinder						
Distilled Water Wash Bottle	Beaker Tongs	Crucible Tongs	Test Tube Tongs						
Hot Plate	Spatulas and Scoopulas	Disposable Pipette	Rubber Policeman						
Forceps	Ring Stand	Iron Support Ring	Utility Clamp						
Wire Gauze with Clay Center	Bunsen Burner	Flint Striker	Clay Triangle						

