

West Linn High School

AP Chemistry

Information Packet

Welcome to AP chemistry! This assignment will be a review of the material covered in regular Chemistry as well as some memorization of ions that will be helpful throughout the year. Having the following skills will be essential to success in AP Chemistry and I will expect that you already have a firm grasp on these topics as we start the year. The following assignment should be complete over the summer and will be collected on the first day of class.

AP Chemistry is a challenging course. While it is not all about memorization, being able to quickly recall some vocabulary can be very helpful. I have included several resources in this packet.

1. The solubility rules are in this packet to help you with some of the questions on the summer assignment. You are not expected to memorize them, but you will be expected to be able to apply the information.
2. This packet contains a list of the ions that you should know on the first day. Utilize the suggestions for making the process of memorization easier. For instance, many of you will remember that most of the monatomic ions have charges directly related to their placement on the periodic table. There are naming patterns that greatly simplify the learning of the polyatomic ions as well. I have included a sheet of flashcards for the polyatomic ions that you should learn. I strongly suggest you cut them out and work on memorizing them.
*****There will be a quiz on the first day of class to assess your knowledge of these polyatomic ions... Please be prepared!***
3. There is a packet of questions to help you review the information that you learned in Chemistry. These questions will be **DUE ON THE FIRST DAY OF CLASS!** While you may need to reference materials to help remind you how to do some of these problems (your notes from chemistry, the internet, etc.) please make sure that your work is **YOUR OWN** as you will be the one responsible for understanding this information.
4. A copy of the periodic table used in AP Chemistry is included. This is not the periodic table used in first year chemistry. The AP table is the same that the College Board allows you to use on the AP Chemistry test.
Notice that it has the symbols of the elements but not the written names. You may want to spend some time familiarizing yourself with the names and symbols of common elements.

It is likely some students will procrastinate and try to do all of this studying just before the start of school. Those students may even cram well enough to do well on the initial quiz. However, they will quickly forget the ions, and struggle every time they are used in lecture, homework, quizzes, tests and labs. Research on human memory shows frequent, short periods of study, spread over long periods will produce much greater retention than long periods of study of a short period.

I could wait and throw these at you on the first day of school, but I don't think that would be fair to you. Use as many learning techniques you can – speak them, write them, visualize them, make flashcards, form a study group, have your family help you.

I look forward to seeing you all at the beginning of the next school year! If you need to contact me during the summer, you can email me and I will get back to you as soon as possible.

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Information

Solubility Rules:

GENERAL SOLUBILITY GUIDLINES		
Compounds	Solubility in Water	Exceptions
Salts of Alkali metals (group 1A) and Ammonium (NH ₄)	Soluble	Some Lithium compounds
All Nitrates, Nitrite, Chlorate, Perchlorate, and Acetate Salts	Soluble	
Sulfate Salts	Soluble	Pb, Hg, Ba, Sr, & Ca Cations
Halide Salts (group 7A – F ⁻ , Cl ⁻ ect..)	Soluble	Pb, Ag, & Hg Cations
Acids	Soluble	
Carbonates, Phosphates, Borates, Chromates, Sulfides, and Sulfites	Insoluble	Alkali Metals (group 1A) and Ammonium (NH ₄)
Hydroxides and Oxides	Insoluble	Alkali Metals (group 1A), Ammonium, Calcium, Barium, and Strontium

Solubility Chart – Modern Chemistry (Holt)

S = soluble in water

A = soluble in acids, insoluble in water

P = partially soluble in water, soluble in dilute acids (if *reactant*, soluble in water, if *product*, insoluble in water)

I = insoluble in dilute acids and insoluble in water

a = slightly soluble in acids but insoluble in water

d = decomposes in water

ION	Acetate	Bromide	Carbonate	Chlorate	Chloride	Chromate	Hydroxide	Iodide	Nitrate	Oxide	Phosphate	Silicate	Sulfate	Sulfide
Aluminum	S	S	-	S	S	-	A	S	S	a	A	I	S	d
Ammonium	S	S	S	S	S	S	-	S	S	-	S	-	S	S
Barium	S	S	P	S	S	A	S	S	S	S	A	S	a	d
Calcium	S	S	P	S	S	S	P	S	S	P	P	P	P	P
Copper (II)	S	S	-	S	S	-	A	-	S	A	A	A	S	A
Hydrogen	S	S	-	S	S	-	-	S	S	-	S	I	S	S
Iron (II)	S	S	P	S	S	-	A	S	S	A	A	-	P	A
Iron (III)	S	S	-	S	S	A	A	S	S	A	P	-	P	d
Lead (II)	S	S	A	S	S	A	P	P	S	P	A	A	S	A
Magnesium	S	S	P	S	S	S	A	S	S	A	P	A	S	d
Manganese (II)	S	S	P	S	S	-	A	S	S	A	P	I	P	A
Mercury (I)	P	A	A	S	a	P	-	A	S	A	A	-	d	I
Mercury (II)	S	S	-	S	S	P	A	P	S	P	A	-	S	I
Potassium	S	S	S	S	S	S	S	S	S	S	S	S	P	S
Silver	P	a	A	S	a	P	-	I	S	P	A	-	S	A
Sodium	S	S	S	S	S	S	S	S	S	S	S	S	P	S
Strontium	S	S	P	S	S	P	S	S	S	S	A	A	S	S
Tin (II)	d	S	-	S	S	A	A	S	d	A	A	-	S	A
Tin (IV)	S	S	-	-	S	S	P	d	-	A	-	-	S	A
Zinc	S	S	P	S	S	P	A	S	S	P	A	A	S	A

Polyatomic Elements and Acids

Diatomic Elements	Polyatomic Elements	Common Acids	
Br ₂ Bromine Cl ₂ Chlorine F ₂ Fluorine H ₂ Hydrogen I ₂ Iodine N ₂ Nitrogen O ₂ Oxygen	O ₃ Ozone P ₄ Phosphorus S ₈ Sulfur	HBr Hydrobromic HCl Hydrochloric HF Hydrofluoric HI Hydroiodic HClO Hypochlorous HClO ₃ Chloric HClO ₄ Perchloric	HNO ₂ Nitrous HNO ₃ Nitric H ₂ SO ₃ Sulfurous H ₂ SO ₄ Sulfuric H ₂ CO ₃ Carbonic H C ₂ H ₃ O ₂ Acetic (vinegar) CH ₃ COOH Acetic (vinegar)

Positive Ions: Cations

+1	+2	+3	+4
Ammonium NH ₄ ⁺ Silver Ag ⁺ Copper (I) Cu ⁺ Gold (I) Au ⁺ Hydrogen H ⁺ Hydronium H ₃ O ⁺ <i>Group 1 Elements</i>	Cadmium (II) Cd ⁺² Chromium (II) Cr ⁺² Cobalt (II) Co ⁺² Copper (II) Cu ⁺² Iron (II) Fe ⁺² Lead (II) Pb ⁺² Manganese (II) Mn ⁺² Mercury (I) Hg ₂ ⁺² Mercury (II) Hg ⁺² Nickel (II) Ni ⁺² Tin (II) Sn ⁺² Zinc Zn ⁺² <i>Group 2 Elements</i>	Chromium (III) Cr ⁺³ Cobalt (III) Co ⁺³ Gold (III) Au ⁺³ Manganese (III) Mn ⁺³ Nickel (III) Ni ⁺³ Iron (III) Fe ⁺³ Aluminum Al ⁺³	Carbon C ⁺⁴ Lead (IV) Pb ⁺⁴ Silicon Si ⁺⁴ Tin (IV) Sn ⁺⁴

Negative Ions: Anions

-1	-2	-3	-4
Acetate CH ₃ COO ⁻ , C ₂ H ₃ O ₂ ⁻ Hypochlorite ClO ⁻ Chlorate ClO ₃ ⁻ Chlorite ClO ₂ ⁻ Perchlorate ClO ₄ ⁻ Cyanide CN ⁻ Hydride H ¹⁻ Bicarbonate HCO ₃ ⁻ Hydroxide OH ⁻ Iodate IO ₃ ⁻ Nitrate NO ₃ ⁻ Nitrite NO ₂ ⁻ Permanganate MnO ₄ ⁻ Thiocyanate SCN ⁻ <i>Group 7A non-metals</i>	Carbonate CO ₃ ⁻² Chromate CrO ₄ ⁻² Dichromate Cr ₂ O ₇ ⁻² Oxalate C ₂ O ₂ ⁻² Silicate SiO ₃ ⁻² Sulfate SO ₄ ⁻² Sulfite SO ₃ ⁻² Thiosulfate S ₂ O ₃ ⁻² <i>Group 6A non-metals</i>	Arsenate AsO ₄ ⁻³ Phosphate PO ₄ ⁻³ Phosphite PO ₃ ⁻³ <i>Group 5A non-metals</i>	Carbide C ⁻⁴

DO NOT DETACH FROM BOOK.

PERIODIC TABLE OF THE ELEMENTS

1	H 1.008																	2	He 4.00																																	
3	Li 6.94	4	Be 9.01																	9	F 19.00	10	Ne 20.18																													
11	Na 22.99	12	Mg 24.30																	17	Cl 35.45	18	Ar 39.95																													
19	K 39.10	20	Ca 40.08	21	Sc 44.96	22	Ti 47.90	23	V 50.94	24	Cr 52.00	25	Mn 54.94	26	Fe 55.85	27	Co 58.93	28	Ni 58.69	29	Cu 63.55	30	Zn 65.39	31	Ga 69.72	32	Ge 72.59	33	As 74.92	34	Se 78.96	35	Br 79.90	36	Kr 83.80																	
37	Rb 85.47	38	Sr 87.62	39	Y 88.91	40	Zr 91.22	41	Nb 92.91	42	Mo 95.94	43	Tc (98)	44	Ru 101.1	45	Rh 102.91	46	Pd 106.42	47	Ag 107.87	48	Cd 112.41	49	In 114.82	50	Sn 118.71	51	Sb 121.75	52	Te 127.60	53	I 126.91	54	Xe 131.29																	
55	Cs 132.91	56	Ba 137.33	57	*La 138.91	58	Hf 178.49	59	Ta 180.95	60	W 183.85	61	Re 186.21	62	Os 190.2	63	Ir 192.2	64	Pt 195.08	65	Au 196.97	66	Hg 200.59	67	Tl 204.38	68	Pb 207.2	69	Bi 208.98	70	Po (209)	71	At (210)	72	Rn (222)																	
87	Fr (223)	88	Ra 226.02	89	†Ac 227.03	90	Rf (261)	91	Db (262)	92	Sg (266)	93	Bh (264)	94	Hs (277)	95	Mt (268)	96	Ds (271)	97	Rg (272)																															
																						98	Ce 140.12	99	Pr 140.91	100	Nd 144.24	101	Pm (145)	102	Sm 150.4	103	Eu 151.97	104	Gd 157.25	105	Tb 158.93	106	Dy 162.50	107	Ho 164.93	108	Er 167.26	109	Tm 168.93	110	Yb 173.04	111	Lu 174.97			
																						112	Th 232.04	113	Pa 231.04	114	U 238.03	115	Np (237)	116	Pu (244)	117	Am (243)	118	Cm (247)	119	Bk (247)	120	Cf (251)	121	Es (252)	122	Fm (257)	123	Md (258)	124	No (259)	125	Lr (262)			

*Lanthanide Series

†Actinide Series

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Sulfite	Sulfate	Thiosulfate
Phosphate	Phosphite	Arsenate
Nitrite	Nitrate	Ammonium
Thiocyanate	Carbonate	Bicarbonate
Iodate	Chromate	Dichromate
Permanganate	Oxalate	Perchlorate
Hydroxide	Cyanide	Acetate
Chlorate	Hypochlorite	Chlorite

