AP Chemistry – Chapter 4 Quiz (90 points)

For each of the following, predict the products, write a balanced formula and net ionic equation with phases, identify the type of reaction, and determine the "driving force" of the reaction. If none exists, write none in the box.

Question 1	Solutions of acetic acid and potassium hydroxide react	
Formula Equation		0 1
Net Ionic Equation		0 1
Type of Reaction		0 1
Driving Force		0 1

Question 2	Solutions of sodium nitrite and hydrochloric acid are mixed	
Formula Equation		0 1
Net Ionic Equation		0 1
Type of Reaction		0 1
Driving Force		0 1

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Question 3	Solutions of ammonium sulfate and potassium hydroxide are mixed	
Formula Equation		0 1
Net Ionic Equation		0 1
Type of Reaction		0 1
Driving Force		0 1

Question 4	Solid magnesium oxide is added to sulfur trioxide gas	
Formula Equation		0 1
Net Ionic Equation		0 1
Type of Reaction		0 1
Driving Force		0 1

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Question 5	Fluorine gas is bubbled into a solution of aluminum chloride	
Formula Equation		0 1
Net Ionic Equation		0 1
Type of Reaction		0 1
Driving Force		0 1

Question 6	Liquid octane is burned completely in oxygen	
Formula Equation		0 1
Net Ionic Equation		0 1
Type of Reaction		0 1
Driving Force		0 1

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Question 7	Aqueous solution of manganese(II)sulfate undergoing hydrolysis	
Formula Equation		0 1
Net Ionic Equation		0 1
Type of Reaction		0 1
Driving Force		0 1

Question 8	A sample of solid copper(II)hydroxide is heated	
Formula Equation		0 1
Net Ionic Equation		0 1
Type of Reaction		0 1
Driving Force		0 1

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Question 9	Solutions of chromium(III)bromide and sodium nitrate are mixed	
Formula Equation		0 1
Net Ionic Equation		0 1
Type of Reaction		0 1
Driving Force		0 1

Question 10	Equal number of moles of aqueous potassium hydroxide and phosphoric acid react	
Formula Equation		0 1
Net Ionic Equation		0 1
Type of Reaction		0 1
Driving Force		0 1

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Question 11	Potassium dichromate solution is added to an acidified solution of sodium sulfite
Skeleton Equation	
	⓪ ① ②
Balance Using Half Reactions	
	⓪ ① ② ③ ④ ⑤ ⑥
Net Ionic Equation	
	⓪ ① ②

Question 12	Chlorine gas is bubbled into cold, dilute sodium hydroxide
Skeleton Equation	
	⓪ ① ②
Balance Using Half Reactions	
	⓪ ① ② ③ ④ ⑤ ⑥
Net Ionic Equation	
	⓪ ① ②

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Question 13
Aqueous solutions of silver nitrate and potassium chromate are mixed.

a. Write the balanced formula and net ionic equation for the following reaction.

0 1 2 3 4

b. Calculate the mass of precipitate formed when 1.95 L of 0.0450 M of silver nitrate is added to 2.40 L of 0.0250 M potassium chromate are mixed.

0 1 2 3 4 5 6

c. Calculate the concentrations of each ion remaining in solution after precipitation is complete.

0 1 2 3 4 5 6

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Multiple Choice

Circle the letter of the choice that best completes the statement or answers the question**. Mathematical set-ups and/or verbal reasoning must be given for each question, which might include why other choices may not be correct.** No credit will be awarded for only recording the letter of the answer.

14. A student weighs out 0.681 g of KHP (molar mass = 204.22 g/mol) and titrates to the equivalence point with 36.78 mL of a stock NaOH solution. What is the concentration of the stock NaOH solution? KHP is an acid with one acidic proton.

⓪ ① ②

a) 0.00333 *M*
b) 0.123 *M*
c) 0.0185 *M*
d) 0.0907 *M*
e) none of these

15. Which of the following aqueous solutions contains the greatest number of ions?

⓪ ① ②

a) 400.0 mL of 0.10 *M* NaCl
b) 300.0 mL of 0.10 *M* $CaCl_2$
c) 200.0 mL of 0.10 *M* $FeCl_3$
d) 200.0 mL of 0.10 *M* KBr
e) 800.0 mL of 0.10 *M* sucrose

16. In the following reaction, which species is oxidized?

$$8NaI + 5H_2SO_4 \rightarrow 4I_2 + H_2S + 4Na_2SO_4 + 4H_2O$$

⓪ ① ②

a) sodium
b) iodine
c) sulfur
d) hydrogen
e) oxygen

17. How many oxygen atoms are there in 1.50 mol of O_2?

⓪ ① ②

a) 9.03×10^{23} atoms
b) 5.78×10^{25} atoms
c) 2.89×10^{25} atoms
d) 2.82×10^{22} atoms
e) 1.81×10^{24} atoms

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18. Consider the following unbalanced oxidation-reduction reaction:

$Fe + Br_2 \rightarrow Fe^{3+} + Br^-$

In the balanced equation, the number of electrons transferred is:

0 1 2

a) 2
b) 3
c) 4
d) 6
e) none of these

19. How many of the following are oxidation-reduction reactions?

$NaOH + HCl \rightarrow NaCl + H_2O$
$Cu + 2AgNO_3 \rightarrow 2Ag + Cu(NO_3)_2$
$Mg(OH)_2 \rightarrow MgO + H_2O$
$N_2 + 3H_2 \rightarrow 2NH_3$

0 1 2

a) 0
b) 1
c) 2
d) 3
e) 4

20. A 17.0 g sample of HF is dissolved in water to give 2.0×10^2 mL of solution. The concentration of the solution is:

0 1 2

a) 0.85 *M*
b) 0.17 *M*
c) 0.09 *M*
d) 4.2 *M*
e) 8.5 *M*

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AP Chemistry - Summer Assignment Quiz (65 points)

How many significant figures are in each of the following? Please write your answer on the line provided.

1. 3.51 g _____ 0 1
2. 0.00130 kg _____ 0 1
3. 4.0×10^5 m _____ 0 1
4. 40190 L _____ 0 1
5. 25 cats _____ 0 1
6. 14000 g _____ 0 1
7. 0.4030 cm _____ 0 1

Calculate the following using proper significant figures. Please write your answer on the line provided.

8. $21.2 \div 0.9190 =$ _____ 0 1
9. $63 - 0.9 =$ _____ 0 1
10. $1000.31 + 96.188 =$ _____ 0 1
11. $42.6 \times 32 =$ _____ 0 1
12. $(156.8 \div 51.1) + [(13.5)(0.25)] - [(1867.1 \div 0.0017)(0.6)] =$ _____ 0 1 2
13. $\frac{[(4.35 + 7.032)(14.6 - 12)] + (87.56 - 21.1)}{(98467.1 - 88617.89)} =$ _____ 0 1 2

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Name the following chemical compounds. Please write your answer on the line provided.

14. LiBr _____ 0 1

15. $MgCl_2$ _____ 0 1

16. P_3O_7 _____ 0 1

17. $CuCl_3$ _____ 0 1

18. MnS_2 _____ 0 1

19. Na_3P _____ 0 1

20. CO _____ 0 1

21. FeO _____ 0 1

22. Ca_3N_2 _____ 0 1

23. NaH _____ 0 1

Write the formulas for the following chemical compounds. Please write your answer on the line provided.

24. nitrogen dioxide _____ 0 1

25. nickel (I) sulfide _____ 0 1

26. iron (II) phosphide _____ 0 1

27. silver chloride _____ 0 1

28. trinitrogen pentafluoride _____ 0 1

29. potassium oxide _____ 0 1

30. magnesium iodide _____ 0 1

31. xenon hexafluoride _____ 0 1

32. manganese (IV) nitride _____ 0 1

33. carbon tetrabromide _____ 0 1

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Calcium metal reacts with water to produce aqueous calcium hydroxide and hydrogen gas

34. Write and balance the following equation. ⓪ ① ② ③ ④

35. If the reaction starts with 4.35 g of calcium metal and 9.47 g of water, what is the limiting reactant? ⓪ ① ② ③ ④ ⑤ ⑥

36. How many grams of calcium hydroxide will be produced? ⓪ ① ② ③ ④

37. How many grams of excess reactant will you have? ⓪ ① ② ③ ④ ⑤ ⑥

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38. A 0.2500 g sample of a compound known to contain carbon, hydrogen and oxygen undergoes complete combustion to produce 0.3664 g of CO_2 and 0.1500 g of H_2O. What is the empirical formula of this compound?

Combustion Analysis: ⓪ ① ② ③ ④ ⑤
Empirical Formula: ⓪ ① ② ③ ④ ⑤

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Mento's Lab Rubric

Section	Not Evident	Not Proficient	Below Average	Proficient	Above Average	Excellent
Title and Logistics		Many components are missing or inaccurate		Some components are missing or inaccurate		All components are included and accurate
	Ⓞ	Ⓝ	Ⓑ	Ⓟ	Ⓐ	Ⓔ
Purpose		Many components are missing or inaccurate		Some components are missing or inaccurate		All components are included and accurate
	O	N	B	P	A	E
Materials		Many components are missing or inaccurate		Some components are missing or inaccurate		All components are included and accurate
	O	N	B	P	A	E
Prelab Questions		Many components are missing or inaccurate		Some components are missing or inaccurate		All components are included and accurate
	O	N	B	P	A	E
Procedure		Many components are missing or inaccurate		Some components are missing or inaccurate		All components are included and accurate
	Ⓞ	Ⓝ	Ⓑ	Ⓟ	Ⓐ	Ⓔ
Data and Calculations		Many components are missing or inaccurate		Some components are missing or inaccurate		All components are included and accurate
	Ⓞ	Ⓝ	Ⓑ	Ⓟ	Ⓐ	Ⓔ
Analysis		Many components are missing or inaccurate		Some components are missing or inaccurate		All components are included and accurate
	O	N	B	P	A	E
Conclusions		Many components are missing or inaccurate		Some components are missing or inaccurate		All elements are included and accurate
	Ⓞ	Ⓝ	Ⓑ	Ⓟ	Ⓐ	Ⓔ
References		Many components are missing or inaccurate		Some components are missing or inaccurate		All elements are included and accurate
	O	N	B	P	A	E

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Quiz – Chapter 4

Name_____
Date_____

Target 2.1 Understand the electromagnetic spectrum and arrangement of electrons _____/50

Target 2.2 _____

1. One of the wave properties of electromagnetic radiation is

(A) Volume
(B) Frequency
(C) Mass
(D) Weight

2. The symbol for wavelength is?

(A) h
(B) c
(C) v
(D) λ

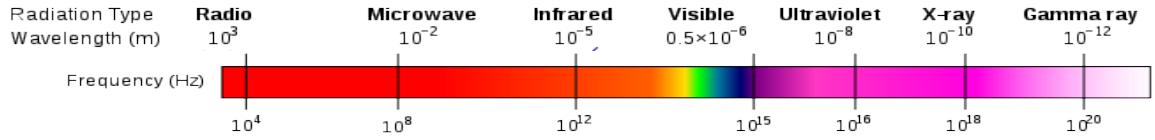
3. The emission of electrons by metals when they are hit with a certain frequency of light is

(A) An excited state
(B) A ground state
(C) Frequency
(D) The photoelectric effect

4. Visible light, X-rays, infrared radiation and radio waves all have the same

(A) Frequency
(B) Wavelength
(C) Speed
(D) Energy

<u>Directions:</u> Use the picture below to answer questions 5 – 8.



5. What type of electromagnetic radiation has a wavelength of $1.2 \bullet 10^{-2}$ m?

(0)
(1)
(2)
(3)

6. What type of electromagnetic radiation has a frequency of $7.38 \bullet 10^{17}$ Hz?

(0)
(1)
(2)
(3)

7. What type of electromagnetic radiation has the longest wavelength?

(0)
(1)
(2)
(3)

8. What type of electromagnetic radiation has the greatest frequency?

(0)
(1)
(2)
(3)

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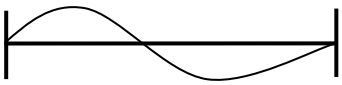
9. This person developed a mathematical equation that treated electrons in atoms as waves.

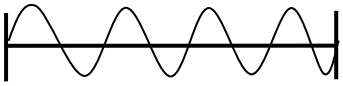
(A) Bohr
(B) De Broglie
(C) Heisenberg
(D) Schrodinger

10. This person said that electrons orbit the nucleus like planets orbit around the sun.

(A) Bohr
(B) De Broglie
(C) Heisenberg
(D) Schrodinger



Wave A



Wave B

Wave C

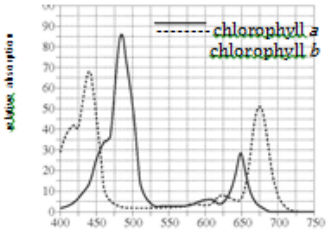
(0) (2) (4) 11. Which of the waves above has the greatest frequency? Explain why.

(0) (2) (4) 12. Which of the following waves has the smallest wavelength? Explain why.

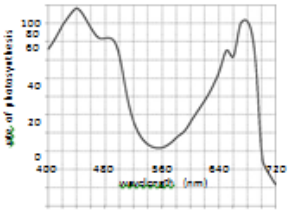
(1) (2) (3) 13. Which of the following waves travels at the speed of light? Explain why.

Table 1	
Color	Wavelength (nm)
Violet	380-430
Blue	430-500
Green	500-565
Yellow	565-585
Orange	585-630
Red	630-750

Table 1 lists wavelength ranges for the visible light spectrum.



Shows the regular absorption of light by chlorophyll (*a*) and (*b*)



Average rate of photosynthesis as a percent of rate at 670 nm

14. Based on table 1 and figure 1 which color of light is associated with the wavelength of light that results in the greatest absorption by chlorophyll *b*.

(A) Blue
(B) Green
(C) Yellow
(D) Red

15. In figure 2, at which of the following wavelengths does the rate of photosynthesis exceed the rate of photosynthesis at 670 nm?

(A) 400 nm
(B) 430 nm
(C) 630 nm
(D) 700 nm

16. Which of the following conclusions is best supported by figures 1 and 2? The wavelength that results in the highest rate of photosynthesis also results in the:

(A) Lowest relative absorption by chlorophyll *a*
(B) Lowest relative absorption by chlorophyll *b*
(C) Highest relative absorption by chlorophyll *a*
(D) Highest relative absorption by chlorophyll *b*

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Name _____Date_____ Period _____
General Chemistry
Solutions and Solubility Test **A** (45 points)

For each of the following, show all work, round to 2 decimal places, and circle your answer.

1. How many grams are in 1.5 liters of a 9.6M solution of HNO_3 solution? (4pts)
   ⓪ ① ② ③ ④

2. What is the final volume of a 1.5M solution **diluted** from 18M H_2SO_4 solution and starting with a volume of 110 mL? (4pts)
   ⓪ ① ② ③ ④

3. If you dissolve 0.90 moles of HCl in enough water to make 350mL of solution, what is the molarity of the solution you made? (4pts)
   ⓪ ① ② ③ ④

4. You accidentally drop 0.427g of sodium sulfate Na_2SO_4 into 2.00L of water. What is the concentration in parts per million (ppm)? What is the solute and solvent? (5pts)
   ⓪ ① ② ③ ④ ⑤

5. How many **grams** of Na_2SO_4 are needed to make 800mL of a 0.25M solution? (4pts)
   ⓪ ① ② ③ ④

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6. If you make a solution with 128g of sodium chloride, NaCl and 1888g of water, what is the mass percent? What is the solute and solvent? (3pts)

⓪ ① ② ③

7. Explain why oil and water are immiscible. You must use complete sentences and discuss polarity. (3pts)

⓪ ① ② ③

8. What is the relationship between temperature and solubility of gases? Explain how doing the Mentos lab on a hot day might change the results of the experiment compared to doing the lab on a cold day. You must use complete sentences. (3pts)

⓪ ① ② ③

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Solutions and Solubility Equation Page

g solution = g solute + g solvent

Water: 1mL = 1 g

1000 mL = 1 L

$$mass\ \ percent = \frac{grams\ solute}{grams\ solution} x100 = \%$$

$$\frac{grams\ solute}{grams\ solvent} = \frac{ppm}{1000000}$$

$$Molarity\ (M) = \frac{moles\ solute}{liters\ solution}$$

$$M_1V_1 = M_2V_2$$

The Periodic Table of the Elements

	1A/+1												3A/+3	4A/±4	5A/-3	6A/-2	7A/-1	8A
	1																	2
1	H																	He
	Hydrogen																	Helium
	1.01	2A/+2																4.00
	3	4											5	6	7	8	9	10
2	Li	Be											B	C	N	O	F	Ne
	Lithium	Beryllium											Boron	Carbon	Nitrogen	Oxygen	Fluorine	Neon
	6.94	9.01											10.81	12.01	14.01	16.00	19.00	20.18
	11	12											13	14	15	16	17	18
3	Na	Mg											Al	Si	P	S	Cl	Ar
	Sodium	Magnesium											Aluminum	Silicon	Phosphorus	Sulfur	Chlorine	Argon
	22.99	24.31											26.98	28.09	30.97	32.07	35.45	39.95
	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36
4	K	Ca	Sc	Ti	V	Cr	Mn	Fe	Co	Ni	Cu	Zn	Ga	Ge	As	Se	Br	Kr
	Potassium	Calcium	Scandium	Titanium	Vanadium	Chromium	Manganese	Iron	Cobalt	Nickel	Copper	Zinc	Gallium	Germanium	Arsenic	Selenium	Bromine	Krypton
	39.10	40.08	44.96	47.87	50.94	52.00	54.94	55.85	58.93	58.69	63.55	65.39	69.72	72.61	74.92	78.96	79.90	83.80
	37	38	39	40	41	42	43	44	45	46	47	48	49	50	51	52	53	54
5	Rb	Sr	Y	Zr	Nb	Mo	Tc	Ru	Rh	Pd	Ag	Cd	In	Sn	Sb	Te	I	Xe
	Rubidium	Strontium	Yttrium	Zirconium	Niobium	Molybdenum	Technetium	Ruthenium	Rhodium	Palladium	Silver	Cadmium	Indium	Tin	Antimony	Tellurium	Iodine	Xenon
	85.47	87.62	88.91	91.22	92.91	95.94	98	101.07	102.91	106.42	107.87	112.41	114.82	118.71	121.76	127.60	126.90	131.29
	55	56	71	72	73	74	75	76	77	78	79	80	81	82	83	84	85	86
6	Cs	Ba	Lu	Hf	Ta	W	Re	Os	Ir	Pt	Au	Hg	Tl	Pb	Bi	Po	At	Rn
	Cesium	Barium	Lutetium	Halfnium	Tantalum	Tungsten	Rhenium	Osmium	Iridium	Platinum	Gold	Mercury	Thallium	Lead	Bismuth	Polonium	Astatine	Radon
	132.91	137.33	174.97	178.49	180.95	183.84	186.21	190.23	192.23	195.08	196.97	200.59	204.38	207.2	208.98	209	210	222
	87	88	103	104	105	106	107	108	109	110	111	112	113	114	115	116	117	118
7	Fr	Ra	Lr	Rf	Db	Sg	Bh	Hs	Mt	Ds	Rg	Uub	Uut	Uuq	Uup	Uuh	Uus	Uuo
	Francium	Radium	Lawrencium	Rutherfordium	Dubnium	Seaborgium	Bohrium	Hassium	Meitnerium	Darmstadtium	Roentgenium	Ununbium	Ununtrium	Ununquadium	Ununpentium	Ununhexium	Ununseptium	Ununoctium
	223	226	262	261	262	263	262	265	266	281	280	285	284	289	288	293	?	294

	57	58	59	60	61	62	63	64	65	66	67	68	69	70
	La	Ce	Pr	Nd	Pm	Sm	Eu	Gd	Tb	Dy	Ho	Er	Tm	Yb
	Lanthanum	Cerium	Praseodymium	Neodymium	Promethium	Samarium	Europium	Gadolinium	Terbium	Dysprosium	Holmium	Erbium	Thulium	Ytterbium
	138.91	140.12	140.91	144.24	145	150.36	151.96	157.25	158.93	162.50	164.93	167.26	168.93	173.04
	89	90	91	92	93	94	95	96	97	98	99	100	101	102
	Ac	Th	Pa	U	Np	Pu	Am	Cm	Bk	Cf	Es	Fm	Md	No
	Actinium	Thorium	Protactinium	Uranium	Neptunium	Plutonium	Americium	Curium	Berkelium	Californium	Einsteinium	Fermium	Mendelevium	Nobelium
	227	232.04	231.04	238.03	237	244	243	247	247	251	252	257	258	259

d-block metals

Ag^{+1}

Zn^{+2}

Common Acids	
Name	Formula
hydrochloric acid	HCl
sulfuric acid	H_2SO_4
phosphoric acid	H_3PO_4
carbonic acid	H_2CO_3
nitric acid	HNO_3

Prefixes			
mono	1	hexa	6
di	2	hepta	7
tri	3	octa	8
tetra	4	nona	9
penta	5	deca	10

Activity Series of Metals	
Name	Symbol
Lithium	Li
Potassium	K
Calcium	Ca
Sodium	Na
Magnesium	Mg
Aluminum	Al
Zinc	Zn
Iron	Fe
Lead	Pb
(Hydrogen)	(H)*
Copper	Cu
Mercury	Hg
Silver	Ag

Names and Formulas of Common Polyatomic Ions							
$C_2H_3O_2^-$	acetate	$Cr_2O_7^{-2}$	dichromate	NO_3^-	nitrate	IO_3^-	iodate
ClO^-	hypochlorite	HCO_3^-	hydrogen carbonate	NO_2^-	nitrite	HS^-	hydrosulfide
ClO_2^-	chlorite		(bicarbonate)	O_2^{-2}	peroxide	SCN^-	thiocyanate
ClO_3^-	chlorate	HPO_4^{-2}	hydrogen phosphate	OH^-	hydroxide	$C_2O_4^-$	oxalate
ClO_4^-	perchlorate	HSO_3^-	hydrogen sulfite	PO_3^{-3}	phosphite	$S_2O_3^{-2}$	thiosulfate
CN^-	cyanide	HSO_4^-	hydrogen sulfate	PO_4^{-3}	phosphate		
CO_3^{-2}	carbonate	MnO_4^-	permanganate	SO_3^{-2}	sulfite		
CrO_4^{-2}	chromate	NH_4^+	ammonium	SO_4^{-2}	sulfate		

Chemical Bonding Written Test (50 points)

Please fill in the following table. Cations and anions should have a symbol and charge shown. (28 pts)

Cation	Anion	Compound Formula	Compound Name	
			zirconium (IV) permanganate	0 1 2 3
		Na_3P		0 1 2 3
		$Fe(NO_3)_3$		0 1 2 3
			Ammonium oxide	0 1 2 3
Ag^{+1}	Cl^{-1}			0 1 2
			osmium (IV) sulfate	0 1 2 3
Mg^{+2}	NO_2^{-1}			0 1 2
		V_2S_5		0 1 2 3
			chromium (III) selenide	0 1 2 3
			calcium hydroxide	0 1 2 3

Please write the answer to the question on the line provided. (6 pts)

How many electrons would be found in the ion whose symbol is Cl^{-}? _____ 0 1

If an ion has 25 protons and 28 electrons, what is the charge of the ion? _____ 0 1

Give the **ion symbol** for the ion that has 14 protons and 17 electrons _____ 0 1

How many protons would be found in the ion whose symbol is N^{-3}? _____ 0 1

How many electrons would be found in the ion whose symbol is Ca^{+2}? _____ 0 1

How many protons would be in the ion whose symbol is Li^{+1}? _____ 0 1

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Please fill in the following table. (16 pts)

Element	Number of Valence Electrons	Lewis Dot Diagram	
Aluminum			0 1 2
Selenium			0 1 2
Iodine			0 1 2
Barium			0 1 2
Lithium			0 1 2
Nitrogen			0 1 2
Carbon			0 1 2
Tellurium			0 1 2

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