Name: ANSWERS **CHEMISTRY REVIEW EXEMPLAR** 66.5/98

** The following are responses made by science students. Analyze their responses and fill-out the Strengths, Weaknesses, Improvements, Mark (SWIM) chart. Include a total mark out of 98, within 2 marks = +5, within 4 = +3, within 6 = +1**

Match the following WHMIS symbols with the correct description. [4/8]

1 mark either right or wrong

	Number	Symbol	Description
✓	1. G		A. symbol indicates substance is poisonous or toxic and will cause serious and immediate effects.
X	2. B		B. symbol indicates the substance will react violently when exposed to air, water, etc.
X	3. F		C. symbol indicates the substance will support burning or increase the temperature at which the fire burns.
X	4. A		D. symbol indicates the substance will burn skin or eat away through materials
✓	5. H		E. symbol indicates the substance is infectious or causing biological illness
✓	6. C		F. symbol indicates the substance is poisonous or toxic and will cause illness over repeated exposure.
✓	7. D		G. symbol indicates the substance will burn while in the presence of oxygen.
X	8. E		H. symbol indicates the substance is under pressure and is hazardous if cylinder is damaged or pressure limits are exceeded.

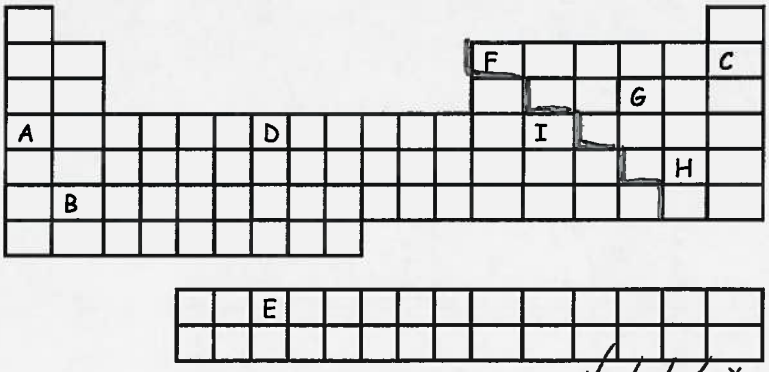
S: #1, 5, 6, 7

W: #2, 3, 4, 8

I: #2 = E, #3 = A, 4 = F, 8 = B

M: 4/8

Using the periodic table below, answer the following questions. [7.5/10]



S: #10, 11, 12

W: #9, F is a metalloid
#13, B has 2 valence e⁻ but it has 6 valence shells

I: #9 = A, B, D, E, I
#13 = F, C

M: 7.5/10

.5 off to max for missing, extra, or wrong

9. List all element letters (A-H) that are classified as metals A, B, D, E, F, I [1.5/2]

10. List all element letters (A-H) that are classified as non-metals G, H, C [2/2]

11. List all elements that would be multivalent cations D, E [2/2]

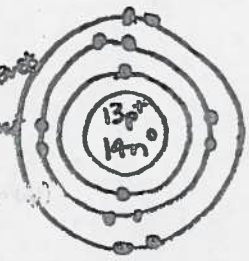
12. List all pairs of elements that their ions would be isoelectric with one another A^{+1}, G^{-2}; B^{+2}, H^{-1} [2/2]

13. List all elements that would have valence electrons in the second energy level Bx F, C [0/2]

-6.5

14. Draw a **Bohr-Rutherford** diagram and a **Lewis Dot Diagram** for silicon (Si): [3/4]

✓-nucleus
.5-energy levels & e⁻ arrangement



✓-symbol
.5-valence e⁻ arrangement

S: very good @ determining # p+, n°, energy levels & element symbol

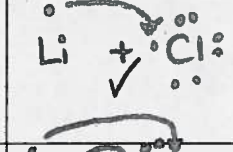
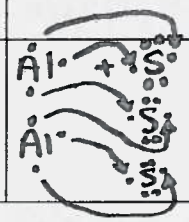
W: e⁻ arrangements

I: e⁻ should be placed as 4 singles.

M: 3/4

15. Complete the following chart for the formation of the ionic bonds between the atoms listed below. [5/6]

0.5 each off for incorrect, missing, or extra

Atoms	Movement of Electrons	Ions Formed	Chemical Formula
Lithium and Chlorine	 ✓	$[Li]^{+1}[Cl]^{-1}$ 0.5	LiCl ✓
Aluminum and Sulphur	 ✓	$2[Al]^{3+}3[S]^{2-}$ 0.5	Al_2S_3 ✓

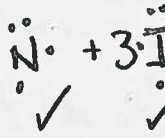
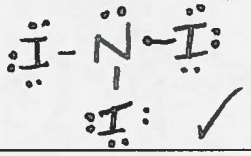
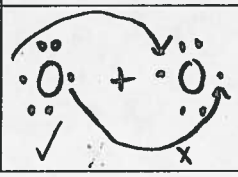
S: good job of showing metals losing & non-metals gaining e⁻, determining charges of ions.

W: no valence e⁻ indicated on anions

I: anions should have 8 valence e⁻ (4 sets of pairs)

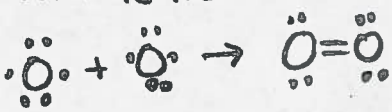
M: 5/6

16. Complete the following chart, showing the sharing of electrons that are required to create the following covalent compounds. [4/6]

Molecule	Lewis Dot Diagram	Structural Diagram
NI_3	 ✓ ✓	 ✓
O_2	 ✓ X	X

S: Lewis dot diagrams of reactants are correctly drawn NI_3 is correctly bonded

W: O_2 is covalent (share e⁻) not ionic

I: 

M: 4/6

17.

Balance the following by inserting the necessary numbers, and state the **type of reaction** that is occurring: [3/6]

✓-balance
✓-type

a) 2 $KClO_3$ → 2 KCl + 3 O_2 ✓ ✓ type: decomp

b) 2 Sr + ___ $Mg(NO_3)_2$ → 2 $Sr(NO_3)_2$ + ___ Mg X type: double disp

c) ___ AlI_3 + ___ Na_3PO_4 → ___ $AlPO_4$ + 3 NaI ✓ X type: synthesis

S: a, c is balanced correctly

W: b is not balanced b, c are the wrong type

I: b) Sr + $Mg(NO_3)_2$ → $Sr(NO_3)_2$ + Mg
b) single displacement
c) double displacement

M: 3/6

-7

18. First indicate whether the chemical is ionic, molecular, or polyatomic and then write the correct name or formula where appropriate. [14/20]

no marks given for I/M/P

Either right or wrong no half marks
√ - formula or √ - name

I/M/P	Name	Formula
M	nitrogen gas	$N_{(g)}$ x
M	√ phosphorus triiodide	PI_3
M	sulphur dioxide	SO_2 √
M	x tetracarbon nonahydride	C_4H_{10}
I	aluminum oxide	Al_2O_3 √
I	√ cesium chloride	CsCl
I	gallium arsenide	GaAs √
P	√ ammonium chlorate	NH_4ClO_3
P	potassium cyanide	$K(CN)_2$ x
P	√ lithium bromate	$LiBrO_3$
I	manganese(IV)oxide	MnO_2 √
P	x aurous phosphate	$AuPO_4$
P	barium nitrate	$Ba(NO_3)_2$ √
M	√ helium gas	He
M	carbon dioxide	CO_2 √
M	√ xenon diiodide	XeI_2
I	stannous oxide	SnO √
I	√ copper(I) fluoride	CuF
I	plumbic carbide	PbC_2 x
P	x disodium carbonate	Na_2CO_3

S: very good @ identifying I/M/P

W: HOFBrINCl crossing charges

I: $N_{2(g)}$
tetracarbon decahydride
KCN
auric phosphate or gold(III)
PbC
sodium carbonate

M: 14/20 (6 incorrect answers)

19. 2 mL of aqueous silver nitrate is added to 2 mL of aqueous sodium chloride. A white precipitate is produced. [4/8]

a) Write a word equation to describe the reaction. [1/2]

√ - reactants & products
.5 - states
.5 - plus & produces

silver nitrate plus sodium chloride equals silver chloride plus sodium nitrate

S: correct products in word eq'n & type of reaction identified

W: no states
nitrate is not N

b) Write a balanced chemical equation to describe the reaction, include states. [2/5]

$$Ag_3N + 3NaCl \rightarrow Na_3N + 3AgCl$$

0.5 each
√ - reactants
√ - products
√ - states
√ - balanced
√ - arrow

I: $AgNO_{3(aq)} + NaCl_{(aq)} \rightarrow NaNO_{3(aq)} + AgCl_{(s)}$

M: 4/8

c) What type of reaction is this? [1/1]

double displacement

-10

20. Compare the properties of acids and bases. Include pH, taste, feel, litmus test, and reaction with phenolphthalein, BTB, and red litmus paper. [8/12]

✓- each box

Substance	pH	Taste	Feel	Red Litmus	Phenolpthalien	BTB
ACIDS	0-7 ✓	sour ✓	slippery × caustic	red ✓	pink ×	yellow ✓
BASES	7-14 ✓	bitter ✓	? caustic	blue ✓	clear ×	blue ✓

S: All but feel & pH test are correct

W: Feel & phenolphthalein is incorrect

I: bases feel slippery
phenolphthalein - clear (acid
- pink (base

M: 8/12

21. Explain how to recognize the chemical formula for an acid, a base, and a salt, and give an example of each. [5/6]

✓ mark for description
✓ for e.g

✓ - acids start with a H e.g. HCl ✓

✓ - bases have OH e.g. NaOH ✓

✓ - salts are ionic compounds so they will have a metal & a non-metal e.g.?

S: acid, base, & neut def^{n}
acid, base examples

W: no example for a sal

I: salt e.g. NaCl

M: 5/6

.5 each
✓- products
✓- states
✓- balanced

22. Write balanced formula equations for the following neutralization reactions: [5/6]]

a) $H_2SO_{4\,(aq)} + Ca(OH)_{2\,(aq)} \rightarrow 2H_2O_{(l)} + SO_4Ca_{(aq)}$ ✓ 2.5/5

b) $H_3PO_{4\,(aq)} + 3LiOH_{(aq)} \rightarrow 3H_2O_{(l)} + PO_4Li_{3\,(aq)}$ 2.5/5

S: correct combining of ions

W: metals are not written first in eq'n

I: $CaSO_4$
Li_3PO_4

M: 5/6

23. Ammonia is a colourless gas with a pungent odour. Its melting point is -77°C and its boiling point is -33.4°C. It is soluble in water. Ammonia is sold as an aqueous solution. Household ammonia, which is commonly used for cleaning glass and washing clothing, consists of approximately 5% ammonia and a detergent. The chemical formula is NH_3.

a) If you were working with household ammonia in a laboratory, what four safety precautions would you take? [2/4]

mark for each point

✓ - wear goggles
✓ - avoid smelling fumes
- ③
-

S: b) & c) well answered

W: only 2 points listed

b) How would you neutralize the household ammonia? [1 /1]

add acid to it to neutralize
base + acid → salt + water
neutralize

I: - wear gloves
- wear protective clothing/ apron

M: 4/6

c) How would you test that the solution was neutralized? [1 /1]

check pH of solution w pH paper

-8