

**Grenfell Campus**  
**MEMORIAL UNIVERSITY OF NEWFOUNDLAND**  
**CHEMISTRY 1810**  
**Sample Midterm Examination**

*Time:* **Two Hours**

*Name:* \_\_\_\_\_

*Student Number:* \_\_\_\_\_

*Instructor:* \_\_\_\_\_

This Examination has 11 Pages  
(including the Periodic Table)

**Read the following carefully**

**Answer each question in the space provided. When answering problems, show all your calculations. Note: a ½ mark will be deducted for any final answer with the incorrect number of significant figures.**

**You are provided with a Periodic Table and data sheet on the last page of the examination. You may detach this sheet.**

**HAND IN THIS PAPER IN ITS ENTIRITY AT THE END OF THE EXAMINATION.**

<b>Page</b>	<b>Value</b>	<b>Mark</b>
<b>3</b>	<b>11</b>	
<b>4</b>	<b>11</b>	
<b>5</b>	<b>12</b>	
<b>6</b>	<b>7</b>	
<b>7</b>	<b>8</b>	
<b>8</b>	<b>12</b>	
<b>9</b>	<b>8</b>	
<b>10</b>	<b>6</b>	
<b>Total</b>	<b>75</b>	

*Note: each question which requires as an answer the name of a chemical element or compound or a scientific term, that word must be spelled correctly in order to obtain any mark.*

[marks]

[5] 1. Provide the correct full **name** for each of the following terms:

- (a) The most perfect form of a solid is called a \_\_\_\_\_
- (b) If a compound turns red litmus blue, it must be a \_\_\_\_\_
- (c) When a solid turns directly to a gas, the process is called  
\_\_\_\_\_
- (d) When a liquid is easy to pour, it is said to have a low  
\_\_\_\_\_
- (e) When a liquid turns to a gas below its boiling point, the process is called  
\_\_\_\_\_

[3] 2. Identify each of the following by **name**:

- (a) The group 2 elements \_\_\_\_\_
- (b) The group 15 elements \_\_\_\_\_
- (c) The elements 90-103 \_\_\_\_\_

[3] 3. Complete the following table of electron configuration:

Element	$n=1$	$n=2$	$n=3$
sulfur			
sulfide ion			

- [3] 4. Answer each of the following parts:  
An atom of a particular isotope of an element has an atomic number of 15 and a mass number of 33.
- (a) What is the name of the element? \_\_\_\_\_
- (b) How many neutrons does this particular isotope possess? \_\_\_\_\_
- (c) How many electrons does the neutral atom possess? \_\_\_\_\_
- [2] 5. What is the common charge (e.g., +1, -1) on each of the following ions:
- (a) lead (two values) \_\_\_\_\_
- (b) aluminum \_\_\_\_\_
- [3] 6. What is the ion formula (e.g. oxide, answer  $O^{2-}$ ) for each of the following ions:
- (a) nitride \_\_\_\_\_
- (b) nitrite \_\_\_\_\_
- (c) nitrate \_\_\_\_\_
- [3] 7. Write the correct formulas corresponding to each of the following names:
- (a) tin(IV) fluoride \_\_\_\_\_
- (b) tetraphosphorushexasulfide \_\_\_\_\_
- (c) zinc oxide \_\_\_\_\_

[5] 8. Write correct names corresponding to each of the following formulas:

(a)  $K_2O$  \_\_\_\_\_

(b)  $Cu_2O$  \_\_\_\_\_

(c)  $N_2O$  \_\_\_\_\_

(d)  $NH_4Br$  \_\_\_\_\_

(e)  $HBr(aq)$  \_\_\_\_\_

[4] 9. Draw the electron-dot formulas for:

(a) Mg

(b) S

(b) MgS

(c)  $H_2S$

[3] 10. Identify, with correct spelling:

(a) The generic name for a substance that forms an electrically conducting solution when dissolved in water \_\_\_\_\_.

(b) A pair of electrons in a molecule that is not being used in a covalent bond is called a \_\_\_\_\_.

(c) The type of covalent bond that involves six shared electrons \_\_\_\_\_.

11. Argon is found to have three naturally-occurring isotopes: Ar-36, atomic mass 35.9675 u, abundance 0.3365%; Ar-38, atomic mass 37.9627 u, abundance 0.00632%; and Ar-40, atomic mass 39.9624 u, abundance 99.6003%. Calculate the average atomic mass of argon.

[3]

12. Calculate the percentage by mass of chlorine in phosphorus pentachloride.

[2]

13. A compound has an empirical formula of  $\text{CH}_2$  and a molar mass of  $84 \text{ g}\cdot\text{mol}^{-1}$ . What is the molecular formula of the compound?

[2]

14. When 8.72 g of iron are heated with chlorine gas, 25.36 g of a compound of iron and chlorine is formed. What is its empirical formula?

[4]

15. Calculate the number of atoms of oxygen in 7.32 g of sulfur trioxide.  
(Avogadro's constant =  $6.02 \times 10^{23}$  molecules  $\cdot$  mol $^{-1}$ )

[4]

- [3] 16. Identify **by name** (spelled correctly) the following elements:
- (a) The most reactive gaseous element \_\_\_\_\_
  - (b) The halogen which is a purple-black solid \_\_\_\_\_
  - (c) 78% of the atmosphere is this gas \_\_\_\_\_
- [2] 17. Write the molecular equation corresponding to the following word equation:  
*Lithium metal burns in nitrogen gas to give solid lithium nitride.*
- [2] 18. Complete the following chemical equations, including the phases of the products:
- (a)  $\text{H}_2\text{CO}_3(aq) \rightarrow$
  - (b)  $\text{K}_2\text{S}(aq) + 2 \text{HCl}(aq) \rightarrow$
- [2] 19. Insert the correct term:
- (a) A substance which alters the rate of a chemical reaction but which is unchanged at the end of the reaction is called a: \_\_\_\_\_
  - (b) Different forms of a chemical element are called: \_\_\_\_\_
- [2] 20. Write the correctly-spelled **name** of:
- (a) **Any** metal which reacts with water \_\_\_\_\_
  - (b) **Any** metal which does not react with acid or water \_\_\_\_\_
- [1] 21. Identify the generic class of the following reaction:  
 $\text{CaO}(s) + \text{CO}_2(g) \rightarrow \text{CaCO}_3(s)$  \_\_\_\_\_



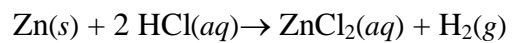
- [2] 22. Answer each of the following by name:
- (a) All ionic compounds of this polyatomic *anion* are soluble \_\_\_\_\_
- (b) Name any *one* of the metal *cations* which always forms soluble ionic compounds.
- \_\_\_\_\_

- [3] 23. Identify *by name* the following gases:
- (a) The dark red-brown gas \_\_\_\_\_
- (b) The gas with a “rotten egg” smell \_\_\_\_\_
- (c) The only basic gas \_\_\_\_\_

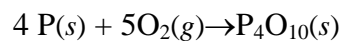
24. 0.500 g of a noble gas occupies 0.582 L at a temperature of 18°C and a pressure of 103 kPa. What is the identity of the gas? Show your calculations.  
( $R = 8.31 \text{ kPa}\cdot\text{L}\cdot\text{mol}^{-1}\cdot\text{K}^{-1}$ )

[3]

[2] 25. Write a balanced net ionic equation corresponding to the following formula equation:



26. Phosphorus reacts with oxygen gas to form tetraphosphorusdecaoxide.



If 26.8 g of phosphorus are used, what mass of oxygen gas is consumed?

[4]

# PERIODIC TABLE OF THE ELEMENTS

← s-block →																		← d-block →																		← p-block →																			
																																				1																			2
																																				H 1.0079																			He 4.0026
3 Li 6.941	4 Be 9.0122																	5 B 10.811	6 C 12.011	7 N 14.0067	8 O 15.9994	9 F 18.9984	10 Ne 20.1797																																
11 Na 22.9898	12 Mg 24.3050																	13 Al 26.9815	14 Si 28.0855	15 P 30.9738	16 S 32.066	17 Cl 35.4527	18 Ar 39.948																																
19 K 39.0983	20 Ca 40.078	21 Sc 44.9559	22 Ti 47.88	23 V 50.9415	24 Cr 51.9961	25 Mn 54.9381	26 Fe 55.847	27 Co 58.9332	28 Ni 58.69	29 Cu 63.546	30 Zn 65.39	31 Ga 69.723	32 Ge 72.61	33 As 74.9216	34 Se 78.96	35 Br 79.904	36 Kr 83.80																																						
37 Rb 85.4678	38 Sr 87.62	39 Y 88.9059	40 Zr 91.224	41 Nb 92.9064	42 Mo 95.94	43 Tc (99)	44 Ru 101.07	45 Rh 102.905	46 Pd 106.42	47 Ag 107.868	48 Cd 112.411	49 In 114.82	50 Sn 118.710	51 Sb 121.75	52 Te 127.60	53 I 126.904	54 Xe 131.29																																						
55 Cs 132.905	56 Ba 137.327	57 La 139.905	58 Ce 140.115	59 Pr 140.907	60 Nd 144.24	61 Pm (147)	62 Sm 150.36	63 Eu 151.965	64 Gd 157.25	65 Tb 158.925	66 Dy 162.50	67 Ho 164.930	68 Er 167.26	69 Tm 168.934	70 Yb 173.04	71 Lu 174.967																																							
87 Fr (223)	88 Ra (226)	89 Ac (227)																104	105	106	107	108	109																																
																		← f-block →																																					
																		90 Th 231.036	91 Pa (231)	92 U 238.028	93 Np (237)	94 Pu (242)	95 Am (243)	96 Cm (247)	97 Bk (247)	98 Cf (249)	99 Es (254)	100 Fm (253)	101 Md (256)	102 No (253)	103 Lw (257)																								

Paranthesis indicates the most stable isotope

$$\text{Avogadro's number} = 6.02 \times 10^{23} \text{ particles} \cdot \text{mol}^{-1}$$