



In-Class Assignment Atomic Structures/Calculations

NAME: _____ DATE: _____

Instructions: You may use any books or aids you wish but you are not permitted to communicate with any one while you are completing this assignment.

Time: 45 minutes.

- 1) Complete the table below for the atoms or ions given. Indicate the numbers of subatomic particles present and state if there has been a gain or loss of electrons.

	PROTONS	NEUTRONS	ELECTRONS	GAIN/LOSS
$^{21}_{10}\text{Ne}$				
$^{64}_{29}\text{Cu}$				
$^{14}_{7}\text{N}^{3-}$				
$^{85}_{37}\text{Rb}^{+}$				
$^{197}_{79}\text{Au}^{3+}$				

5 marks

2) Below is a list of the first five ionisation energies of 7 elements.

Element	Ionisation Energies kJmol^{-1}				
	1 st	2 nd	3 rd	4 th	5 th
1	700	1500	7700	10500	13600
2	1300	3400	5300	7500	11000
3	600	1800	2800	11600	14800
4	500	4600	6900	9500	13400
5	600	1200	4900	6500	8100
6	400	3100	4400	5900	8000
7	1100	2400	4600	7500	37800

Next to the number corresponding to the element above, write down the number of valence electrons that element has.

1	_____
2	_____
3	_____
4	_____
5	_____
6	_____
7	_____

3 marks

3) Write the electron configuration and draw an orbital diagram for each of the following atoms in the ground state?

	Electron configuration	Orbital diagram
a) B	_____	
b) Ar	_____	
c) Mg	_____	
d) S	_____	
e) Br	_____	

5 marks

4. 100 mL of 2.00 mol L^{-1} sodium hydroxide is mixed with 50.0 mL of 2.50 mol L^{-1} sodium hydroxide, then 50.0 mL of distilled water is added to the solution. What is the concentration of the final sodium hydroxide solution produced?

2 marks

5. Experiments have shown that a pure substance 'X' is a soluble monoprotic acid. 1.308 g of 'X' was dissolved in water and the solution made up to 250 mL in a volumetric flask. Five 20.00 mL aliquots of 'X' were titrated with $0.1031 \text{ mol L}^{-1}$ sodium hydroxide from the burette. Phenolphthalein was used as the indicator. The result of the titrations are shown in the table below.

Final Reading (mL)	9.90	16.20	23.32	29.50	35.70
Initial Reading (mL)	2.07	9.96	17.10	23.32	29.50
Volume Added (mL)					

- a) Calculate the appropriate value for the volume of sodium hydroxide solution required for titration.

2 marks

- b) From the value calculated in (a), calculate the number of moles of NaOH used in the titration.

2 marks

- c) How many moles of 'X' were in each 20.00 mL aliquot?

2 mark

- d) Calculate the number of moles of 'X' in the original 1.308 g sample and hence determine the molecular mass of 'X'.

4 marks

6. A sample of sterling silver alloy weighing 0.375g was dissolved in concentrated nitric acid, forming silver nitrate in solution, water and liberating nitrogen dioxide gas. The silver was then precipitated from solution as silver chloride by the addition of ammonium chloride solution.

a. Give balanced chemical equations for both reactions.

1 mark

1 mark

b. Calculate the percentage of silver in the alloy.

4 marks

END OF ASSESSMENT