



THE OPEN UNIVERSITY OF SRI LANKA

Certificate course for laboratory Technology 2009 / 2010

PSC 1222 — Basic Chemistry for Laboratory Practice

Assignment test 1

Continuous Assessment Test I (Open Book Test)

Duration: one hour

Date : 06th February, 2010

Time: 1.00 p.m. to 2.00 p.m.

Reg. No.



Question No.	Marks
MCQ	
1	
2	
Total	
Percentage	

Instructions to candidates

- Answer all questions.
- Write down the answers in the spaces provided in the paper itself. Attached sheets will not be graded.

Part A

Underline the correct answer.

1. The element Mg is

1. an alkali metal

2. an alkali earth metal

3. a halogen

4. a metalloid

5. a transition metal

2. The chemical symbol for potassium is ${}^{39}_{19}\text{K}$. The number of neutrons in K is

1. 20

2. 19

3. 39

4. 58

5. 38

3. The atomic number of K is

1. 20

2. 19

3. 39

4. 58

5. 38

4. Isotopes of a specific element have
1. the same mass number and atomic number
 2. the same mass number but different atomic numbers
 3. different mass numbers and atomic numbers
 4. different mass numbers and the same atomic numbers
 5. none of the above is correct

5. Which of the following describes an isotope with a mass number 99 that contains 56 neutrons in its nucleus?

1. ${}^{99}_{56}\text{Ba}$ 2. ${}^{56}_{43}\text{Tc}$ 3. ${}^{43}_{56}\text{Ba}$ 4. ${}^{155}_{199}\text{Es}$ 5. ${}^{99}_{43}\text{Tc}$



6. Which of the following elements is a halogen?

1. H 2. O 3. K 4. Na 5. I

7. Which of the following pairs of elements would be most likely to form a covalent bond?

1. Al and F 2. K and Sn 3. C and H 4. K and H 5. Na and Cl

8. Which of the following pairs of elements would be most likely to form an ionic bond?

1. Mg and Ca 2. S and O 3. B and F 4. C and O 5. Mg and Br

9. The chemical formula of aluminium sulphide is

1. AlS 2. Al₃S₂ 3. Al₂S₃ 4. AlS₂ 5. Al₂S

10. A student prepared a solution by dissolving 10.0 g of solid NaOH in water and the final volume of the solution was 250.0 mL. What is the molarity of the solution?

(Na = 23 g mol⁻¹, O = 16 g mol⁻¹, H = 1 g mol⁻¹)

1. 0.1 M 2. 0.4 M 3. 10 M 4. 40 M 5. 250 M

(20 marks)

Part B

1. (i) The element X reacts with the element Y to give a product containing X^{3+} ions and Y^{2-} ions.

a) Is element X likely to be a metal or a non metal?

b) Is element Y likely to be a metal or a non metal?

c) What is the chemical formula of the product?

d) What are the groups of the periodic table elements X and Y likely to be in?

X =

Y =

(10 marks)

(ii) A molecule containing only nitrogen and oxygen contains (by mass) 36.8% N.
(O = 16 g mol^{-1} , N = 14 g mol^{-1})

a) What is the weight of N in 100 g of the compound?

b) What is the weight of O in 100 g of the compound?

c) Calculate the number of moles of N in 100 g of the compound.

d) Calculate the number of moles of O in 100 g of the compound.

e) What is the empirical formula of the compound.

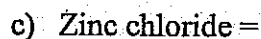
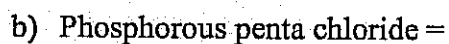
(20 marks)

2. (i) Name the following compounds.



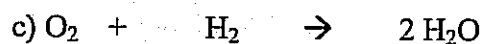
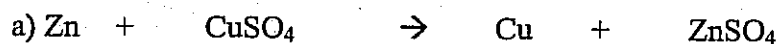
(06 marks)

(ii) Write the chemical formula of the following compounds.



(06 marks)

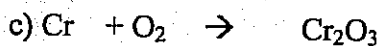
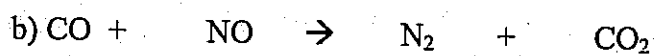
(iii) Identify each of the following reactions as decomposition, combination or replacement reactions.



(08 marks)



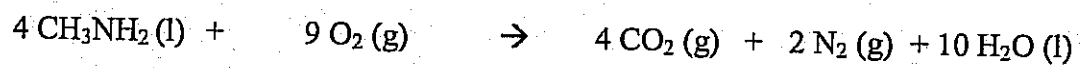
(iv) Balance the following equations.



(12 marks)

(v) The following equation shows the combustion of methylamine (CH_3NH_2).

(C = 12 g mol^{-1} , N = 14 g mol^{-1} , H = 1 g mol^{-1})



a) How moles of O_2 reacts with 4.50 moles of methylamine?

b) How many moles of N_2 are produced from 32.2 g of methylamine?



c) How many molecules of O_2 are required to form 0.56 g of N_2 ?

(18 marks)

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Answer guide for the Continuous Assessment test (Open Book Test)

Part A

(1) 2 (2) 1 (3) 2 (4) 4 (5) 5 (6) 5 (7) 3 (8) 5 (9) 3 (10) 1

Part B

1. (i) a) metal b) non-metal c) X_2Y_3 d) $X=3, Y=6$
 (ii) a) 36.8 g b) 63.2 g c) $36.8/14 = 2.63 \text{ N}$ d) $63.2/16 = 3.95 \text{ O}$

e)		N	O
	No. of moles present	2.63	3.95
	Molar ratio	$2.63/2.63 = 1$	$3.95/2.63 = 1.5$
		2	3

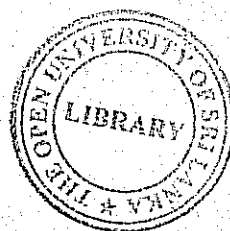
Empirical formula = N_2O_3

2. (i) a) CaCO_3 = Calcium carbonate
 b) CCl_4 = Carbon tetrachloride
 c) H_3PO_4 = Phosphoric acid
 (ii) a) $\text{Mg}(\text{OH})_2$ b) PCl_5 c) ZnCl_2
 (iii) a) replacement b) decomposition c) combination d) replacement
 (iv) a) $2\text{NH}_3 + 2\text{O}_2 \rightarrow \text{N}_2\text{O} + 3\text{H}_2\text{O}$
 b) $2\text{CO} + 2\text{NO} \rightarrow \text{N}_2 + 2\text{CO}_2$
 c) $4\text{Cr} + 3\text{O}_2 \rightarrow 2\text{Cr}_2\text{O}_3$
 d) $2\text{C}_8\text{H}_{18} + 25\text{O}_2 \rightarrow 16\text{CO}_2 + 18\text{H}_2\text{O}$

- (v) a) $4\text{CH}_3\text{NH}_2 + 9\text{O}_2 \rightarrow 4\text{CO}_2 + 2\text{N}_2 + 10\text{H}_2\text{O}$
 4 moles of CH_3NH_2 react with 9 moles of O_2
 For 4.5 moles of $\text{CH}_3\text{NH}_2 \rightarrow (9/4) \times 4.5 = 10.125$

- b) 4 moles of CH_3NH_2 gives 2 moles of N_2

Molecular weight of CH_3NH_2 = 31 g
 No of moles contain in 31g of CH_3NH_2 = 1 mole
 " " " " 32.2 g of CH_3NH_2 = $32.2 / 31 \text{ mol}$



PQ 1850

4 moles of CH_3NH_2 gives 2 moles of N_2

32.2/31 moles of CH_3NH_2 gives $\rightarrow (2/4) \times (32.2/31) = 0.0355$ moles of N_2

c) 28g of N_2 is 1 mole

No of moles in 0.56 g of $\text{N}_2 = 0.56/28 \text{ mol} = 0.02 \text{ mol}$

2 moles of N_2 required 9 moles of O_2

No of moles of O_2 required to form 0.02 moles of $\text{N}_2 = (9/2) \times 0.02 \text{ mol}$
 $= 0.09 \text{ mol}$

1 mole of O_2 have 6.023×10^{23} molecules

No of molecules in 0.09 moles of O_2
 $= 0.09 \times 6.023 \times 10^{23}$
 $= 0.054 \times 10^{23}$