General Chemistry Lab. 109
Mid-Term Exam

Date: 17/4/2014
Time: 75 min.

Name: ..... Reg. No.: .....

Instructor Name: ..... Section : .....

ANSWER SHEET

1.	a	b	c	d	e	8.	a	b	c	d	e
2.	a	b	c	d	e	9.	a	b	c	d	e
3.	a	b	c	d	e	10.	a	b	c	d	e
4.	a	b	c	d	e	11.	a	b	c	d	e
5.	a	b	c	d	e	12.	a	b	c	d	e
6.	a	b	c	d	e	13.	a	b	c	d	e
7.	a	b	c	d	e	14.	a	b	c	d	e

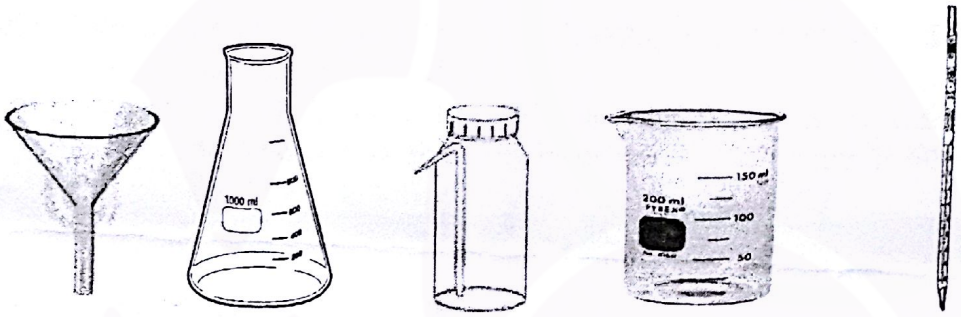
GOOD LUCK

Answer each of the following questions and put "X" on the correct choice on the front page.

1. Which of the following statements is **not correct** concerning lab safety rules?

   a) Chemical waste should be disposed off in an appropriate manner, in special containers found in the fume hoods, and solids should not be thrown into the sink.
   b) In order to avoid chemical loss, unused chemicals should be returned to the stock bottles.
   c) Shared chemicals should not be removed from their original locations.
   d) Long hair should be tied back during lab periods.
   e) Every chemical in the lab should be treated as if it is hazardous.

2. Identify the names of the following labware in the same order they appear from left to right?:



   a) Filter funnel ,beaker, Erlenmeyer flask, pipet, wash bottle
   b) Erlenmeyer flask ,beaker, pipet, filter funnel, wash bottle
   c) Beaker, filter funnel, Erlenmeyer flask , pipet, wash bottle
   d) Filter funnel , Erlenmeyer flask, wash bottle, beaker, pipet
   e) Beaker, Erlenmeyer flask, wash bottle , filter funnel, pipet

3. Given the following set of data for the determination of density of a solid material:

   - Mass of empty beaker = 42.17 g
   - Mass of empty beaker + solid = 68.51 g
   - Initial graduated cylinder reading = 25.0 mL
   - Final graduated cylinder reading = 31.4 mL

   Solid = 26.34 / 6.4

   6.4

   The density (g/mL) of the solid is

   The answer should consider the correct number of significant figures.

   a) 4 b) 4.1156 c) 4.12 d) 4.116 e) 4.1

4. A 0.926 g sample of hydrate was heated to give 0.519 g of anhydrous product .If the molar mass of the anhydrous salt is 161.48 g/mol. Given the molar mass of water is 18.0 g/mol, what is the value of "x"?

a) 12 b) 8 c) 7 d) 6 e) 9

5. Which of the following statements is **correct** in relation to the experiment of the formula of a hydrate?

a) $Na_2SO_4.xH_2O$ is an example of an alum.
b) $KAl(SO_4)_2$ is an example of hydrate.
c) If the salt decomposes giving volatile products, then the calculated value of (x) would be lower than the actual value.
d) If the dehydration of the hydrate is incomplete, the calculated value of (x) will be lower than the actual value.
e) If the mass of the hydrate is 1.166 g and the water removed from it is 0.642 g, then the mass percent of the anhydrous salt in the hydrate is 60%.

6. Given the following set of data for the determination of empirical formula of magnesium oxide:

- Mass of crucible = 16.46 g
- Mass of crucible + Mg = 17.70 g
- Mass of crucible + MgO = 18.45 g

Molar masses in g/mol, for Mg = 24 and for O = 16.
The ratio of moles of Mg to moles of O is:

a) 1 b) 0.91 c) 1.1 d) 1.3 e) 0.88

7. The mass percentage of a metal (M) in a metal oxide (M_xO_y) is 69.9%.Given that the molar masses of metal and oxygen are 55.85 and 16.0 g/mol, respectively, the empirical formula of the metal oxide is

a) M_2O_3 b) M_2O_5 c) M_3O_2 d) M_5O_2 e) M_3O_5

3 $BaCl_2$ ⟶ 1 $Ba_3(PO_4)_2$

3X ⟵ 1.081×10^{-3}

$n = \frac{m}{MW}$ $\frac{0.65}{601}$

8. In an experiment on limiting reactant , a student dissolved a 2.26 g sample of a mixture of $BaCl_2.2H_2O$ (molar mass = 244 g/mol) and $Na_3PO_4.12H_2O$ (molar mass = 380.12 g/mol) in 150. mL water, and the mass of $Ba_3(PO_4)_2$ (molar mass = 601 g/mol) collected was 0.65 g. Knowing that addition of two drops of $BaCl_2$ solution to the filtrate leads to precipitate formation, calculate the mass percent of limiting reactant in the original sample:

The balanced equation is:

Limiting

$$3\,BaCl_2 + 2\,Na_3PO_4 \rightarrow Ba_3(PO_4)_2 + 6\,NaCl$$

a) 22% b) 36% c) 16% d) 28% e) 50. %

n $BaCl_2 = 3.24 \times 10^{-3}$

Mass = 0.79

9. Concerning the limiting reactant experiment, if the precipitate was not completely dried, which of the following statements is **correct**?

↑ % = $\frac{\text{mass}}{\text{mass of mixture}}$ ↑

a) The mass percent of the limiting reactant will be higher than the actual value.
b) The mass percent of the excess reactant will not be affected.
c) The mass percent of the excess reactant will be higher than the actual value.
d) The mass percent of the limiting reactant will be lower than the actual value.
e) The mass percent of both reactant will be lower than the actual value.

C

10. In an experiment to standardize sodium hydroxide solution, 1.14 g of KHP (molar mass 204.22 g/mol) were dissolved in 50 mL of water . The solution was titrated to the end point with 15.5 mL of NaOH solution.What is the molarity of sodium hydroxide solution?

NaOH

KHP = NaOH = 5.58×10^{-3} $M = \frac{n}{V}$

a) 0.123 M b) 0.540 M c) 0.171 M d) 0.360 M e) 0.481 M

11. A volume of 22.20 mL of 0.120 M NaOH aqueous solution was required to neutralize 10.0 mL of vinegar solution , calculate the mass % of acetic acid (molar mass = 60.0 g/mol) in vinegar solution, assuming the density of vinegar solution is 1.05 g/mL.

a) 6.09% b) 3.17% c) 3.50% d) 4.57% e) 1.52%

$\% = \frac{M_1 \cdot M_2}{10\,d}$

$M = \frac{n}{V} \Rightarrow 0.120 = \frac{n}{0.0222} = 2.66 \times 10^{-3}$

$M = \frac{2.6}{4} = 0.2604$

12. Which of the following statements is **not correct**?

a) In the titration of vinegar solution; if the buret which was used for NaOH solution contains water, then the calculated molarity of acetic acid in vinegar solution would increase.

b) During the titration of vinegar solution; rinsing the inner walls of the titration flask with distilled water, will decrease the calculated molarity of acetic acid in vinegar solution.

c) KHP ($KHC_8H_4O_4$) is a primary standard substance.

d) Standard NaOH solution can not be prepared by weighing the required amount of NaOH accurately into a measured volume of distilled water.

e) The volume of water used to dissolve KHP in your experiment does not have to be measured carefully.

M=0.1 V=33 NaOH M=0.15 V=50 HCl

13. A 0.17 g antacid tablet was dissolved in 50.0 mL of 0.150 M HCl solution. The excess acid was titrated to the end point with 33.00 mL of 0.100 M NaOH solution. Calculate the neutralizing capacity of the antacid tablet in mol HCl/g antacid tablet.

a) 2.5×10^{-2} b) 1.1×10^{-2} c) 7.4×10^{-3} d) 5.5×10^{-2} e) 8.8×10^{-3}

$M = \frac{n}{V}$

$M = \frac{\frac{mass}{mw}}{V}$

$MV = \frac{mass}{mw}$

$M_1V_1 = M_2V_2$

$n = MV = \frac{mass}{mw}$

HCl = 7.5×10^{-3}

NaOH = 3.3×10^{-3}

HCl = 4.2×10^{-3}

14. Given:
The antacid capacity of a substance is 0.0230 mol HCl/g antacid tablet.
The stomach acid is 0.100 M HCl.
Calculate the volume of stomach acid that can be neutralized by 0.92 g antacid tablet.

a) 480 mL b) 320 mL c) 100. mL d) 420 mL e) 210 mL

0.230 ⟶ 1g $M = \frac{n}{V}$

x ⟶ 0.92 $\frac{n}{M}$

Y = $M = \frac{n}{V}$