

Resolving the sample and ... where

1A

Mu'tah University  
General Chemistry Laboratory (105)  
Midterm Exam

20  
98

Student Name .....  
T. A: .....  
Day & Time of your Lab: ... 10:00 - 12:30  
Date: 30/11/2023

Part I. Read the following questions and answers as True or False (Mark: 1.5)

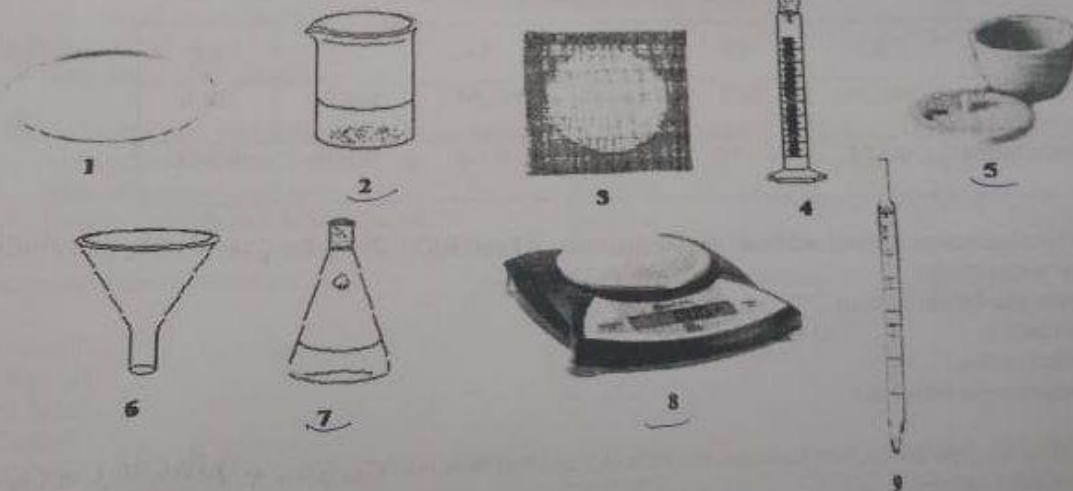
True	1. A dirty crucible can be cleaned with 6M HNO <sub>3</sub> .
True	2. The hottest part of the flame is the top of the inner cone.
False	3. The formula of the anhydrous salt of magnesium chloride is MgSO <sub>4</sub> ·7H <sub>2</sub> O

Part II. This part consists of 16 multiple choice questions. (Mark: total 23.5)

Circle the best answer of the following: -

Based on the figure below, answer questions 1 - 3 that follow:

(Mark: 1 each, total 3)



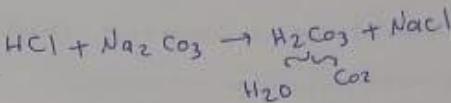
1. The correct names of equipment's number 2, 5, 7, and 8 respectively (حسب الترتيب) are:  
 A) Beaker, crucible with lid, Erlenmeyer flask, and top-loading balance  
 B) Beaker, crucible with lid, volumetric flask, and top-loading balance  
 C) Beaker, Erlenmeyer flask, crucible with lid, and top-loading balance  
 D) Erlenmeyer flask, Beaker, crucible with lid, and top-loading balance

2. Which of the above equipments is used in the separation of a precipitate from a solution?  
 A) 1      B) 2      C) 3      D) 6      E) 9

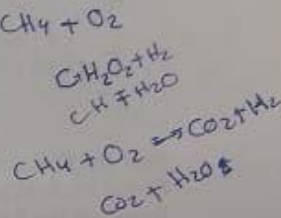
3. Which of the following equipments is used to measure the most accurate volume of solution?  
 A) 1      B) 2      C) 4      D) 7      E) 9

4. What is the purpose of using wire gauze equipment in the laboratory?
- to collect a precipitate
  - to run a chemical reaction
  - to measure volume of solution
  - to separate a precipitate from a solution
  - to distribute the heat over the surface of container

5. Which one of the following reactions generates  $\text{CO}_2$  gas?
- $\text{H}_2\text{SO}_4$  and  $\text{Na}_2\text{SO}_3$
  - $\text{H}_2\text{SO}_4$  and  $\text{NH}_4\text{Cl}$
  - $\text{HCl}$  and  $\text{Na}_2\text{CO}_3$
  - $\text{Na}_2\text{CO}_3$  and  $\text{NaHCO}_3$
  - $\text{HCl}$  and  $\text{Na}_2\text{SO}_4$



6. When methane gas is burned on a Bunsen burner with enough oxygen, the result will be:
- hot nonluminous yellow flame and  $\text{CO}_2$  gas.
  - hot nonluminous blue flame and  $\text{CO}_2$  gas +  $\text{H}_2\text{O}_{(g)}$ .
  - hot luminous blue flame and  $\text{CO}_2$  gas +  $\text{H}_2\text{O}_{(g)}$ .
  - luminous yellow flame and  $\text{CO}_2$  and  $\text{CO}$  gases +  $\text{H}_2\text{O}_{(g)}$ .
  - nothing happens



Consider the following Table and answer questions 7 - 9 below it.

Test tube No.	A1	A2	A3	A4	A5	A6
Chemical substance	$\text{Na}_2\text{CO}_3$	$\text{HCl}$	$\text{CuSO}_4$	$\text{NH}_4\text{NO}_3$	$\text{NaOH}$	$\text{NiCl}_2$
Information	0.1 M	0.1M	0.1 M	0.1 g	0.1 M	0.1 M

7. What observation is obtained from mixing test tubes A1 and A6?  $\text{Na}_2\text{CO}_3 + \text{NiCl}_2 \rightarrow \text{NaCl} + \text{Ni}_2\text{CO}_3$
- gas without odor
  - green precipitate formed
  - no reaction
  - a heat evolved
  - ammonia gas with odor
8. What is the type of reaction between test tube A3 and test tube A4?  $\text{CuSO}_4 + \text{NH}_4\text{NO}_3 \rightarrow \text{Cu}(\text{NO}_3)_2 + (\text{NH}_4)_2\text{SO}_4$
- oxidation-reduction
  - precipitation reaction
  - double - displacement reaction
  - acid - base reaction
  - simple displacement
9. What observation is obtained from mixing test tubes A4 and A5?  $\text{NH}_4\text{NO}_3 + \text{NaOH} \rightarrow \text{NH}_4\text{OH} + \text{NaNO}_3$
- gas without odor
  - no reaction
  - white precipitate formed
  - ammonia gas with odor
  - a heat evolved
- $\text{NH}_3 \quad \text{H}_2\text{O}$

10. An example of an intensive property is:

- A) Density  
 B) Color  
 D) Volume  
 E) A and B are correct  
 C) Mass

11. The density of solid (X) is  $3.50 \frac{g}{mL}$  and that of solid (Y) is  $1.65 \frac{g}{mL}$ . If equal masses of both solids are transferred to two separate graduated cylinders, each containing  $10 mL$  of water.

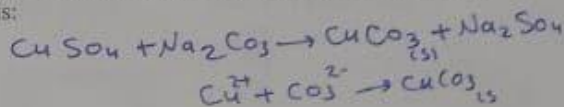
- Which of the following is the correct answer?  
 A) the volume of water remains unchanged.  
 B) solid (X) will displace larger volume of water than solid (Y) does.  
 C) solid (X) will displace the same volume of water as solid (Y) does. ✗  
 D) solid (Y) will displace larger volume of water than solid (X) does.

12. For the "Limiting reactant" experiment, heating the solution mixture to near boiling and then cooling is called

- A) supernatant  
 B) precipitation  
 C) filtrate ✗  
 D) digestion  
 E) collection ✗

13. For the metathesis reaction between copper(II) sulfate ( $CuSO_{4(aq)}$ ) and sodium carbonate ( $Na_2CO_{3(aq)}$ ), the net ionic equation for the reaction is:

- A)  $Cu^{2+}_{(aq)} + CO_3^{2-}_{(aq)} \rightarrow CuCO_{3(s)}$   
 B)  $2Na^+_{(aq)} + SO_4^{2-}_{(aq)} \rightarrow Na_2SO_{4(aq)}$   
 C)  $2Cu^{2+}_{(aq)} + CO_3^{2-}_{(aq)} \rightarrow Cu_2CO_{3(s)}$   
 D)  $2Na^+_{(aq)} + SO_4^{2-}_{(aq)} \rightarrow Na_2SO_{4(s)}$



14. The following data were collected from the analysis of a hydrated salt ( $MX \cdot nH_2O$ ): (Mark: 2)

Mass of crucible plus hydrated salt:	17.175 g	$m_{hydrated} = 0.689$
Mass of Empty Crucible:	16.486 g	
Mass of crucible and anhydrous salt:	16.928 g	$m_{anh.} = 0.442$

(MM of  $H_2O = 18.02$ ;  $MX = 96.74$  g/mole)

The formula of the hydrated salt is:

- A)  $MX \cdot 6H_2O$   
 B)  $MX \cdot 3H_2O$   
 C)  $MX \cdot 5H_2O$   
 D)  $MX \cdot H_2O$   
 E)  $MX \cdot 4H_2O$

Show your calculations.

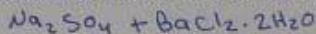
$$n = \frac{m_{mol H_2O}}{m_{mol Salt}} = 3.00003$$

$$n_{H_2O} = \frac{m}{Mr} = \frac{0.247}{18.02} = 0.0137069 \dots$$

$$n_{subtracted} = \frac{0.442}{96.74} = 4.579$$

\*Questions 15 – 16 are based on the following paragraph.

A student weighs 1.650 g mixture containing  $\text{Na}_2\text{SO}_4$  and  $\text{BaCl}_2 \cdot 2\text{H}_2\text{O}$ . After dissolving the sample and stirring, the mixture was heated to near boiling for 15.0 minutes. After cooling, the mixture was filtrated where  $\text{BaSO}_4$  was separated and weighed, the weight of  $\text{BaSO}_4$  was 0.825 g. The obtained filtrate was divided into two parts, to the first part drops of  $\text{Na}_2\text{SO}_4$  were added and nothing was observed. To the second part drops of  $\text{BaCl}_2$  were added and a cloudy solution was obtained. Molar masses:  $\text{Na}_2\text{SO}_4 = 142.04$ ;  $\text{BaCl}_2 \cdot 2\text{H}_2\text{O} = 244.26$ ; and  $\text{BaSO}_4 = 233.40$  g/mole.



15. The limiting reactant was

- A)  $\text{BaSO}_4$   
 B)  $\text{Na}_2\text{SO}_4$   
 C)  $\text{BaCl}_2$   
 D)  $\text{H}_2\text{O}$   
 E) None of these

16. The percentage of  $\text{Na}_2\text{SO}_4$  in the original salt mixture is: *Show your calculations.* (Mark: 2)

- A) 47.7%  
 B) 30.4%  
 C) 34.5%  
 D) 52.3%  
 E) 69.6%

$$\frac{m_{\text{Na}_2\text{SO}_4}}{1.65} \times 100 = \frac{0.825}{1.65} \times 100$$

Name: -

Transfer your answers into the following Table:

Question#	1	2	3	4	5	6	7	8
Answer	C	A	C	E	E	B	B	E

Question#	9	10	11	12	13	14	15	16
Answer	D	B	D	D	A	B	C	D

End of Exam