###For the "**Limiting reactant**" experiment. A 1.12 g mixture containing Na_2SO_4 (s) and $BaCl_2.2\,H_2O_{(s)}$ was dissolved in water, and then heated to near boiling for 15.0 minutes. After cooling, the mixture was filtrated off and 0.113 g of $BaSO_4$ obtained as precipitate. The obtained filtrate was divided into two parts, to the first part drops of 0.50 M $Na_2SO_{4(aq)}$ were added and nothing was observed. To the second part, drops of 0.50 M $BaCl_{2(aq)}$ were added and a cloudy solution was obtained. Given the molar masses (MM) for reactants and products are summarized in the table

Compound	Molar mass (g/mol)
Na_2SO_4	142.043
$BaCl_2.2\,H_2O$	244.263
$BaSO_4$	233.391

Answer questions 8, 9 and 10

8. In this experiment, which lab equipment was used to perform the digestion step?

(a) Evaporating dish (b) Direct Bunsen burner
(c) Crucible (d) Beaker, glass rod, watch glass

9. The limiting reactant was

(a) $BaSO_4$ (b) Na_2SO_4 (c) $BaCl_2$
(d) H_2O (e) NaCl

10. The percentage of $BaCl_2$ in the original salt mixture is

(a) 6.10 % (b) 12.20 % (c) 93.90 %
(d) 35.00% (e) 65.00%

11. A properly adjusted Bunsen burner flame has .....distinct cone(s).

(a) One (b) Two (c) Three
(d) Four (e) Zero

12. The mass of a beaker was 5.944 g. After 5.00 mL of an alcohol was pipetted into the beaker, the combined mass was 9.891 g. Determine the density of the alcohol?

(a) 0.789 g (b) 1.188 g/mL (c) 1.188 g
(d) 0.789 g/mL (e) can't be calculated

13. Which of the following is considered an evidence for a chemical reaction

(a) Gas (b) Water of hydration (c) Digestion
(d) Excess reactant (e) None of these

14. Which of the following reactions would give a precipitate?

(a) $HCl + K_2CO_3 \rightarrow$ (b) $BaCl_2 + H_2SO_4 \rightarrow$ (c) $HNO_3 + NaOH$
(d) $AgNO_3 + Na_2CO_3$ (e) b and d are correct

15. One of the following reactions generates CO_2 gas:

(a) $NH_4Cl + H_2SO_4$ (b) $H_2SO_4 + Na_2CO_3$ (c) $NaCl + Na_2CO_3$
(d) $Na_2CO_3 + NaHCO_3$ (e) b and c are correct

Answers

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
D	A	C	E	B	A	C	D	B	E	C	D	A	E	B

End of Exam

Mass mixture → 1.12 g
Mass of $BaSO_4$ → 0.113 g
Limiting
$BaCl_2$ → 0.50 M
Na_2SO_4 → 0.50 M
Limiting
moles = mass / Molar Mass

Mass beaker = 5.944 g
Volume alchol = 5.00 mL
mass of combined = 9.89
density = mass / Volume
$\frac{9.891 - 5.944}{5.00}$ =

Mass water = Mass hydrate + C − Mass hydrous + C = 17.3670 −

Moles H_2O = Mass / Molar Mass = $\frac{0.1431}{(2\times1)+(16)}$ = 7.95×10^{-3} Mole H_2O

17.2239 (= 0.14319 H_2O)

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

Fall 2017/2018 Date: 16/110/2017

Student Name:-
Day & Time of your Lab:
T.A:

Circle the best correct answer

1. Which of the following is NOT a laboratory safety rule?
   (a) You should never mix acids with bases
   (b) You should tie back your long hair
   (c) You should never add water to acid
   (d) All of the above are valid safety rules

2. Which of the following statements does **not** describe a **physical** property of chlorine?
   (a) Chlorine combines with sodium to form table salt.
   (b) The color of chlorine gas is green.
   (c) The density of chlorine gas at standard temperature and pressure is 3.17 g/L.
   (d) The freezing point of chlorine is –101 °C.

3. Which of the following is a **chemical** property of water?
   (a) its density is 1.000 g/cm3 at 4 °C
   (b) it causes light rays to bend
   (c) it forms bubbles when calcium is added
   (d) its melting point is 0 °C

4. What piece of laboratory equipment is best-suited for accurately measuring the volume of a liquid?
   (a) Crucible (b) Test tube (c) Erlenmeyer flask
   (d) Beaker (e) Graduated cylinder

For the "**Formula of a hydrate**" experiment, a student obtained the following data

Mass of crucible plus sample, g	17.3670
Mass of Empty Crucible, g	16.3805
Mass of hydrate sample, g	0.9865
Mass of crucible and sample after heating and cooling, g	17.2239

If the molar mass of the anhydrous salt is 208.23 g/mol, **answer questions 5, 6 & 7**

5. In this experiment, which lab equipment was used to heat the hydrated salt?
   (a) Beaker (b) Crucible (c) Evaporating dish
   (d) Direct Bunsen burner (e) Test tube

6. Mass percent (mass %) of water in the sample
   (a) 14.51 (b) 15.10 (c) 13.23
   (d) 35.12 (e) None of these

7. Average number of moles of water per mole of hydrate (n), mol
   (a) 5 (b) 4 (c) 2
   (d) 3 (e) 1