1) Co_3^{2-}
2) OH^-
3) HCO^-
4) **All of above**

Which of the following is NOT laboratory safety rule?

(a) You should never mix acids with bases

(b) you should never add water to acid

(c) you should tie back your long hair

(d) All ot the above are valid safety rules

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 zero C

What piece of laboratory equipment is best-suited for accurately measuring the volume of a liquid?

(a) Crucible

(b) test tube

(d) Beaker

(c) Erlenmeyer fask

(d) Graduated cylinder

What is the purpose of using wire gauze equipment in the laboratory?

A) To measure volume of solution

B) To run a chemical reaction

C) To distribute the heat over the surface of container

D) To collect a precipitate

E) To separate a precipitate from a solution

When two aqueous solutions of Na_2CO_3 and HCl are mixed together, the observation of occurrence of a reaction is:

A) evolution of a gas without odor
B) evolution of a gas with odor
C) formation of a white precipitate
D) Nothing changed.

Which of the following events is not a common sign that a chemical change has taken place?

A) production of heat or light
B) bubbling
C) Formation of a precipitate.
D) change in the state (phase) of matter
E) Change in color or odor.

What instruments do we use to measure accurate density of a liquid?

A) Top loading balance and thermometer
B) Top loading balance and stopwatch
C) Graduated cylinder, top loading balance and thermometer
D) Graduated cylinder and thermometer
E) **Pipet, top loading balance and thermometer**

The density of a diamond is 3.51 g/cm3, and the density of platinum is 21.43 g/cm3. If equal masses of diamond and platinum are transferred to equal volumes of water in separated graduated cylinders, which graduated cylinder would have the greatest volume change?

A) The platinum because it has the lower density.
B) The diamond because it has the lower density.
C) All of the above answers are correct
D) All of the above answers are incorrect

An example of a chemical property is chemical property

A) Solubility
B) Mass

C) Density
D) Boiling
E) None of these

What is the purpose of using wire gauze equipment in the laboratory?

A) to separate a precipitate from a solution
B) to run a chemical reaction
C) to measure volume of solution
D) to distribute the heat over the surface of the container
E) to collect a precipitate

Which of the following observations is correct when methane burns in Bunsen burner with sufficient oxygen?

A) Hot, luminous blue flame and $CO_2 + H_2O$
B) Hot, nonluminous blue fame and $CO_2 + H_2O$
C) Luminous low flame and $C(s) + CO(g) + CO_2(g) + H_2O$
D) Hot luminous yellow flame and CO_2

When sodium hydroxide solution was added to a solution of one of the following chemicals, a gas with pungent odor was evolved. This gas turned a moisture litmus paper <u>blue</u>. The chemical was

A) $BaCl_2$
B) Na_2CO_3
C) NH_4Cl
D) $NaCl$
E) $ZnSO_4$

In an experiment on limiting reactant, a student dissolved a 1.30 g sample of a mixture of $BaCl_2$ $2H_2O$ (molar mass = 244 g/mol) and $Na_3PO_4.12H_2O$ (molar mass = 380 g/mol) in 200 mL water, and the mass of $Ba_3(PO_4)_2$ (molar mass = 601 g/mol) collected was = 0.50 g Knowing that addition of two drops of $BaCl_2$ solution to the filtrate lead to precipitate formation, calculate the mass percent of $BaCl_2$ $2H_2O$ in the original sample:

$3\ BaCl_2.2H_2O + 2\ Na_3PO_4.12H_2O \rightarrow Ba_3(PO_4)_2 + 6NaCl + 14H_2O$
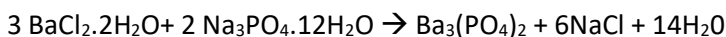
A) 19%
B) 41%
C) 50%
D) 53%
E) 61%

A balance has a precision of ± 0.01 g. A sample weighs about 3 g on this balance. How many significant figures should be reported for this measurement?

A) 3000 g/ 4 significant figures

B) 3 g/ 1 significant figures

C) 3.0 g/ 2 significant figures

D) 300 g/ 3 significant figures

If the percentage yields of a chemical reaction is equal to 100%, then

A) The actual yield is less than the theoretical yield
B) The actual yield is equal to the theoretical yield
C) The actual yield is greater than the theoretical yield
D) There was no limiting reactant

Which of the following statements false?

A) To prevent eye injury in a laboratory, always wear safety glasses.
B) Do not blow out the solution remaining in the pipette tip after delivery.
C) Never touch, taste, or smell a chemical unless told to do so
D) Excess chemicals could be returned to the reagent bottle.
E) Lab coat must be worn all the times in the laboratory.

A student obtained the following set of data on density measurements of a solid: Mass of empty beaker = 84.35 g

Mass of beaker + metal pieces = 98.25 g

Initial water level in the graduated cylinder = 55.0 mL

Final water level in the graduated cylinder with the metal pieces = 57.3 mL. The density (g/cm3) of the solid with proper significant figures is:

A) 6.043

B) 6.04

C) 6.0

D) 6.0435

Wash bottles should be filled 'only' with

A) Tap water.
B) Distilled alcohol
C) Washing or cleansing solution
D) Distilled or demonized water
E) None of these answers

When does a reaction stop?

A) When all the excess reactant is consumed
B) When all the limiting reactant is consumed
C) When all the excess reactant is consumed
D) When it wants to

Consider the following properties which can be used to identify an unknown compound: 1) boiling point 2) solubility 3) density 4) formation of a precipitate

All these properties are

A) chemical except (1) and (4)
B) chemical except (4)
C) physical except (4)
D) physical except (1)
E) physical except (2) and (3)

Which of the following is NOT laboratory safety rule?

A) You should never mix acids with bases

B) you should never add water to acid

C) you should tie back your long hair

D) All ot the above are valid safety rules

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 zero C

What piece of laboratory equipment is best-suited for accurately measuring the volume of a liquid?

A) Crucible

B) test tube

C) Beaker

D) Erlenmeyer fask

E) Graduated cylinder

Which one of the following is the correct way to heat a liquid
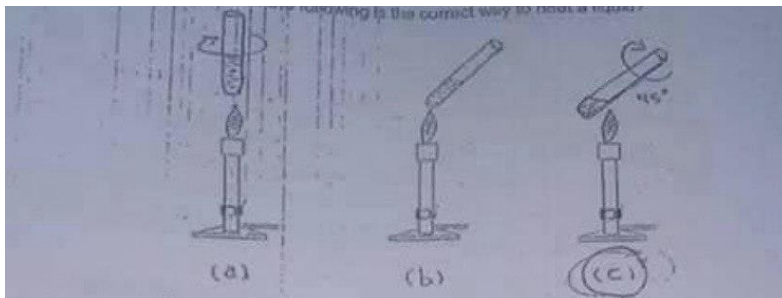
The observations obtained from a mixture of sodium hydroxide and hydrochloric acid is:

A) Color change

B) ppt. formed

C) No reaction

D) Increasing in temperature

E) Gas evolved

A cube of metal is 1.56 centimeters on an edge. Its mass is 16.3 grams. What is its density?

A) 4.68 g/cm^3

B) 4.30 g/cm^3

C) 5.69 g/cm^3

D) 6.14 g/cm^3

E) 4.86 g/cm^3

15.0 ml. of alcohol are pipette into a beaker of mass of 17.832 g. The combined mass of alcohol and the beaker was 29.674 g. What is the density of alcohol?

A) 1.188 g/ml.

D) 0.837 g/ml.

C) 0.789 g/ml.

 E) 0.474 g/ml

C) 0.991 g/ml.
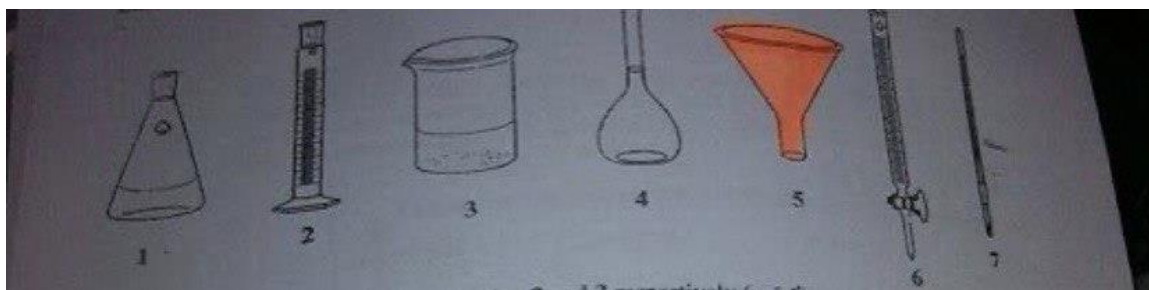
1. The correct names of equipments number 2 and 3 respectively () are;

A) Pipet and Beaker.

B) Erlenmeyer Flask and Beaker.

C) Beaker and Funnel.

 D) Graduated Cylinder and Beaker.

2. Which of the above equipments is used to separate a precipitate from a solution?

A) 2

B) 7

C) 5

D) 1

3. What is the name of equipment number 6?

A) Buret

B) Pipet

C) Volumetric flask 4

D) Thermometer

4. Which of the above equipments is the best use to measured volume of solution?

It's 6

mL of 0.145 M HCl is added to an antacid sample. The Solutiors is heated for about 1 min. Then the indicator was added to the solution and titrated to the end point using,24.9 ml. of (0.12 M NaOH). Answur these questions :

A. What is the purpose of heating: ………………………………………………………………

B. The type of titration is called………………………………………………………………..

C. The name of indicator is …………………………………..... colored in base …………………………..

Q1: 0.246g of a condensod vapor of an unkaown volatile liquid was collected in a 150 ml fask at 60°Cand a pressure of 740 torr. Assaming ideal behavior,R: 0.082 L.atm/mol.K, Calculate:

1. The number of moles of the volatile liquids

2. The molar mass of volatile liquid

Q2: For the molecular weigat of the volatile liquid experiment a student obtained the following data

Mass of flask and foil cap and unknown = 83.35 g

Mass of flask and foil cap = 82.65 g

Water path temperature = 95 C°.

Barometric pressure, at atm = 1.01 atm.

Volume of the flask, ml = 270 ml

Calculate the molar mass of the volatile liquid.

| Compound	Chemical formula	Chemical Reaction
Aluminum hydroxide	$Al(OH)_3$	$Al(OH)_{3\ (s)} + 3\ HCl_{(aq)} \rightarrow$ $AlCl_{3(aq)} + 3\ (H_2O)_{(l)}$
Calcium carbonate	$CaCO_3$	$CaCO_{3\ (s)} + 2\ HCl_{(aq)} \rightarrow$ $CaCl_{2\ (aq)} + H_2O_{(l)} + CO_{2\ (g)}$
Magnesium carbonate	$MgCO_3$	$MgCO_{3\ (s)} + 2\ HCl_{(aq)} \rightarrow$ $MgCl_{2\ (aq)} + H_2O_{(l)} + CO_{2\ (g)}$
Magnesium hydroxide	$Mg(OH)_2$	$Mg(OH)_{2\ (s)} + 2\ HCl_{(aq)} \rightarrow$ $MgCl_{2\ (aq)} + 2\ H_2O_{(l)}$
Sodium bicarbonate	$NaHCO_3$	$NaHCO_{3(aq)} + HCl_{(aq)} \rightarrow$ $NaCl_{(aq)} + H_2O_{(l)} + CO_{2\ (g)}$

A student titrated a 25.00 mL sample of vinegar containing acetic acid, $HC_2H_3O_2$, with a 0.9980M NaOH solution. It required 22.78 mL of the base to reach the equivalence point. Based on this information determine the following.

- What is the morality of the OH⁻ ? How many moles of OH⁻ are used to reach the equivalence point?
- How many moles of H+ are present at the equivalence point?
- What is the morality of the H⁺ (MH^+)?
- What is the morality of the acetic acid (M_{acid})? What is the % by mass of acetic acid in vinegar?

An antacid tablet was dissolved in water and 10mL of 0.20 M HCI was added from buret and color of antacid solution changed to yellow. After the acid had reacted with the tablet it required 20 mL of 0.05 M NaOH to neutralize the excess HCI. How many moles of HCI did the antacid neutralize?

An antacid tablet containing magnesium hydroxide instead of calcium carbonate was dissolved in 100.0 mL of 0.2893 M HCl. 10.00 mL of this solution was titrated to endpoint with 25.20 mL of 0.1007 M NaOH. How much magnesium hydroxide was in the antacid tablet (in mg)? Assume 100% of the tablet was dissolved in the acid.

solution of 3.84 g mixture of solid salt RaCt, 2H,O and AgNO, produces 1.148 g of AgCl is a precipitate. It is experimentally found that the supernatant solution contains Ag ions. (MM of $AgNO_3$ =169.9/$BaCl_2$.$2H_2O$=2442/AgCl = 1434 and $Ba(NO_3)_2$=261.3 g/mol).

$BaCl_2$. $2H_2O$+ $2AgNO_3$→ $2AgCl$ + $Ba(NO_3)_2$
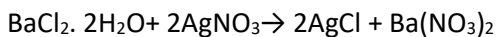
Answer the following three questions:

1) What is the limiting reactant?

2) What is the mass of the limiting reactant?

3) What is the percent composition of $AgNO_3$, in the salt mixture?

---

solution of a 0.960 g mixture of solid salt Na_2SO_4 and $BaCl_2H_2O$ produces 1.203 x 10^{-3} moles of $BaSO_4$ as a precipitate. It is experimentally found that the supernatant solution contains SO_4^{2-}ions. (MM of Na_2SO_4 = 142.0; $BaCl_2$.$2H_2O$= 244.3 g/mol). Accordingly, answer questions:

1) What is the limiting reactant?

2) The number of moles and the mass of the limiting reactant are:

---

elements are arranged according to decreasing their reactivity from left to right, (Mg, Zn, Pb,H, and Cu), complete the following equations:

a) Cu(s) + HCl(aq) →

b) Fe(s) + $MgSO_4$(aq) →

c) Mg(s) + $ZnSO_4$(aq) →

d) Zn(s) + HCl(aq) →

True and false

Most laboratory balances in the general chemistry laboratory can measure the mass o a substance to less than 0.01 g. **True**

Use a spatula to transfer chemicals from a reagent bottle. **False**

The hottest part of the flame is the top of the inner cone. **True**

To avoid waste in the use of chemicals, always return the unused portions directly to the bottle **False**

If your skin is burned by a flame, immediately treat the affected area by covering it with a medical cream. **True**

pipette should be rinsed several times with the liquid or solution before it is final filled.   **True**

Analytical balance is more sensitive than top loading balance **True**

Erlenmeyer flask is not suitable glassware to measure exact volume. **True**

Cool flame is an adjusted Bunsen burner having a full supply fuel and limited air. **False**

Addition of sodium hydroxide solution to an ammonium chloride solution gave ammonia gas. **True**

The boiling point of flammable liquids can be measured by using Bunsen burner as source of heat. **True**

Adjusted Bunsen burner has two cones, in which the top of the inner corn is the hottest part. **False**

The best way to smell a chemical compounds is by point the test tube away from face while gently fanning vapors toward nose. **True**

Don't blow out the solution remaining in the pipette tip after solution has drain from the pipette. **True**

Working alone in the laboratory is not permitted in any circumstances. **True**

Complete with the correct word(s), phrase, or value(s).

Ask your instructor to identify the questions you are to complete.

1. Technique 1. To insert glass tubing through a rubber stopper, first moisten the glass with __water__ or __glycerol__

2. Technique 2. Glassware should first be washed with ~~Millipore~~ Tap water and a detergent solution followed by final rinses with __deionized__ water.

3. Technique 2. Glassware is clean when __no water droplets adhere to the clean__ surfaces / tubes

4. Technique 4. Information on the properties and disposal of chemicals can be found in the stockroom or online from the __MSDS__ collection. (material safety data sheet)

5. Technique 5. Most solutions used for quantitative work are prepared in flasks called __volumetric__ flasks.

6. Technique 6. The mass of a sample measured on a balance without regard to its container is called its __tared__ mass.

7. Technique 6. After completing a mass measurement, the mass settings are to be set to __zero position__

8. Technique 7. A well of a 24-well plate has the same approximate volume that is slightly larger than a __75__ mm test tube.

9. Technique 8. To collect a water-soluble gas __less__ dense than air, the mouth of the gas-collecting flask should be pointed downward.

10. Technique 9. Do not use a __spatula__ to transfer a solid from its reagent bottle.

11. Technique 10. Transfer liquids or solutions from the reagent bottle to a beaker with the aid of a __stirring rod__.

12. Technique 11c. The bowl of the funnel should be less than __two third__ full when gravity filtering a mixture.

13. Technique 11f. A centrifuge should be balanced with _____ numbers of test tubes containing _____ volumes of solution.

14. Technique 12. If a noxious or nauseating gas is evolved from a reaction mixture, it is good advice to perform the reaction __fume hoods__ or __improvised hoods__

15. Technique 13a. A nonluminous flame with a reduced supply of fuel is called a _____. Such a flame is most critical when heating liquids and solutions contained in a __test tube__.

16. Technique 13c. A nonflammable liquid in a flask or beaker that is greater than one-fourth full, can be heated using the laboratory setup shown in Figure _____.

17. Technique 13d. Solutions in test tubes can be maintained at a constant "higher" temperature with the use of a _____

18. Technique 15a,b. Solids are commonly heated to dryness in a drying oven and then cooled (ideally) in a __disiccator__

19. Technique 16a. The volume of a liquid should be read at the __bottom__ of the meniscus.

20. Technique 16b. The volume of a liquid in a pipet should be controlled with the __index__ finger.

21. Technique 16c. A buret should be rinsed with several 3- to 5-mL portions of _____ before being filled.

Four test tubes, numbered as 1, 2, 3 and 4. Each contains one of the aqueous solutions H_2SO_4, Na_2SO_4, $BaCl_2$, and Na_2CO_3). The observations appeared in the table below are noticed. Accordingly, answer questions below?

Test tube Numbers	Observation
1 + 2	White precipitate cloudy
2 + ③	Gas evolution
③ + ④	Nothing
1 + ④	White precipitate cloudy Litmus paper turns red
2	

1) Test tube number (1) contains:

A) Na_2SO_4

B) Na_2CO_3

C) BaCl₂

D) H_2SO_4

2) Test tube number (4) contains:

A) Na_2CO_3

B) Na₂SO₄

C) $BaCl_2$

D) H_2SO_4

3) Test tube number (3) contains:

A) $BaCl_2$

B) Na_2SO_4

C) H_2SO_4

D) Na₂CO₃

4) Which one of the following reactions generates CO_2 gas?

A) H₂SO₄ and NaHCO₃

B) HCl and NH₄Cl

C) NaCl and Na₂CO₃

D) Na₂CO₃ and NaHCO₃

E) H₂SO₄ and Na₂SO₄

When methane gas is burned on a Bunsen burner with sufficient amount of oxygen, the result will be:

A) Hot nonluminus yellow flame and CO_2 gas.

B) Hot luminous blue flame and CO_2 gas+ $H_2O(g)$

C) Hot nonluminus blue flame and CO_2 gas+ $H_2O(g)$

D) luminous yellow flame and CO_2 and CO gases + $H_2O(g)$

E) Nothing happens

A (1.12 g) mixture containing Na_2SO_4, and $BaCl_2.2H_2O$ 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, the first part drops of 0.050 M BaCl2 were added and nothing was obtained where the second part, drops of 0.50 M NA2SO4 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
$BaCl_2.2H_2O$	244.263
$BaSO_4$	233.391

1) 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

2) The limiting reactant was:
   (a) $BaSO_4$
   (b) Na_2SO_4
   (c) $BaCl_2$
   (d) H_2O
   (e) NaCl

3) The percentage of $BaCl_2$ in the original salt mixture is
   (a) 6.10%
   (d) 35.00%
   (b) 12.20%
   (c) 65.00%
   (d) 93.90%
   (e) 35.00%

A properly adjusted Bunsen burner flame has ……………………… distinct cone(s)
   (a) One
   (b) Two
   (c) Three
   (d) Four
   (e) Zero

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

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

Which of the following reactions would give a precipitate?

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

One of the following reactions generates CO2 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