

Units 1 – 5

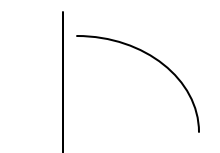
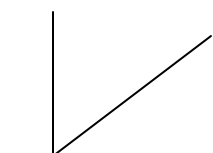
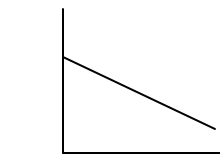
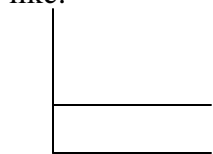
MIDTERM PRACTICE EXAM

1--INTRODUCTION TO CHEMISTRY

1. Which two pieces of equipment are specifically designed to measure the volume of liquids most precisely?

| | |
|------|--------------------|
| i. | Beaker |
| ii. | Erlenmeyer flask |
| iii. | Buret |
| iv. | Graduated Cylinder |

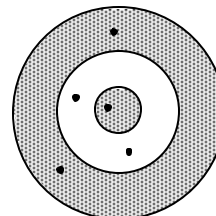
- a) i and iv c) ii and iv
b) iii and iv d) i and ii
2. The “glowing splint test” is a test for
a) O₂ c) H₂
b) CO₂ d) CH₄
3. If we mix hydrogen peroxide and yeast, which gas will be formed?
a) O₂ c) H₂
b) CO₂ d) CH₄
4. The “limewater test” is a test for
a) O₂ c) H₂
b) CO₂ d) CH₄
5. If we graph the mass vs. volume of four objects made of the same material, the graph would look like:



6. During a demonstration using light sticks, one light stick is kept at room temperature for comparison. This is called a(n) _____
a) experimental control.
b) experimental variable.
c) source of error.
d) experimental standard.
7. Why is it dangerous to dilute sulfuric acid by pouring water into the concentrated acid?
a) A fire may be started.
b) The water may decompose.
c) A poisonous gas may be evolved.
d) The heat liberated may cause spattering.

2--MEASUREMENT

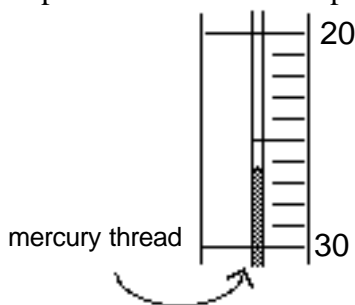
8. Which one of the following statements is true?
a) 1000 cm = 1 m
b) 1 mm = $\frac{1}{100}$ meter
c) 1 kg = 1000 g
d) each of these statements is true
9. The marks on the following target represent someone who is:



- a) accurate, but not precise.
b) precise, but not accurate.
c) both accurate and precise.
d) neither accurate nor precise.

10. The density of copper is known to be 8.96 g/mL. A student's experimental result shows that the density of her copper cube is 8.79 g/mL. The percent error in this data is _____.
- a) 1.93 % c) 1.90 %
b) 0.17 % d) 0.98 %

11. Which measurement below shows the temperature to the correct precision?



- a) 26.3 °C c) 26.25 °C
b) 26 °C d) 26.30 °C
12. Which measurement is the most precise?
- a) $5.6 \pm .1$ g c) $2.3 \pm .2$ g
b) $3.5 \pm .4$ g d) $4.2 \pm .3$ g

3--PROBLEM SOLVING

13. What conversion factor would you use to convert from feet to inches?
- a) $\frac{1 \text{ foot}}{12 \text{ inches}}$ c) $\frac{12 \text{ feet}}{1 \text{ inch}}$
b) $\frac{12 \text{ inches}}{1 \text{ foot}}$ d) $\frac{1 \text{ inch}}{12 \text{ feet}}$
14. What conversion factor would you use to convert milligrams to grams?
- a) $\frac{1000 \text{ mg}}{1 \text{ g}}$ c) $\frac{1 \text{ gram}}{1000 \text{ mg}}$
b) $\frac{1 \text{ mg}^2}{10 \text{ g}^2}$ d) $1 \text{ g} = 1000 \text{ mg}$
15. Which value is the same as 1.52×10^{-3} ?
- a) 0.000152 b) 152,000
c) 1520 d) 0.00152

4--MATTER

16. Which property is always conserved during a chemical reaction?
- a) mass c) pressure
b) volume d) solubility
17. A cube of metal measures 2 cm on each side. It's mass is 90.4 grams. What kind of metal is the cube made of?
- a) Fe (7.86 g/mL) c) Au (19.3 g/mL)
b) Al (2.70 g/mL) d) Pb (11.3 g/mL)
18. Which process is a chemical change?
- a) The melting of ice.
b) The burning of a candle.
c) The magnetizing of steel.
d) The liquifaction of oxygen.
19. Which set consists only of elements?
- a) Na, Ca, H₂
b) H₃O⁺, Cl⁻, I₃⁻
c) NaCl, CH₄, Br₂
d) H₂S, CuCl₂, KI
20. The second most abundant gas in the atmosphere is
- a) CO₂ c) N₂
b) Ar d) O₂

7--CHEMICAL FORMULAS

21. Which one of the following is the correct formula for calcium phosphate?
- a) CaPO₄ c) Ca₃(PO₄)₂
b) PO₄Ca₃ d) Ca₂(PO₄)₃
22. What is the name of the compound N₂O₃?
- a) nitrate
b) dinitrogen trioxide
c) nitrogen oxide
d) dinitrogen trioxygen

23. In the compound $\text{Sn}(\text{SO}_4)_2$, what is the name of the positive ion?
- a) strontium c) stannic
b) tin(II) d) stannous

24. The acid, H_2CO_3 , is called
- a) hydrocarbonic acid
b) carbonic acid
c) dihydrogen carbonate
d) hydrogen carbonate

8--THE MATH OF CHEMICAL FORMULAS

25. What is the volume of 0.500 mole of carbon dioxide gas, CO_2 , measured at STP?
- a) 5.60 liters c) 33.6 liters
b) 11.2 liters d) 44.8 liters
26. How many moles of hydrogen cyanide, HCN , are contained in 9.00 grams of HCN ? (molar mass = 27.03 g/mol)
- a) 0.900 c) 1.00
b) 0.333 d) 9.00
27. How many molecules are in 2.00×10^{-2} moles of carbon tetrachloride, CCl_4 ? (molar mass = 154 g/mol)
- a) 1.20×10^{22} c) 3.01×10^{23}
b) 1.20×10^{23} d) 6.02×10^{23}
28. What is the percent of carbon in barium carbonate, BaCO_3 ? (molar mass = 197.3 g/mol)
- a) 3.04% c) 14.0%
b) 6.09% d) 20.0%
29. What is the mass of one mole of aluminum sulfate, $\text{Al}_2(\text{SO}_4)_3$?
- a) 630 g c) 273 g
b) 342 g d) 123 g

9--CHEMICAL EQUATIONS

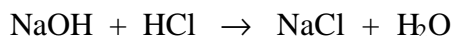
30. Which set of coefficients balances the equation for the complete combustion of ethane, C_2H_6 ?
- $__ \text{C}_2\text{H}_6 + __ \text{O}_2 \rightarrow __ \text{CO}_2 + __ \text{H}_2\text{O}$

- a) 1,3,2,3 c) 2,6,4,5
b) 1,6,2,6 d) 2,7,4,6

31. When this expression is balanced, $2 \text{C}_3\text{H}_6 + __ \text{O}_2 \rightarrow __ \text{CO}_2 + 6 \text{H}_2\text{O}$ what is the coefficient of oxygen, O_2 ?

- a) 6 c) 12
b) 9 d) 18

32. During a "titration lab," an acid was neutralized by the following reaction:



This reaction would be classified as...

- a) synthesis
b) decomposition
c) double replacement
d) single replacement

33. The complete combustion of ethane, C_2H_6 , produces

- a) $\text{C}_2\text{H}_5\text{OH}$ c) CO_2 and H_2
b) CH_3COOH d) CO_2 and H_2O

34. Which reaction below would be classified as a single replacement reaction?

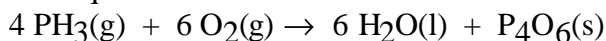
- a) $\text{NaHCO}_3 \rightarrow \text{NaOH} + \text{CO}_2$
b) $2 \text{H}_2 + \text{O}_2 \rightarrow 2 \text{H}_2\text{O}$
c) $2 \text{AgNO}_3 + \text{Cu}^\circ \rightarrow \text{Cu}(\text{NO}_3)_2 + 2 \text{Ag}^\circ$
d) $\text{Ba}(\text{OH})_2 + \text{H}_2\text{SO}_4 \rightarrow \text{BaSO}_4 + 2 \text{H}_2\text{O}$

10--THE MATH OF CHEMICAL EQUATIONS

35. What mass of sulfur dioxide, SO_2 (64.0 g/mole), is produced when 245 g of sulfuric acid, H_2SO_4 (98.0 g/mole) reacts completely with zinc metal?
- $\text{Zn}^\circ + 2 \text{H}_2\text{SO}_4 \rightarrow \text{ZnSO}_4 + \text{SO}_2 + 2 \text{H}_2\text{O}$

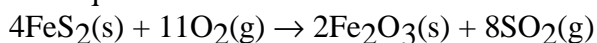
- a) 64.0 g c) 128 g
b) 80.0 g d) 160 g

36. At STP, how many Liters of oxygen gas react with 4.00 moles of PH_3 according to this equation?



- a) 32.0 c) 134
b) 89.6 d) 146

37. How many moles of FeS_2 are required to produce 64 grams of SO_2 according to the equation



- a) 0.40 c) 3.2
b) 0.50 d) 4.5

16--SOLUTIONS

38. In a sample of salt water, the salt is called the

- a) solvent c) solution
b) solute d) precipitate

39. How many grams of sodium hydroxide pellets, NaOH , are required to prepare 50.0 mL of a 0.150 M solution?

[molar mass $\text{NaOH} = 40.0 \text{ g/mol}$]

- a) 0.300 c) 3.00
b) 2.00 d) 200.

40. If 50 mL of a 200 mL sample of 0.10 M sodium chloride solution is spilled, what is the concentration of the remaining solution?

- a) 0.20 M c) 0.075 M
b) 0.10 M d) 0.025 M

41. A 100 mL sample of a solution with a concentration of 5.00 M is diluted to a new volume of 400 mL with distilled water. The new concentration will be

- a) 1.25 M c) 1.66 M
b) 20.0 M d) 15.0 M

17--CHEMICAL KINETICS & THERMODYNAMICS

42. Which one of the following changes will result in a **decreased** rate of reaction?

- a) adding a catalyst
b) heating up the reactants
c) cutting the reactants into smaller pieces
d) diluting the reactants

43. A catalyst is a substance that...

- a) oxidizes undesired waste products.
b) changes the rate & doesn't get used up.
c) lowers the energy of the reactants.
d) increases the kinetic energy of the molecules.

44. Increasing the surface area of a solid mixed with a gas will

- a) slow down a reaction.
b) increase the rate of reaction.
c) have no effect on reaction rate.

19--ACIDS, BASES AND SALTS

45. A solution that conducts electricity very well is called a:

- a) weak electrolyte
b) strong electrolyte
c) metallic solution
d) liquid conductor

Describe these household substances:

- a) acidic b) basic c) neutral

46. Sugar water ___
47. Vinegar ___
48. Rubbing Alcohol ___
49. Milk of Magnesia ___
50. Household ammonia ___

Questions 51 - 55

Match the household chemical with its formula

- ___51. Vinegar a) NaOH
___52. Pool Acid b) NaHCO_3
___53. Rubbing Alcohol c) HCl
___54. Drano d) $\text{HC}_2\text{H}_3\text{O}_2$
___55. Baking Soda e) $\text{C}_3\text{H}_7\text{OH}$

56. Acids are substances that
- increase the [H⁺]
 - increase the [OH⁻]
 - decrease the [H⁺]
 - decrease the [H₂O]
57. A property of acids are that they
- taste sour
 - taste bitter
 - feel slippery
 - neutralize water
58. A substance that turns cabbage juice blue and slightly lights up a light bulb is a:
- strong acid
 - strong base
 - weak acid
 - weak base
59. Which of the following substances is a base?
- H₂O
 - HC₂H₃O₂
 - Ca(OH)₂
 - H₂SO₄

20—ACID-BASE REACTIONS

60. When an acid and a base react, the products are
- salt and water
 - salt and base
 - base and acid
 - water and acid
61. When NaOH is mixed with H₂SO₄, one of the products is
- Na₂SO₄
 - H₂OH
 - H₂
 - NaSO₄

21--OXIDATION AND REDUCTION

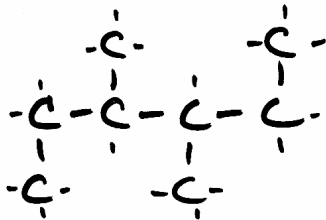
62. During the “ornament lab,” hydrogen gas was produced according to the following equation:
- $$\text{Zn}^\circ + 2 \text{HCl} \rightarrow \text{ZnCl}_2 + \text{H}_2$$
- Which chemical was oxidized?
- Zn[°]
 - HCl
 - ZnCl₂
 - H₂

63. At winter break, we made a “Chemist’s Tree” by using the reaction:
- $$\text{Cu}^\circ + 2\text{Ag}^+ \rightarrow 2 \text{Ag}^\circ + \text{Cu}^{2+}$$
- The copper, Cu[°], is ____ electrons and being ____.
- gaining, oxidized
 - gaining, reduced
 - losing, oxidized
 - losing, reduced
64. When we reacted AgNO₃ and K₂CrO₄ to form Ag₂CrO₄ and KNO₃, _____ was oxidized.
- silver ion
 - nitrate ion
 - chromate ion
 - nothing (it wasn’t a Redox reaction)

24--ORGANIC CHEMISTRY

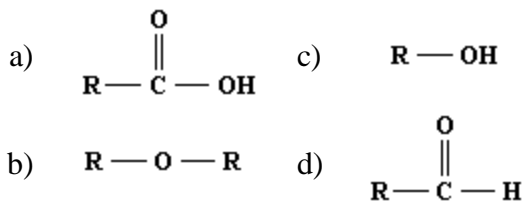
65. The general formula C_nH_{2n} describes the molecular composition of the hydrocarbon family known as the
- alkanes
 - alkenes
 - alkynes
 - alkadienes
66. Structural formulas have advantages over molecular formulas because they show the
- bonding capacity of each carbon atom.
 - geometric arrangement of the atoms.
 - number of atoms of each element present.
 - percentage composition of the compound.
67. Organic chemistry is the branch of chemistry that is the study of
- compounds of carbon.
 - nonmetals.
 - once-living organisms.
 - compounds produced by living organisms.
68. The number of isomers of bromopropane, C₃H₇Br is
- 2
 - 3
 - 4
 - 7

69. How many carbons make up the “parent chain” in the following molecule?



- a) 4 c) 6
b) 5 d) 7

70. Which functional group is an “ether”?



25--BIOCHEMISTRY

71. Protein molecules are made up of:

- a) benzene rings c) hydrocarbons
b) alcohol + acids d) amino acids

Answers:

| | | | | | | | |
|-----|---|-----|---|-----|---|-----|---|
| 1. | B | 21. | C | 41. | A | 61. | A |
| 2. | A | 22. | B | 42. | D | 62. | A |
| 3. | A | 23. | C | 43. | B | 63. | C |
| 4. | B | 24. | B | 44. | B | 64. | D |
| 5. | B | 25. | B | 45. | B | 65. | B |
| 6. | A | 26. | B | 46. | C | 66. | B |
| 7. | D | 27. | A | 47. | A | 67. | A |
| 8. | C | 28. | B | 48. | C | 68. | A |
| 9. | D | 29. | B | 49. | B | 69. | C |
| 10. | C | 30. | D | 50. | B | 70. | B |
| 11. | A | 31. | B | 51. | D | 71. | D |
| 12. | A | 32. | C | 52. | C | | |
| 13. | B | 33. | D | 53. | E | | |
| 14. | C | 34. | C | 54. | A | | |
| 15. | D | 35. | B | 55. | B | | |
| 16. | A | 36. | C | 56. | A | | |
| 17. | D | 37. | B | 57. | A | | |
| 18. | B | 38. | B | 58. | D | | |
| 19. | A | 39. | A | 59. | C | | |
| 20. | D | 40. | B | 60. | A | | |

Useful Information

$$1 \text{ L} = 1000 \text{ mL} \quad 1 \text{ kg} = 1000 \text{ g}$$

$$1 \text{ m} = 100 \text{ cm}$$

$$1 \text{ mole} = 22.4 \text{ L (at STP)}$$

$$1 \text{ mole} = 6.02 \times 10^{23} \text{ molecules}$$

$$\text{density} = \frac{\text{mass}}{\text{volume}} \quad M = \frac{\text{moles}}{\text{Liters}}$$

$$\text{STP} = 0^\circ\text{C} = 273 \text{ K and } 1 \text{ atm}$$

$$\text{alkane, } \text{C}_n\text{H}_{2n+2} \quad \text{alkene, } \text{C}_n\text{H}_{2n}$$

Note: The actual Midterm will also include questions about protons, neutrons, and electrons as well as electron configurations (Unit 5).