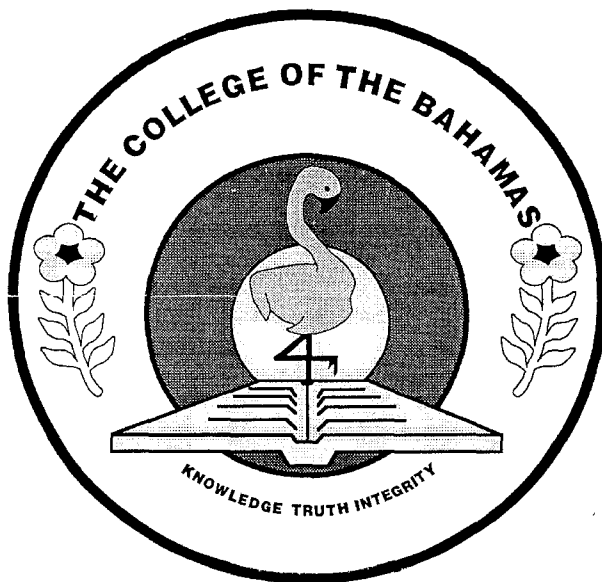


THE COLLEGE OF THE BAHAMAS



NASSAU

FREEPORT

EXAMINATION FOR THE SPRING SEMESTER, 012000

DIVISION: NATURAL SCIENCE

COURSE NUMBER: CHEMISTRY 115

COURSE TITLE: INTRODUCTORY CHEMISTRY

Date and Time: *Thurs 20 April* Duration: 2½ Hours
(To be entered by Examination Office) *2 pm*

INSTRUCTION TO CANDIDATES: This paper has 7 pages and 31 questions. It consists of three sections.

SECTION A: MULTIPLE CHOICE – 25 questions, 25 points. Answer ALL questions.

SECTION B: SHORT ANSWERS – 6 questions, 50 points. Answer ALL questions.

Section A Multiple Choice

Select the correct answer from the choices provided. Place an X in the space that indicates your choices on the answer sheet. (Each question allotted one mark)

- A metal that reacts with steam, but not with cold water.
 - Copper
 - Calcium
 - Magnesium
 - Sodium
- Which of the following metals is the most powerful reducing agent
 - Zinc
 - Sodium
 - Silver
 - Lead
- A metal which has a nitrate that decomposes on heating, to give off **one gas only** and has a carbonate that does not decompose on heating is:-
 - Potassium
 - Calcium
 - Silver
 - Tin
- Which one of the following statements concerning the trends going down group 7 element is true?
 - Reactivity increases
 - The element has a decreased tendency to form an ion of the type X^-
 - Electronegativity increases
 - The elements become more volatile
- Which one of the following sets of electronic structures represents those of **non-metals only**?
 - 2 ; 2:8:2 ; 2:8:8:2
 - 2:1 ; 2:2 ; 2:3
 - 2:5 ; 2:8:6 ; 2:8:7
 - 1 ; 2:1 ; 2:8:1
- When a copper rod is placed in a solution containing zinc ions :-
 - a displacement reaction occurs
 - zinc ions are reduced
 - nothing happens
 - copper sulphate is formed
- Which one of the following statements concerning the reactivity series of metals is true?
 - Metals higher in the same series lose electrons less readily than those in the lower series
 - Metals higher up in the series are less easily extracted from their ores
 - When heated, carbonates of metals lower in the series decompose less readily than those of metals higher in the series
 - Metals high in the series do not react with water
- Which one of the following best describes what occurs when ammonium chloride is heated in a test tube?
 - It sublimes
 - Chlorine gas is produced
 - There is no visible change
 - Water vapour is given off

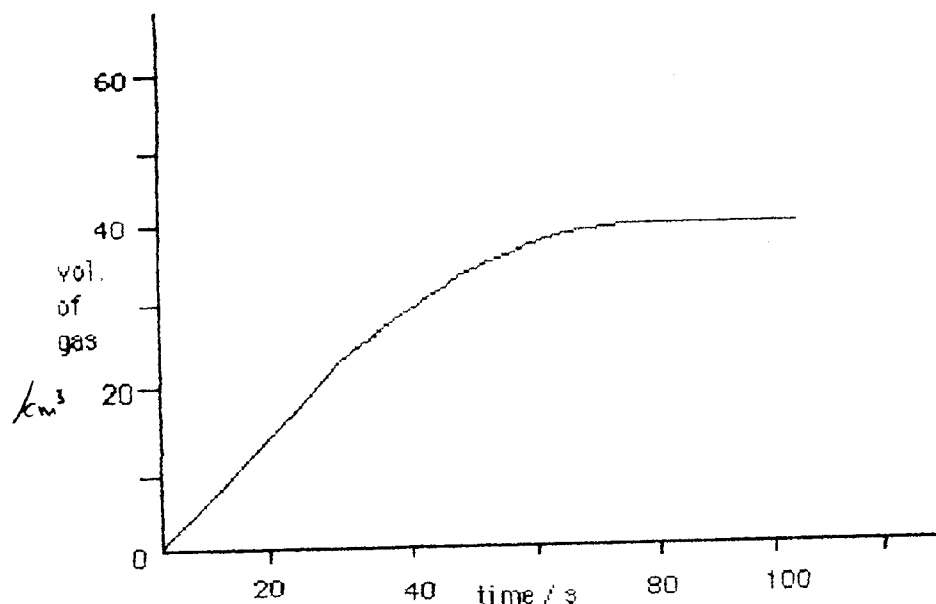
- 9.) Which one of the following will NOT decompose when heated in a Bunsen flame?
- silver oxide
 - lead(II) carbonate
 - sodium nitrate
 - calcium oxide
- 10.) The type of reaction between bromine water and ethene is best described as:
- substitution
 - addition
 - decomposition
 - combustion
- 11.) A mixture containing 5 drops of ethanol, 5 drops of ethanoic acid and 1 drop of concentrated sulphuric acid are warmed gently together in a test tube. The distinctive odour in the vapour given off is due to:
- ethanol
 - ethyl ethanoate
 - ethene
 - ethane 1,2-diol
- 12.) Two moles of carbon tetrachloride (CCl_4) contain
- two atoms of chlorine
 - 4 moles of chlorine atoms
 - 8 atoms of chlorine
 - 2 moles of carbon atoms
- 13.) What mass of iron would contain the same number of atoms as 5g of silicon?
(Fe=56, Si=28)
- 2.8g
 - 5.6g
 - 10g
 - 5g
14. What mass in grams of potassium hydroxide (relative formula mass = 56) must be dissolved to give 500cm^3 of 1.0M solution?
- 28g
 - 5.6g
 - 14g
 - 56g
15. Which one of the following statements concerning the collision theory is NOT correct?
- Particles must collide before they react
 - Not all collisions result in reaction
 - All collisions with sufficient energy results in reaction
 - Colliding particles must have the correct orientation for reaction to occur
16. Which one of the following is a correct statement concerning the equilibrium state of a reversible reaction?
- The reaction is stopped
 - The rate of the forward reaction is decreasing
 - The forward and reverse reaction are proceeding at the same rate
 - There are always more product than reactants
17. What volume would 34g of Ammonia (RMM = 17) occupy at STP?
- 44.8dm^3
 - 22.4dm^3
 - 2.24dm^3
 - 4.48dm^3

Select from the list of alternatives below to answer Questions 18 – 21.

- | | |
|-------------|------------|
| A. Alcohols | B. Alkanes |
| C. Alkenes | D. Esters |

Choose the group of compounds which:

18. Has a characteristically sweet smell
 19. Has a relatively high boiling point and melting point because of hydrogen bonding
 20. Reacts by addition reaction
 21. De-colourises bromine in the light only
-
22. A weak electrolyte
 - a) contains no ions
 - b) contains covalent molecules only
 - c) contains mobile electrons
 - d) contains few ions and many molecules
 23. In electrolysis the cathode
 - a) is the electrode connect to the positive side of the electricity supply
 - b) attracts the negative ions in the electrolyte
 - c) supplies electrons to discharge cations
 - d) is the electrode where oxidation occurs
 24. When **concentrated** sodium chloride is electrolysed using inert electrodes
 - a) sodium is discharged at the cathode
 - b) chlorine ions are oxidised at the anode
 - c) hydrogen gas is liberated at the anode
 - d) oxygen gas is liberated at the cathode
 25. When copper(II)sulphate solution is electrolysed using copper electrodes
 - a) the solution loses its blue colour
 - b) the anode increases in weight
 - c) the cathode gets eaten away
 - d) the concentration of ions in the solution remains the same

Rates of Reaction

2.) The graph above refers to the reaction between lumps of calcium carbonate (in excess) and 500cm^3 0.1 M dilute hydrochloric acid, at a 35°C .

a) What was the total volume of carbon dioxide produced in the reaction? (1)

b) After what time in seconds, was the reaction complete? (1)

c) Using the same axes above, draw four lines, A,B,C and D, which could represent the results of using the identical conditions except separately:-

i) doing the reaction at 25°C (1)

ii) Using calcium carbonate powder instead of lumps (1)

iii) Using 250cm^3 of acid of concentration 1.5M instead of 0.1M acid (1)

Equilibrium

3.) Consider the following reversible reaction which is exothermic:



Predict, using Le Chatelier's Principle, the effect on the position of equilibrium of the following:

a) Lowering the temperature (1)

b) Increasing the pressure (1)

c) Decreasing the concentration of ammonia (1)

Chemical Equations

4.) Write balanced chemical equations for the following metals dissolved in the given solutions: -

(a) Aluminium in Iron (II) Chloride

_____ (1)

(a) Iron in Copper(II)Sulphate

_____ (1)

(b) Iron in Lead Nitrate

_____ (1)

(c) Lead in Copper(II)Chloride

_____ (1)

(d) List the metal in order of their reactivity, using the above equations.

_____ (2)

(e) Explain why each metal was placed in its respective position.

_____ (2)

(f) Write the reduction half equation in (a)

_____ (1)

(g) List the oxidising agent in (b)

_____ (1)

Organic Chemistry

5.) Draw the structure of the following compounds, showing all atoms and bonds separately: -

(3)

a. 1-pentene

b. 2-propanol

c. 2,2,4-trimethyl-hexane

Explain each of the following terms, as used in Organic Chemistry, giving examples of each: -

(6)

i. Saturated

ii. Markownikoff's Rule

iii. Substitution reaction

iv. Write a balanced equation showing ester formation, using ethanol and propanoic acid.

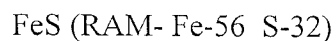
(2)

v. Write a balanced equation to represent the reaction of propene and bromine.

(2)

Stoichiometry

6.) 14 grams Iron (Fe) was reacted with 20 grams of sulphide



a) Which reagent is the limiting reagent? _____ (1)

b) How many grams of FeS were produced? _____ (2)

(2)

c) How many moles of this reagent remained after the reaction

(2)