StudentBounty.com

JUNIOR LYCEUM AND SECONDARY SCHOOL
ANNUAL EXAMINATIONS 2010

Directorate for Quality and Standards in Education
Educational Assessment Unit

FORM 5 **CHEMISTRY** **TIME: 1h 45min**

Name: _____ **Class: _____**

Useful Data: Atomic numbers and relative atomic masses are shown in the periodic table printed below.
One mole of any gas occupies 22.4 dm^3 at standard temperature and pressure
Faraday constant = 96500 C mol^{-1} Q =It

State symbols are expected to be included in all chemical equations.

PERIODIC TABLE

1	2											3	4	5	6	7	0
							1 H 1										4 He 2
7 Li 3	9 Be 4											11 B 5	12 C 6	14 N 7	16 O 8	19 F 9	20 Ne 10
23 Na 11	24 Mg 12											27 Al 13	28 Si 14	31 P 15	32 S 16	35.5 Cl 17	40 Ar 18
39 K 19	40 Ca 20	45 Sc 21	48 Ti 22	51 V 23	52 Cr 24	55 Mn 25	56 Fe 26	59 Co 27	59 Ni 28	63.5 Cu 29	65 Zn 30	70 Ga 31	73 Ge 32	75 As 33	79 Se 34	80 Br 35	84 Kr 36
85 Rb 37	88 Sr 38	89 Y 39	91 Zr 40	93 Nb 41	96 Mo 42	99 Tc 43	101 Ru 44	103 Rh 45	106 Pd 46	108 Ag 47	112 Cd 48	115 In 49	119 Sn 50	122 Sb 51	128 Te 52	127 I 53	131 Xe 54
133 Cs 55	137 Ba 56	139 La 57	178 Hf 72	181 Ta 73	184 W 74	186 Re 75	190 Os 76	192 Ir 77	195 Pt 78	197 Au 79	201 Hg 80	204 Tl 81	207 Pb 82	209 Bi 83	210 Po 84	210 At 85	222 Rn 86

Key

a X *b*	relative atomic mass symbol atomic number

Marks Grid [For Examiners use only]

Question N°.	Section A						Section B			
	1	2	3	4	5	6	7	8	9	
Max Mark	8	10	10	12	8	12	20	20	20	
Actual Mark										

Theory Paper: 85%	Practical: 15%	Final Score: 100%

www.StudentBounty.com
Homework Help & Pastpapers

StudentBounty.com

SECTION A – Answer ALL questions. This section carries 60 marks.

1 a. The statements below can be attributed either to (i) ionic compounds or to (ii) covalent compounds. Near each statement, in the box provided, write down IONIC/COVALENT

● Most are crystalline solids at room temperature	
● Most are poor electrical conductors in all states	
● Most are soluble in organic solvents such as benzene or hexane but insoluble in water.	
● Most conduct electricity when molten	
● Most have low melting points and boiling points	
● Most are soluble in water but insoluble in organic solvents such as benzene or hexane.	

[3]

b. Draw a dot/cross diagram showing:

(i) all electron shells, to illustrate that NaF is ionic

(ii) only the outer electron shells, to illustrate that CO_2 is covalent

[5]

www.StudentBounty.com
Homework Help & Pastpapers

StudentBounty.com

2. The word equation below represents a general type of reaction

   Reactant A + Reactant B ⟶ salt + water.

   a. What is the term given to such a reaction?

   _____

   [1]

   b. Most (but not all) reactions of this type are exothermic. What is an exothermic reaction?

   _____

   [1]

   c. Give one example of a chemical compound that can be used as Reactant A and one example that can be used as Reactant B.

   Reactant A: _____ Reactant B: _____

   [2]

   d. Write down a balanced equation that illustrates the reaction between the reactants you named in c.

   _____

   [2]

   e. Name two different methods by which the salt formed can be obtained/separated from its solution.

   _____ _____

   [2]

   f. In sewage treatment, magnesium oxide is often added before the wastewater is released to the environment.

   (i) Give one reason for this._____

   (ii) Suggest another chemical that can replace magnesium oxide. _____

   [2]

www.StudentBounty.com
Homework Help & Pastpapers

StudentBounty.com

3. Some acidic oxides are air pollutants because they react with moisture in the air to produce acid rain.

   a. (i) Give two examples of acidic oxides responsible for air pollution.

   _____ _____

   (ii) Write a balanced equation to show the reaction of one acidic oxide with water.

   _____

   [4]

   b. Some air pollutants are released during coal burning in power plants. Name two other ways how these may be released into the air.

   _____ _____

   [2]

   c. (i) Unpolluted rainwater is slightly acidic with a pH of 5.6. What would you expect the pH of polluted rainwater to be?

   _____

   (ii) What colour change would occur if polluted rainwater is tested with litmus paper?

   _____

   [2]

   d. Give two hazards or adverse effects produced by acid rain.

   _____ _____

   [2]

www.StudentBounty.com
Homework Help & Pastpapers

StudentBounty.com

4. a. Alkanes form a homologous series of saturated hydrocarbons.

(i) What is a saturated hydrocarbon?

_____

(ii) Write an equation for the reaction between any alkane and bromine water.

_____

(iii) What term is used to describe the reaction in (ii)

_____

[4]

b. Members of a homologous series of organic compounds show particular characteristics that differ slightly as the number of carbon atoms increases. Explain this, using methane, ethane, propane and butane as examples.

_____

_____

[2]

c. Alkanes with more than three carbon atoms per molecule form structural isomers.

(i) What is a structural isomer?

_____

(ii) Butane forms two structural isomers. Write down the structural formula for each.

Butane **Isomer of butane**

[4]

d. Alkanes are frequently used in everyday life. Write the **name** of two alkanes and state their **use**:

Alkane: _____ Use: _____

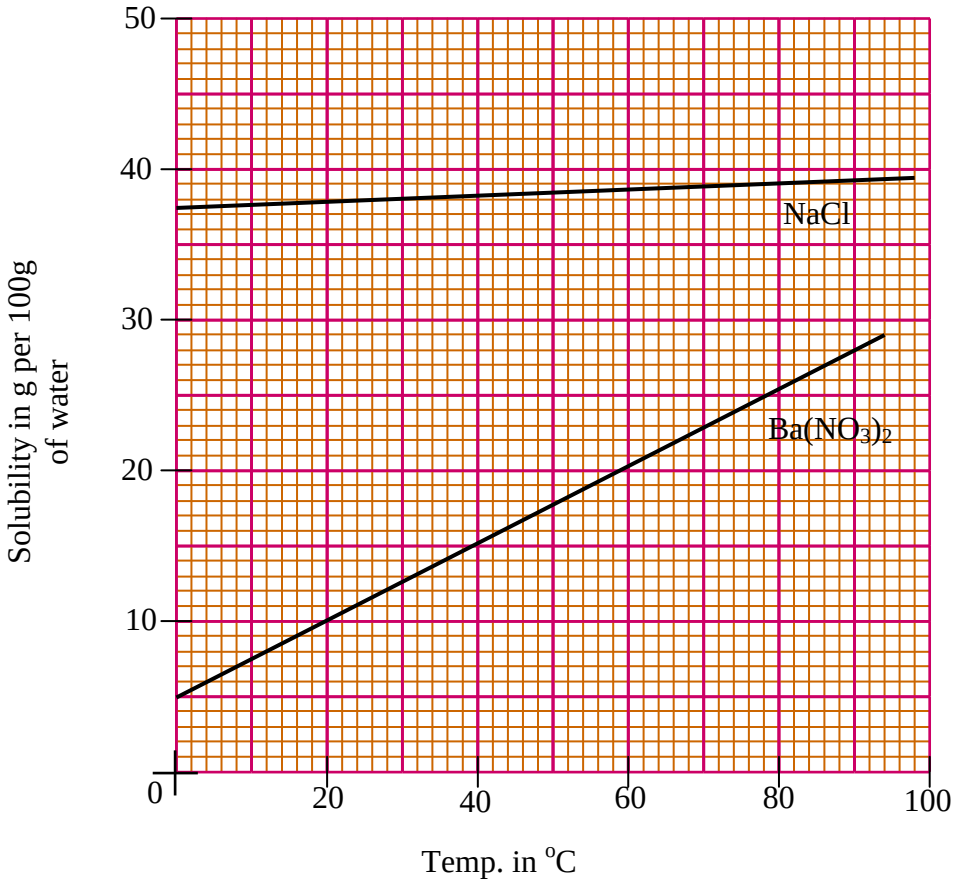
Alkane: _____ Use: _____

[2]

www.StudentBounty.com
Homework Help & Pastpapers

StudentBounty.com

5. The graph below shows how the solubilities of sodium chloride and barium nitrate vary wit temperature.
[At normal temperature, 1g of water occupies 1 cm^3]



a. Each of the graphs shown above is known as a

_____ _____

[2]

b. What is the solubility of Ba $(NO_3)_2$ in g per 100g of water at 40^o C?

_____

[1]

c. When the maximum amount of solute possible dissolves in a solvent at a specific temperature, the resulting solution is said to be _____

[1]

www.StudentBounty.com
Homework Help & Pastpapers

StudentBounty.com

d. (i) The graph for NaCl shows that 38g of NaCl dissolves in 100g of water at 25 °C.
Calculate the mass of NaCl that dissolves in 1 dm^3 of water at this temperature.

_____

(ii) Calculate the molar mass of NaCl

_____

(iii) Calculate the molarity in mol dm^{-3} of the NaCl solution at 25 °C.

_____

[4]

6. A student was told that unlabelled bottles of chemicals contained either iron (II) chloride or iron (III) bromide.
   - To identify the metallic ion present, the student added drops of aqueous sodium hydroxide to an aqueous solution of the salt. He/She immediately observed what happened.
   - To identify the non-metallic ion present, the student added drops of aqueous acidified silver nitrate to another aqueous solution of the salt. He/She again observed what happened.

   a. Fill in the table below with the student's observations for each salt:

	when aq. sodium hydroxide was added	when aq. acidified silver nirate was added
Iron (II) chloride is present		
Iron (III) bromide is present		

[4]

   b. Give balanced equations that illustrate the chemical reaction between:
      (i) **Either** aqueous iron (II) chloride **or** aqueous iron (III) bromide and sodium hydroxide solution.

      _____

      (ii) **Either** aqueous iron (II) chloride **or** aqueous iron (III) bromide and acidified silver nitrate solution.

      _____

[4]

   c. Iron reacts with dilute hydrochloric acid and with chlorine. For each reaction, state the **name** of the compound formed.
      (i) With dilute hydrochloric acid: _____

      (ii) With chlorine: _____

[2]

   d. Some iron nails are placed in copper (II) sulfate solution.
      (i) Give one observation that could be made after a day or two.

      _____

      (ii) Give a reason for this observation

      _____

[2]

www.StudentBounty.com
Homework Help & Pastpapers

StudentBounty.com

SECTION B – Answer TWO questions only on the foolscap provided.
This section carries 40 marks.

7. In your practical work, you carried out the laboratory preparation of the following eight gases: oxygen, hydrogen, carbon dioxide, ammonia, nitrogen dioxide, sulfur dioxide, chlorine and hydrogen chloride.
   a. Describe the **test** that can be used to show the presence of any **five** of these gases. **[5]**
   b. Select any **three** of the gases above and for each, give one **use** in everyday life. **[3]**
   c. Describe the laboratory preparation of a pure, dry sample of **one** of the gases above.
   Your answer should include: a clear labelled diagram of the apparatus
   the name of the reagents used
   one condition necessary for the reaction to take place
   a balanced equation for the reaction. **[12]**

8. a. Draw a diagram to show the laboratory apparatus that can be used to carry out the electrolysis of brine (a concentrated solution of sodium chloride). Your diagram should show how the gaseous products are collected.
   On your diagram label:
   (i) The **polarity** and **name** of each electrode
   (ii) The **names** of the gases collected and their relative **volumes**. **[8]**
   b. (i) Give the **symbols/formulae** for all the ions present in the solution.
   (ii) Write down the ionic half equations for the reactions occurring at each electrode and give a reason for the preferential discharge of ions. **[8]**
   c. A current of 4.03 amperes flows through the solution for 8 minutes.
   (i) Calculate the electrical charge used in Faradays
   (ii) Calculate the volume in dm^3 of **one** of the gases liberated at S.T.P. **[4]**

9. In the second stage of the Contact Process, sulphur dioxide is converted to sulphur trioxide.

   $2SO_{2(g)} + O_{2(g)} \rightleftharpoons 2SO_{3(g)} \quad \Delta H = -\_\_\_\_\_$

   Consider the following changes:
   - increasing the pressure
   - increasing the temperature
   - decreasing the concentration of oxygen

   a. What would be the effect of **each** of these three changes on the **rate of formation** of sulphur trioxide. Give a reason in terms of particle collisions. **[6]**
   b. What would be the effect of **each** of these three changes on the **yield** of sulphur trioxide. Explain your answer in terms of Le Chatelier's principle. **[11]**
   c. (i) For this reaction to proceed, a catalyst is required. What is a catalyst?
   (ii) What is the effect of the catalyst on the **attainment** of equilibrium and on the **yield** of sulphur trioxide? **[3]**

www.StudentBounty.com
Homework Help & Pastpapers