SCHEME OF WORK OF CHEMISTRY FOR SENIOR SIX IN SCIENCE COMBINATIONS (MCB; PCB AND PCM)

ACADEMIC YEAR 2013

FIRST TERM 2013

Month	Period	Contents or Topic	Specific objectives	Learning activities	References	Observations
January	1st week 7/01-11/01	**Chapter I. Chemical kinetics** I.1. The concepts of chemical kinetics	-Explain the concepts of chemical kinetics. -Define a rate of reaction -Write a mathematical expression of rate law -Determine the molecularity of a reaction -Define the order of reaction	1.The teacher should give examples of fast and slow reactions 2. Do some calculations involving orders of reactions. 3. Use calculation and graphs to determine half-life.	1. Advanced level chemistry curriculum for sciences combinations. 2.OCR Chemistry AS 3. OCR Chemistry A2 4.A-Level CHEMISTRY Fourth Edition	
	2nd week 14/01-18/01	I.1. The concepts of chemical kinetics I.2. Factors that affect the rate of reaction	-Define order of reaction with respect to the reactants and then the overall order of r(x) -Explain the effects of	4.Simple experiments using clock reactions to determine the order of reactions e.g.	1. Advanced level chemistry curriculum for sciences combinations. 2.OCR Chemistry	

			different factors on the rate of reaction.	H_2O_2 and I^- or $S_2O_3^{2-}$ and H^+ And the graphical representation 5. Carry out some experiments on the factors affecting rate of reaction	AS 3. OCR Chemistry A2 4.A-Level CHEMISTRY Fourth Edition	
February	3rd week 21/01-25/01	I.2. Factors that affect the rate of reaction I.3. EXERCISES	-Explain the effects of different factors on the rate of reaction. -Improve the knowledge of students	6. Mention positive and poisoning catalysts 7. Use Arrhenius equation to determine the effect of temperature on the rate constant. 8. Do exercises	1.OCR Chemistry AS 2. OCR Chemistry A2 3.A-Level CHEMISTRY Fourth Edition	

	4th week 28/01-01/02	**Chapter II. Chemical equilibrium** II.1. Explanation of chemical equilibrium concepts	-Explain the concepts of chemical equilibrium -calculation of equilibrium concentration, Kc and Kp	1.The teacher will mention that the rate of forward reaction is equal to the rate of backward reaction	1.OCR Chemistry AS 2. OCR Chemistry A2 3.A-Level CHEMISTRY Fourth Edition	
	5th week 04/02-08/02	II. 2. Comparison between Kc and Kp II.3. Factors affecting the position of equilibrium in accordance with the LeChatelier's principle: Concentration, Pressure, Temperature and Catalysts	-Compare Kc and Kp expressions -Explain and apply the LeChatelier's principle.	Exercises involving calculations on Kc and Kp	1.OCR Chemistry AS 2. OCR Chemistry A2 3.A-Level CHEMISTRY Fourth Edition	

	6th week 11/02-15/02	II.4. Applications of factors on industrial processes: contact process and Haber process II. 5. EXERCISES	-Show the importance of equilibrium constant factors on industrial process. -Improve the knowledge of students.	Do assignment on Applications of factors on industrial processes: contact process and Haber process	1.OCR Chemistry AS 2. OCR Chemistry A2 3.A-Level CHEMISTRY Fourth Edition	
	7th week 18/02-22/02	**Chapter III. Phase equilibrium** III.1. Explanation of phase equilibrium concepts III.2. Phase diagram of water III.3. Partition or Distribution coefficient and solvent extraction.	-Explain the phase equilibrium concepts -Interpret phase diagrams -Explain the partition coefficient as means of separation of mixture.	-The teacher should emphasize o triple point and critical and pressure. -The teacher should mention partition coefficient as means of separation of mixtures.	1.A-Level CHEMISTRY Fourth Edition 2. General chemistry, fourth edition.	

	8th week 25/02-01/03	III.4. Raoult's law and its application III.5. Colligative properties III.6. EXERCISES	-State the Raoult's law -Calculate molecular mass -Explain the effect of a solute on the boiling and freezing point of solvent. -Improve the knowledge of students.	Exercises involving molecular mass and colligative properties.	1.A-Level CHEMISTRY Fourth Edition 2. General chemistry, fourth edition.	
March	9th week 04/03-08/03	**Chapter IV. Solubility and solubility product constant (Ksp)** IV. 1. Sparingly soluble solids and solubility IV.2. Solubility product constant (Ksp) and	-Define solubility -Derive solubility product constant (Ksp) -Derive the solubility from Ksp and calculate the solubility product constant.	-Do exercises on solubility and solubility product constant	1.A-Level CHEMISTRY Fourth Edition 2. General chemistry, fourth edition.	

		calculation involved. IV.3. Relationship between solubility and solubility product constant (Ksp)				
	10th week 11/03-15/03	IV.4. Comparison between ionic product and solubility IV. 5. (a) Common ion effect (b) Solubility and complex ion formation IV.6. Carry out some experiments and exercises on Ksp calculations.	-Predict if the formation of precipitate occurs -Explain the effect of common ion and complex ion formation on solubility. -Improve the knowledge of students.	-Carry out experiments about precipitation due to common ion effect -Do exercises/ experiments to determine whether precipitation occurs or not. -Do exercises/ experiments to determine on complex ion formation.	1.A-Level CHEMISTRY Fourth Edition 2. General chemistry, fourth edition.	
	11th week 18/03-22/03	Revision and exams	Improve the knowledge of students.			
	12th week	Exams and works of school progressive reports	Improve the knowledge of students.			

	18/03-22/03					

LESSON PLAN

1. **SUBJECT: Chemistry**
2. **TOPIC: Chemical kinetics**
3. **TITLE: Factors affecting the rate of reactions**
4. **Rationale**: People want to speed up useful reactions and to slow harmful reactions. There are many factors which can allow speeding up the rate of reaction. This offers the advantages of reaching the expected yield in a short time.
5. **LEVEL OF STUDENTS: S6MCB**
6. **TIME REQUIRED**: 50 minutes
7. **KNOWLEDGE REQUIRED BEFORE THIS LESSON: Classification of Chemical reactions**
8. **SPECIFIC OBJECTIVES:***By the end of the lesson, the learners should be able to:*

a. Differentiate between slow and faster reaction

b. Explain the effect of concentration, catalyst, surface area or particles size

9. **TEACHING AND LEARNING AIDS:** Test tubes, test tubes holder, test tubes racks, rubbers stopper, droppers, match boxes, source of heat, stop clock, plastic syringes, cold tap water, litmus papers, magnesium ribbon, magnesium strips, HCl, H_2O_2 and MnO_2

Stages/ Steps	Time	Teacher's activities	Learners activities	Learning points	Resources(Teaching and Learning aids) and References

Introduction	5min.	1. Teacher asks questions to Learners on chemical equations and preparation of oxygen and that of hydrogen. 2. Teacher corrects mistakes made by Learners and answers their questions. 3. Teacher requests Learners to predict the faster reaction when Mg reacts with concentrated HCl or diluted HCl.	1. Learners answer questions from the Teacher on chemical equation and preparation of oxygen and hydrogen. 2. Learners ask questions where they do not understand very well. 3. Learners predict that for concentrated HCl the reactions will be faster. Some refuse the assumption and request for a proof.	1.Chemical reactions are represented by chemical equations 2.The chemical equation of the preparation of oxygen from hydrogen peroxide is: $2H_2O_2(l) \rightarrow 2H_2O(l) + O_2(g)$ 3.The reaction between Mg and hydrochloric acid to prepare hydrogen is: $Mg(s) + 2HCl(aq) \rightarrow MgCl_2(aq) + H_2(g)$ 4.The reaction between Mg and HCl is faster with concentrated solution rather than with diluted solution of HCl	
Lesson Body	30 min.	1.Teacher organizes Learners in groups and gives instructions for group activities 2.Teacher passes through different groups as Learners	1. Learners sit in groups and carry out their activities according to the instruction given by Teacher. 2.Learners ask	**1.Effect of concentration** When HCl is concentrated, the reaction is faster. **2.Effect of catalyst** H_2O_2 decomposes faster in presence of	1.Test tubes, test tubes holder, test tubes racks, rubbers stopper, droppers, match boxes, source of heat, stop clock, plastic syringes, cold tap water, litmus papers, magnesium

		are conducting their group activity 3. Teacher helps Learners where a need is. 4. Teacher organizes Learners to presents their findings and to ask questions to the presenter from other group. 5. Teacher harmonizes the findings from Learners and corrects mistakes that were not discovered by Learners and top up with suitable scientific terms.	further explanations where need is 3. Learners record their findings and get ready to report. 4. Learners present their finding per group and answer to questions from the audience. 5. Learners ask questions to the presenter and to the other members of the group.	MnO_2 than without MnO_2 3.**Effect of heat** When HCl is heated, the reaction is faster than in cold condition **4.Effect of surface area** Mg fillings react faster than Mg granules	ribbon, magnesium strips, HCl, H_2O_2 and MnO_2

Conclusion	10 min.	1. Teacher summarizes the findings from different groups and gives notes.	1. Learners write note in their notebooks.	FACTORS AFFECTING THE RATE OF REACTION. With reference to the amount of gas collected in the syringe, some reactions are faster and others are slow. 1. EFFECT OF CONCENTRATION The increase in concentration of reactants increases the number of reacting molecules in the same volume and they have no space to move then they are more closed together and more collide to form product, hence the increase in concentration increases the rate of reaction. 2. EFFECT OF CATALYST A catalyst is a substance which speeds up the rate of a chemical reaction by reducing or lowering or decreasing the activation energy but it remains unaltered or unchanged at the end of that reaction. 3. EFFECT OF HEAT When the temperature increases, the rate of the reaction increases because the reacting molecules become more in motion and therefore they collide. 4. EFFECT OF SURFACE AREA When the reacting particles are finely	2. OCR Chemistry AS 3. OCR Chemistry A2 4.A-Level CHEMISTRY Fourth Edition

				divided to reduce their particles size the surface area of contact between reacting particles and the rate of reaction is speed up rather than that of the big size particles. 5. EFFECT OF PRESSURE When the pressure of a gas is increased, the volume is decreased and the concentration is increased. The molecules have less space to move and are more likely to collide because they are pushed closer together. Hence the increasing pressure increases the rate of reaction.	
Assessment And follow-up.	5min.	Teacher asks written questions to Learners.	Learners answer questions from the Teacher.	Q1.State factors which can increase the rate of a chemical reaction. Q2.What is a catalyst? Q3. Explain the effect of catalyst on the rate of chemical reaction Q4. What is activation energy?	
Self - evaluation					

References:

- NCDC, *Advanced Level Chemistry National Curriculum for Science Combination*, Kigali, June 2010

- http://www.eduweb.vic.gov.au, visited February17th, 2013
- http://drjj.uitm.edu.my, visited February17th, 2013