

KIST DP Course Descriptions 2011-2012

Group: Group 4

Level: HL/SL

Subject: Chemistry

Grade: 12

Unit Number: 1

Unit Title: Kinetics

Approximate Duration: 2 weeks

Key Concepts:

Rates of reactions

Collision theory

LP Link: Risk Taker

TOK Link(s):

Should the relative validity of conclusions be based on experimental or on theoretical data?
Experimental results can support the theory but cannot prove it.

Description of the Unit:

In this unit, the students will begin by considering chemical reactions which proceed at different speeds or rates. They will then learn to calculate and compare rates of reactions by measuring any of the variables that change with time during the course of a reaction and thus know about the various techniques of measuring the rate of a reaction. They will explore how reactions happen at the molecular level by studying and applying the collision theory. They will investigate the effect that different factors have on reaction rates.

Key Knowledge/Skills Addressed:

Describe suitable experimental procedures for measuring rates of reactions.

Analyse data from rate experiments.

Describe the kinetic theory in terms of the movement of particles whose average energy is proportional to the temperature in kelvins.

Predict and explain using the collision theory, the qualitative effects of particle size, temperature, concentration and pressure on the rate of a reaction.

Sketch and explain qualitatively the Maxwell-Boltzmann energy distribution curve for a fixed amount of gas at different temperatures and its consequences for changes in reaction rates.

Describe the effect of catalyst on a chemical reaction.

Main Summative Assessment of the Unit: DP Past Paper Exam

KIST DP Course Descriptions 2011-2012

Group: Group 4

Level: HL/SL

Subject: Chemistry

Grade: 12

Unit Number: 3

Unit Title: Equilibrium

Approximate Duration: 2 weeks

Key Concepts:

Dynamic equilibrium

The position of equilibrium

LP Link: Balanced

TOK Link(s):

What criteria do we use in judging whether discrepancies between experimental and theoretical values are due to experimental limitations or theoretical assumptions?

Description of the Unit:

This unit focuses on the study of chemical systems in a state of dynamic equilibrium. Students learn to predict the effects of constraints on a system at equilibrium by applying Le Chatelier's principle. Students also realise the importance of the concept by taking important industrial processes into consideration.

Key Knowledge/Skills Addressed:

Outline the characteristics of chemical and physical systems in equilibrium.

Deduce the equilibrium constant expression (K_c) and the extent of a reaction from the magnitude of the equilibrium constant.

Apply Le Chatelier's principle to predict qualitative effects of changes of temperature, pressure and concentration on the position of equilibrium and on the value of the equilibrium constant.

State and explain the effect of a catalyst on an equilibrium reaction.

Apply the concepts of kinetics and equilibrium to industrial processes.

Main Summative Assessment of the Unit: DP Past Paper Exam

KIST DP Course Descriptions 2011-2012

Group: Group 4

Level: HL/SL

Subject: Chemistry

Grade: 12

Unit Number: 3

Unit Title: Acids and Bases

Approximate Duration: 2 weeks

Key Concepts:

Theories of acids and bases

Properties of acids and bases

Strong and weak acids and bases

The pH scale

LP Link: Communicator

TOK Link(s):

To what extent is it true that scales used in measuring are considered artificial or arbitrary?

In using different theories to explain the same phenomenon, how are depth and simplicity related?

Description of the Unit:

In this unit, the students will become aware of the evolution of the theories of acids and bases with the progress in knowledge of the atomic structure. They will study the properties of acids and bases and their classification into strong and weak acids and bases.

Key Knowledge/Skills Addressed:

Define acids and bases according to the Bronsted-Lowry and Lewis theories.

Outline the characteristic properties of acids and bases in aqueous solution.

Distinguish between strong acid and weak acids and bases in terms of the extent of dissociation, reaction with water, electrical conductivity and determine the relative strengths of acids and bases, using experimental data.

Distinguish between aqueous solutions that are acidic, neutral or alkaline using the pH scale.

State that each change of one pH unit represents a ten-fold change in the hydrogen ion concentration.

Main Summative Assessment of the Unit: DP Past Paper Exam

KIST DP Course Descriptions 2011-2012

Group: Group 4

Level: HL/SL

Subject: Chemistry

Grade: 12

Unit Number: 4

Unit Title: Oxidation and Reduction Reactions

Approximate Duration: 1 month

Key Concepts:

Introduction to oxidation and reduction

Redox reactions

Reactivity

Voltaic cells

Electrolytic cells

LP Link: Risk Taker

TOK Link(s):

What price do we continue to pay in terms of energy and waste in choosing a metal so prone to oxidation, and why was it chosen?

Description of the Unit:

In this unit, the students will gain an understanding of oxidation and reduction, which is an integral part of a large branch of chemistry both in the laboratory and in the real world. The students will apply the knowledge of electrochemical series to deduce the feasibility of a redox reaction. This will be followed by a study of electrochemical and electrolytic cells.

Key Knowledge/Skills Addressed:

Define oxidation and reduction in terms of electron loss and gain and deduce the oxidation number of an element in a compound.

Deduce whether an element undergoes oxidation or reduction in reactions using oxidation numbers.

Deduce the oxidation and reduction half-equations given the species involved in a redox reaction and deduce redox equations using half-equations.

Define the terms oxidizing agent and reducing agent and identify the oxidizing and reducing agents in redox reactions.

Explain how a redox reaction is used to produce electricity in a voltaic cell and in an electrolytic cell.

Deduce the products of the electrolysis of a molten salt.

Main Summative Assessment of the Unit: DP Past Paper Exam

KIST DP Course Descriptions 2011-2012

Group: Group 4

Level: HL/SL

Subject: Chemistry

Grade: 12

Unit Number: 5

Unit Title: Organic Chemistry

Approximate Duration: 1 month

Key Concepts:

Introduction to organic chemistry

Alkanes

Alkenes

Alcohols

Halogenoalkanes

Reaction pathways

LP Link: Open Minded

TOK Link(s):

What is the difference between an individual's responsibility and government's responsibility in relation to environmental concerns of global significance?

Description of the Unit:

This chapter will begin by considering how the study of organic compounds is organized through classification. The students will focus on some specific groups of organic compounds with an emphasis on their characteristic reactions and the applications of these processes in today's world.

Key Knowledge/Skills Addressed:

Describe the features of a homologous series.

Deduce structural formulas apply IUPAC rules for naming compounds containing up to six carbon atoms with one of the following functional group: alcohol, aldehyde, ketone, carboxylic acid and halide.

Discuss the volatility and solubility in water of compounds containing the functional groups in the following functional groups: alcohol, aldehyde, ketone, carboxylic and halide.

Distinguish between alkanes and alkenes using bromine water.

Describe, using equations, the oxidation reactions of alcohols and determine the products formed by the oxidation of primary and secondary alcohols.

Describe, using equations, the substitution reactions of halogenoalkanes with sodium hydroxide.

Explain the substitution reaction of halogenoalkanes with sodium hydroxide in terms of SN1 and SN2 mechanisms and deduce reaction pathways given the starting materials and the products.

Main Summative Assessment of the Unit: DP Past Paper Exam