SMK SERI KERAMAT
YEARLY TEACHING PLAN
CHEMISTRY
FORM 5

Weeks	Learning Objectives	Suggested Learning Activities	Learning Outcomes	Notes	Vocabulary
	THEME: INTERACTION BETWEEN CHEMICALS				
	LEARNING AREA: 1. RATE OF REACTION				
1	1.1 Analysing rate of reaction	Discuss: (a) the meaning of rate of reaction, (b) some examples of fast reactions, (c) some examples of slow reactions. Discuss to identify observable changes to reactants or products and its method of measurement in order to determine the rate of reaction. Carry out an activity involving a reaction between zinc and acid, and plot a graph to determine average rate of reaction and the rate of reaction at any given time. Carry out problem solving activities involving rates of reaction.	A student is able to: • state what rate of reaction is, • identify observable changes to reactants or products for determining rate of reaction, • determine average rate of reaction, • determine the rate of reaction at any given time from a graph, • solve numerical problems involving average rate of reaction, • solve numerical problems involving rate of reaction at any given time.	The rate of reaction at any given time is also known as instantaneous rateof reaction.	reactant – *bahan tindak balas* product*hasil tindak balas* rate of reaction – *kadar tindak balas* observable change – *perubahan yang dapat diperhatikan*
2, 3	1.2 Synthesising factors affecting the rate of reaction	Discuss possible factors affecting the rate of reaction. Design and carry out activities to investigate factors affecting the rate of reaction, i.e. size of reactant, concentration, temperature and catalyst. Some suggested reactions: (a) a reaction between calcium carbonate, $CaCO_3$, and hydrochloric acid, HCl, (b) a reaction between sodium thiosulphate, $Na_2S_2O_3$, and sulphuric acid, H_2SO_4,	A student is able to: • design experiments to investigate factors affecting the rate of reaction, • give examples of reactions that are affected by size of reactant, concentration, temperature and catalyst, • explain how each factor affects the rate of reaction, • describe how factors affecting the rate of reaction are applied in daily life and in industrial processes, • solve problems involving factors	Using examples discuss the meaning and characteristics of catalyst. Size of reactants is related to the total surface area.	catalyst – *mangkin* decomposition-*penguraian*

		(c) decomposition of hydrogen peroxide, H2O2, in the presence of a catalyst . View computer simulations to investigate how the movement and collision of particles in a reaction are affected by temperature, size of reactant, pressure, concentration and catalyst. Collect and interpret data to explain factors affecting the rate of reaction in the following: (a) combustion of charcoal, (b) storing food in a refrigerator, (c) cooking food in a pressure cooker, (d) industrial production of ammonia, sulphuric acid and nitric acid. Solve problems involving rate of reaction.	affecting rate of reaction.		
4	1.3 Synthesising ideas on collision theory	Carry out simulations on: (a) movement and collision of particles in chemical reactions, (b) movement and collision of particles in reaction affected by temperature, size of reactant, pressure, concentration and catalyst. Collect, interpret data and discuss the following: (a) collision, (b) effective collision, (c) activation energy, (d) collision frequency, (e) effective collision frequency, (f) energy profile diagram. Discuss to conceptualise collision theory.	A student is able to: • relate reaction with energy produced by movement and effective collision of particles, • describe activation energy, • sketch and describe energy profile diagram, • relate the frequency of effective collisions with the rate of reaction, • relate the frequency of effective collisions with factors influencing the rate of reaction, • describe how a certain factor affects the collision of particles in a reaction.		effective collision – *perlanggaran berkesan* activation energy**tenaga pengaktifan** frequency*frekuensi / kekerapan* energy profile diagram*rajah profil tenaga*
	1.4 Practising scientific	Carry out some daily activities related to factors affecting the rate of reaction.	A student is able to: • apply knowledge on factors affecting		

	knowledge to enhance quality of life	Collect and interpret data on scientists' contribution in enhancing the quality of life. Carry out problem solving activities involving rate of reaction in the field of science and technology through experiment and research.	the rate of reaction in everyday activities, • adopt problem solving approaches and make rational decisions based on research.		
	LEARNING AREA: 2. CARBON COMPOUNDS				
5	2.1 Understanding carbon compounds	Collect and interpret data on: (a) the meaning of carbon compound, (b) the meaning of organic compound with respect to its sources, content and combustion products, (c) the meaning of hydrocarbon, inclusive of saturated and unsaturated hydrocarbons, (d) sources of hydrocarbon, (e) examples of organic and inorganic compounds. Carry out an activity to identify the products of the combustion of organic compounds, i.e. carbon dioxide and water.	A student is able to: • state what carbon compound is, • state that carbon compounds can be classified into two groups, i.e. organic and inorganic, • state what organic compound is, • gives examples of organic and inorganic carbon compounds, • state what a hydrocarbon is, • list the sources of hydrocarbon, • identify the combustion products of organic carbon compounds.	The term 'organic' should not be limited to carbon compounds derived from living organisms.	saturated – *tepu* unsaturated – *tak tepu* combustion - *pembakaran*
5	2.2 Analysing alkanes	Collect and interpret data on: (a) the meaning of alkane, (b) the meaning of structural formula, Carry out an activity to construct molecular models and draw structural formulae of the first ten straight-chain alkanes. Construct a table showing names, molecular formulae, structural formulae and physical properties of the first ten straight-chain alkanes. Collect and interpret data on: (a) physical properties of alkanes, i.e. melting and boiling points, density, physical state at room temperature, solubility	A student is able to: • state what alkane is, • state what structural formula is, • deduce the molecular formulae of the first ten alkanes, • draw the structural formulae for the first ten straight-chain alkanes, • deduce the general formula of alkanes, • name the first ten alkanes, • relate changes in physical properties with increase in the number of carbon atoms in alkane molecules, • explain the effect of the increase in number of carbon atoms in	Methane may be used as examples for combustion and substitution reactions.	straight-chain alkane – *alkana rantai lurus* substitution - *penukargantian*

		in water and electrical conductivity, (b) chemical properties of alkanes, i.e. combustion, substitution reactions with halogen. Discuss: (a) the relationship between changes in physical properties with increase in the number of carbon atoms in alkane molecules, (b) the effect on boiling points of alkanes due to increase in the number of carbon atoms in alkane molecules, (c) the complete and incomplete combustion of alkanes, (d) the substitution reactions of alkanes. Write chemical equations for combustion and substitution reactions of methane. Discuss that decomposition of organic matter produces methane and how this may cause fire in land fills and peat swamps.	alkane molecules on the molecules boiling points, • describe complete and incomplete combustion of alkanes, • describe the substitution reaction of alkanes, • write chemical equations for combustion and substitution reactions of methane. • describe how methane affects everyday life.		
6	2.3 Analysing alkenes	Collect and interpret data on the meaning of alkene, Carry out an activity to construct molecular models and draw structural formulae of the first nine straight-chain alkenes with one double bond. Construct a table showing names, molecular formulae, structural formulae and physical properties of the first nine straight-chain alkenes. Collect and interpret data on: (a) physical properties of alkenes, i.e. melting and boiling points, density, physical state at room	A student is able to: • state what alkene is, • deduce the molecular formulae of the first nine alkenes, • deduce the general formula of alkenes, • name the first nine alkenes, • draw the structural formulae for the first nine straight-chain alkenes, • relate changes in physical properties with increase in the number of carbon atoms in alkene molecules, • explain the effects on boiling points of alkenes due to increase in the number of	Restrict to the first three members of alkene. Hexene or cyclohexene can be used.	addition – *penambahan* sootiness – *kejelagaan*

		temperature, solubility in water and electrical conductivity, (b) chemical properties of alkenes, i.e. combustion, addition reaction and polymerisation. Discuss: (a) the relationship between changes of physical properties with increase in the number of carbon atoms in alkene molecules, (b) how the increase in the number of carbon atoms in alkenes, affect their boiling points, (c) the combustion of alkenes, (d) the addition reaction of alkenes, (e) the polymerisation of alkenes. Write chemical equations for combustion, addition and polymerisation reactions of alkenes. Investigate addition reactions of alkenes through computer simulation. Carry out activities to compare properties of alkanes and alkenes having the same number of carbon atoms such as hexane, C6H14, and hexene, C6H12, with respect to: (a) sootiness of flame, (b) reactions with bromine, Br2, (c) reaction with acidified potassium manganate(VII), KMnO4. Compare qualitatively the sootiness of flame during combustion of an alkane with the corresponding alkene. Discuss to generalise the characteristics of homologous series in terms of having the same general formula, can be made by similar	carbon atoms in alkene molecules, • describe chemical properties of alkenes, • compare and contrast alkanes with alkenes. • relate the reactivities of alkanes and alkenes to their chemical bonds. • generalise the characteristics of homologous series based on alkanes and alkenes.		

		methods, steady changes in physical properties, and similar chemical properties.			
7	2.4 Synthesising ideas on isomerism	Construct all possible models and draw structural formulae for a particular alkane and alkene. Construct a table showing names and formulae of alkyl groups. Discuss isomerism. Discuss the existence of isomers. Draw structural formulae of alkane and alkene isomers and name them. Examine isomerism through models or computer simulations.	A student is able to: • construct various structural formulae of a particular alkane and alkene, • explain what isomerism is, • use IUPAC nomenclature to name isomers.	(a) Examples of isomers should not include cyclic carbon compounds. (b) Examples of alkanes and alkenes should not exceed five carbon atoms.	IUPAC nomenclature*sistem penamaan IUPAC*
7	2.5 Analysing alcohols	Carry out an activity to derive the general formula of alcohols and identify the functional group. Construct a table of names and molecular formulae for the first four alcohols. Carry out an activity to draw various possible structural formulae of the first four alcohols and name them. Collect and interpret data on the industrial production of ethanol, Carry out an activity on the preparation of ethanol in the laboratory through fermentation and distillation. Collect and interpret data on the physical properties of ethanol (C_2H_5OH), i.e. colour, odour, boiling	A student is able to: • state the general formula of alcohols, • identify the functional group of alcohols, • list the names and the molecular formulae of the first four alcohols, ? draw structural formulae for isomers of propanol (C_3H_7OH) and butanol (C_4H_9OH), ? name isomers of propanol and butanol using IUPAC nomenclature, • describe the industrial production of ethanol, • describe the preparation of ethanol in the laboratory, • state the physical properties of ethanol, • describe the chemical properties of ethanol,		functional group*kumpulan berfungsi* odour – *bau* fermentation*penapaian* distillation – *penyulingan* volatility – *kemeruapan* dehydration*pendehidratan*

		point, physical state at room temperature, volatility and solubility, Carry out activities to investigate the chemical properties of ethanol in terms of: (a) combustion, (b) oxidation, (c) dehydration. Write chemical equations for the above reactions involving ethanol, propanel and butanol. Carry out an activity to predict the chemical properties for other members of alcohols. Collect and interpret data on: (a) uses of alcohols in everyday life, (b) effects of alcohol misuse and abuse.	• predict the chemical properties of other members of alcohols, • explain with examples the uses of alcohols in everyday life, • explain the effects of the misuse and abuse of alcohols.		
8	2.6 Analysing carboxylic acids	Carry out an activity to derive the general formula of carboxylic acids and identify the functional group. Construct a table with names and molecular formulae of the first four members of carboxylic acid, and draw their structural formulae Collect and interpret data on the preparation of ethanoic acid (CH_3COOH) in the laboratory, Collect and interpret data on the physical properties of ethanoic acid, i.e. colour, odour, boiling point, physical state at room temperature and solubility in water,	A student is able to: • state the general formula of carboxylic acids, • identify the functional group of carboxylic acids, list the names and molecular formulae of the first four members of carboxylic acid, ? draw structural formulae of the first four members of carboxylic acid and name them using the IUPAC nomenclature, • describe the preparation of ethanoic acid in the laboratory, • state the physical properties of carboxylic acids, • state the chemical reactions of ethanoic acid with other chemicals,		

		Carry out activities to investigate the chemical properties of ethanoic acid through its reactions with: (a) base, (b) metallic carbonate, (c) metal, (d) alcohol. Carry out an activity to write chemical equations for the above reactions involving propanoic acid (C2H5COOH) and butanoic acid (C3H7COOH). Carry out an activity to predict the chemical properties of other members of carboxylic acids. Collect and interpret data on the uses of carboxylic acids in everyday life.	predict the chemical properties for other members of carboxylic acid, • explain with examples the uses of carboxylic acids in everyday life.		
8	2.7 Analysing esters	Carry out an activity to derive the general formula of esters and identify the functional group. Construct a table of molecular formulae and names of esters. Carry out an activity to prepare ethyl ethanoate (CH3COOC2H5) in the laboratory. Carry out an activity to investigate the physical properties of ethyl ethanoate, i.e. the odour and solubility. Discuss to predict the esters produced from the esterification between various carboxylic acids and alcohols. Write equations for esterification reactions.	A student is able to: ? state the general formula of esters, • identify the functional group of esters, • list the names and molecular formulae of simple esters, ? draw structural formulae of simple esters and name them using the IUPAC nomenclature, • describe the preparation of ester in the laboratory, • state the physical properties of ethyl ethanoate, • predict the ester produced from the esterification reaction, • write equations for the esterification reactions, • state the natural sources of ester, • state the uses of ester in everyday life.	The separation process is not needed in the preparation of ethyl ethanoate. Esterification involves molecules requiring catalyst, whereas neutralisation involves ions to form water. The separation process is not needed in the preparation of ethyl ethanoate. Esterification involves molecules requiring catalyst, whereas neutralisation involves ions to form water. Limit discussion to esterification reactions between the first four members of alcohols	esterification – *pengesteran* extraction - *pengekstrakan*

		Collect and interpret data on: (a) natural sources of ester, (b) uses of ester in everyday life. Carry out a project to extract esters from plants.		and the first four members of carboxylic acids.	
9, 10	PEPERIKSAAN PENGGAL 1				
	CUTI PERTENGAHAN PENGGAL				
11	2.8 Evaluating fats	Collect and interpret data on: (a) what oils and fats are, (b) why our body needs oils and fats, (c) sources and the uses of oils and fats, (d) the difference between oils and fats at room temperature in terms of physical state, (e) structural formulae for fat molecules of certain fatty acids. Collect and interpret data on: (a) what saturated and unsaturated fats are, (b) sources and compositions of saturated and unsaturated fats, (c) the differences between saturated and unsaturated fats, (d) the need to convert unsaturated to saturated fats, (j) effects of fats on health. Discuss the production of margarine by hydrogenation, Visit a palm oil factory, margarine manufacturing plant or palm oil research institute. Discuss: (a) the advantages of palm oil as compared to other vegetable oils, (b) research on oil palm in Malaysia, (c) the importance of palm oil industry to the development of the country.	A student is able to: • state what oils are, • state what fats are, • state the importance of oils and fats for body processes, • state the sources of oils and fats, • list the uses of oils and fats, • state the differences between oils and fats, ? identify structural formulae for fat molecules of certain fatty acids, • state what saturated fats are, • state what unsaturated fats are, • compare and contrast between saturated and unsaturated fats, • describe the process of changing unsaturated fats to saturated fats, • describe the effects of eating food high in fats on health, • describe the industrial extraction of palm oil, • justify the use of palm oil in food production.	Suggested fatty acids: Palmitic acid, $CH_3(CH_2)_{14}COOH$ Stearic acid, $CH_3(CH_2)_{16}COOH$ Linoleic acid, $CH_3(CH_2)_4CH=CHCH_2CH(CH_2)_7$ -COOH Oleic acid, $CH_3(CH_2)_7CH=CH(CH_2)_7COOH$ Students are not required to know how to draw the structural formulae of fat molecules. Margarine can also be produced by the mechanical squeezing method.	

12	2.9 Analysing natural rubber	Collect and interpret data on: (a) natural polymer i.e. natural rubber, starch and protein, and their respective monomers, (b) properties of natural rubber in terms of elasticity, oxidation and the effects of heat and solvents. (c) uses of natural rubber, (d) structural formula of natural rubber. Carry out an activity to investigate the coagulation of latex and methods to prevent coagulation. Carry out activities to produce latex products such as gloves and balloons. Carry out an activity to produce vulcanised rubber. Investigate the process of rubber vulcanisation using computer simulation. Discuss: (a) how the presence of sulphur atoms in vulcanised rubber changes the properties of vulcanised rubber. (b) research on natural rubber in Malaysia. Carry out an activity to compare the elasticity of vulcanised and unvulcanised natural rubber. Visit a rubber plantation, a latex processing factory, a rubber product manufacturing plant or a rubber research institute.	A student is able to: • list examples of natural polymers and their monomers, • draw the structural formula of natural rubber, • state the properties of natural rubber, • state the uses of natural rubber, • describe the coagulation process of latex, • describe the method used to prevent latex from coagulating, • describe the vulcanisation of rubber, • describe how the presence of sulphur atoms changes the properties of vulcanised rubber, • compare and contrast the properties of vulcanised and unvulcanised natural rubber.	Students need only to draw a simple (molecular) structure formula of isopropane. Unvulcanised rubber is also known as nonvulcanised rubber	elasticity*kekenyalan* vulcanised - *tervulkan* coagulation*penggumpalan*
13	2.10 Creating	Construct a table naming each member of the homologous series according to	A student is able to: ? describe the systematic		

	awareness of order in homologous series	the increasing number of carbon atoms. Discuss the order in the physical and chemical properties of compounds in homologous series.	approach in naming members of homologous series, • describe the order in the physical and chemical properties of compounds in homologous series.		
13	2. 11 Expressing gratefulness for the variety of organic materials in nature	Collect and interpret data on the existence of a variety of organic materials in consumer products. Attend activities (talks, forum, exhibition) related to good nutrition for health. Conduct a forum related to the contribution of palm oil and natural rubber industries with the country's economy.	A student is able to: • describe the existence of various organic materials and their uses in everyday life, ? practise good nutrition for health, • relate the contribution of palm oil and natural rubber to the economic development of the country.	gratefulness - *kesyukuran*	
	LEARNING AREA : 3. OXIDATION AND REDUCTION				
14	3.1 Analysing redox reactions	Collect and interpret data on oxidation, reduction, redox reaction, oxidising agent and reducing agent based on: (a) loss or gain of oxygen, (b) loss or gain of hydrogen, (c) transfer of electron, (d) change in oxidation number. Calculate the oxidation number of an element in a compound. Carry out an activity to identify the oxidation number of an element in a compound and name the compound using the IUPAC nomenclature. Carry out an activity to identify oxidation and reduction processes in chemical equations: (a) using oxidation number, (b) in terms of electron transfer.	A student is able to: • state what oxidation is, • state what reduction is, • explain what redox reaction is, • state what oxidising agent is, • state what reducing agent is, • calculate the oxidation number of an element in a compound, • relate the oxidation number of an element to the name of its compound using the IUPAC nomenclature, • explain with examples oxidation and reduction processes in terms of the change in oxidation number, • explain with examples oxidation and reduction processes in terms of electron transfer, • explain with examples oxidising and reducing agents in redox	Redox reactions must be clarified through halfequation and ionic equation. Half-equation is also known as halfreaction. Oxidation number is also known as oxidation state. Use 1,1,1-trichloroethane, CH3CCl3, as a solvent to replace tetrachloromethane CCl4, in confirming halogen displaced	oxidising agent*agen pengoksidaan* reducing agent*agen penurunan* oxidation state*keadaan pengoksidaan* metal displacement*penyesaran logam*

		Carry out activities to investigate oxidation and reduction in the following reactions: (a) combustion of metal in oxygen or chlorine, (b) heating of metallic oxide with carbon, (c) change of Fe2+ ions to Fe3+ ions and Fe3+ ions to Fe2+ ions, (d) displacement of metal from its salt solution, (e) displacement of halogen from its halide solution, (f) transfer of electrons at a distance (a variety of solutions to be used). Carry out an activity to write oxidation and reduction half-equations and ionic equations for the above reactions.	reactions, • write oxidation and reduction half-equations and ionic equations.		
15	3.2 Analysing rusting as a redox reaction	Collect and interpret data on: (a) conditions for the rusting of iron, (b) the meaning of corrosion of metal, (c) the process of rusting in terms of oxidation and reduction. Discuss the redox reactions in corrosion of metals including rusting. Discuss on the use of other metals to control rusting. Carry out an activity to investigate the effect on iron nails when it is in contact with other metals. Collect and interpret data on methods to control metal corrosion using a more electropositive metal or a less electropositive metal.	A student is able to: • state the conditions for the rusting of iron, • state what corrosion of metal is, • describe the process of rusting in terms of oxidation and reduction, • generate ideas on the use of other metals to control rusting, • explain with examples on the use of a more electropositive metal to control metal corrosion, • explain with examples on the use of a less electropositive metal to control metal corrosion.		corrosion – *kakisan* rusting – *pengaratan*
15	3.3 Understanding	Carry out an activity to investigate the reactivity of some metals with oxygen.	A student is able to: • compare the differences in the		reactivity series – *siri kereaktifan*

	the reactivity series of metals and its application	Arrange metals in terms of their reactivity with oxygen. Carry out activity to determine the position of carbon and hydrogen in the reactivity series of metals. Discuss to predict the position of other metals in the reactivity series. Collect and interpret data on the extraction of iron and tin. Visit metal extraction factories or view a video on the extraction of metals. Discuss the use of the reactivity series of metals to predict possible reactions involving metals.	vigour of the reactions of some metals with oxygen, • deduce the reactivity series of metals, • determine the position of carbon and hydrogen in the reactivity series of metals, • state what the reactivity series of metals are, • describe the extraction of iron and tin from their ores, • explain the use of carbon as the main reducing agent in metal extraction, • use the reactivity series of metals to predict possible reactions involving metals.		vigour – *kecergasan* extraction – *pengekstrakan*
16	3.4 Analysing redox reactions in electrolytic and chemical cells	Carry out an activity to investigate oxidation and reduction reactions in electrolytic and chemical cells. Using computer simulation, study and discuss redox reactions in various types of cells. Discuss the differences between electrolytic and chemical cells in terms of: (a) basic structure, energy conversion and the transfer of electrons at the electrodes, (b) oxidation and reduction processes.	A student is able to: • explain with examples the oxidation and reduction reactions at the electrodes of various chemical cells, • explain with examples the oxidation and reduction reactions at the electrodes of various electrolytic cells, • state the differences between electrolytic and chemical cells in terms of basic structure, energy conversion and the transfer of electrons at the electrodes, • compare and contrast electrolytic and chemical cells with reference to the oxidation and reduction processes		electrolytic cell – *sel elektrolisis* chemical cell – *sel kimia* energy conversion – *pertukaran tenaga*
16	3.5 Appreciating the	Discuss the applications of the change of oxidation number in substances in the	A student is able to: • describe the various	Look into cells/ technologies such	

	ability of elements to change their oxidation numbers	following processes: (a) extracting metal from its ore, (b) corrosion of metal, (c) preventing corrosion of metal, (d) generation of electricity by cell, (e) recycling of metals. Collect and interpret data on: (a) the existence of various types of ores in our country, (b) methods of preventing corrosion of metal, (c) varieties of chemical cells, (d) recycling of metals. Discuss: (a) the contribution of metal extraction industry to the economy of our country, (b) the potential of new chemical cells to be developed as an alternative source of renewable energy.	applications of the change of oxidation number in substances, • describe the existence of various types of ores in our country, • describe efforts to prevent corrosion of metals, • describe the contribution of metal extraction industry to the economy of our country, • appreciate chemical cell as a source of renewable energy.	as: ? rechargeable, ? alkaline, ? lithium, ? photo/solar.	
	LEARNING AREA : 4. THERMOCHEMISTRY				
17	4.1 Evaluating energy changes in chemical reactions	Discuss the meaning of exothermic and endothermic reactions. Carry out activities to study exothermic and endothermic reactions in the: (a) reaction between sodium hydrogen carbonate, $NaHCO_3$, and an acid, (b) reaction between sodium hydroxide, NaOH, and hydrochloric acid, HCl, (c) dissolving of sodium hydroxide in water, (d) dissolving of ammonium salts, such as ammonium chloride, NH_4Cl, ammonium nitrate, NH_4NO_3, and ammonium sulphate, $(NH_4)_2SO_4$, in water. Carry out an activity to construct energy level diagrams for exothermic and endothermic reactions.	A student is able to: ? state what exothermic reaction is, ? state what endothermic reaction is, ? identify exothermic reactions, ? identify endothermic reactions, ? give examples of exothermic reactions, ? give examples of endothermic reactions, ? construct energy level diagrams for exothermic reactions, ? construct energy level diagrams for endothermic reactions, ? interpret energy level diagram, ? interrelate energy change with formation and breaking of bonds, ? describe the application of		

		Discuss to interpret an energy level diagram. Discuss the release or the absorption of energy during formation and breaking of bonds using simulation, computer animation, games or other methods. Show and discuss the application of exothermic and endothermic reactions, such as in cold or hot packs.	knowledge of exothermic and endothermic reactions in everyday life.		
18	4.2 Understanding heat of precipitation	Discuss the meaning of heat of reaction for the following types of reactions: (a) precipitation, (b) displacement, (c) neutralisation, (d) combustion. Carry out an activity to determine the heat of precipitation for a reaction and construct its energy level diagram. Carry out an activity to solve numerical problems related to heat of precipitation using information based on thermochemical equations.	A student is able to: • state what heat of reaction is, • state what heat of precipitation is, • determine the heat of precipitation for a reaction, • construct an energy level diagram for a precipitation reaction, • solve numerical problems related to heat of precipitation.	Unit for energy is joule (J). Calculations should be based on the assumption that there is no heat loss to the surrounding.	precipitation – *pemendakan* displacement – *penyesaran* neutralisation – *peneutralan* thermochemical equations – *persamaan termokimia* specific heat capacity – *muatan haba tentu*
18	4.3 Understanding heat of displacement	Discuss the meaning of heat of displacement. Carry out an activity to determine the heat of displacement for a reaction and construct the energy level diagram. Calculate heat of displacement using information based on thermochemical equations. Carry out an activity to solve numerical problems related to heat of displacement using information based	A student is able to: • state what heat of displacement is, • determine heat of displacement, • construct the energy level diagram for a displacement reaction, • solve numerical problems related to heat of displacement.		

		on thermochemical equations.			
19, 20	PEPERIKSAAN PERTENGAHAN TAHUN				
	CUTI PERTENGAHAN TAHUN				
21, 22	4.4 Understanding heat of neutralisation	Discuss the meaning of heat of 16ractice16r16ion. Carry out activities to determine the heat of 16ractice16r16ion, and construct energy level diagrams, for the following types of reactions between: (a) strong acid and strong alkali, (b) weak acid and strong alkali, © strong acid and weak alkali, (d) weak acid and weak alkali. Discuss the difference between the heat of 16ractice16r16ion for a strong acid and/or strong alkali with heat of 16ractice16r16ion for a reaction involving a weak acid and a weak alkali. Carry out an activity to solve numerical problems related to heat of 16ractice16r16ion using information based on thermochemical equations.	A student is able to: • state what heat of neutralization is, • determine the heat of 16ractice16r16ion, • construct energy level diagrams for various types of 16ractice16r16ion reactions, • compare the heat of 16ractice16r16ion for the reaction between a strong acid and a strong alkali with the heat of 16ractice16r16ion for a reaction between a weak acid and/or a weak alkali, • explain the difference of the heat of 16ractice16r16ion for a strong acid and a strong alkali with the heat of neutralization for a reaction involving a weak acid and/or a weak alkali, • solve numerical problems related to heat of 16ractice16r16ion.		
23	4.5 Understanding heat of combustion	Discuss the meaning of heat of combustion. Carry out activities to determine heat of combustion of various alcohols. Discuss: 27 the difference between heat of combustion of various alcohols, (b) the difference between fuel values of various fuels, © the selection of suitable fuel for specific purposes. Carry out an activity to solve numerical problems related to heat of combustion using information based on	A student is able to: • state what heat of combustion is, • determine heat of combustion for a reaction, • construct an energy level diagram for a combustion reaction, • compare the heat of combustion of various alcohols, • state what fuel value is, • describe the difference between heats of combustion of various alcohols, • describe the applications of fuel value, • compare and contrast fuel	Fuel value is also known as heat value. The unit used is Kj.	Fuel value – *nilai haba bahan api*

		thermochemical equations.	values for various fuels, • solve numerical problems related to heat of combustion.		
23	4.6 Appreciating the existence of various energy sources	Carry out group work where each group: 27 brainstorm and identify the various energy sources, (b) choose an energy source, © identify technology used to harness this energy, (d) discuss the pros and cons in using this energy source. Discuss the use of various energy sources and its effect on humans and the environment.	A student is able to: ? describe a variety of energy sources, ? identify various technology used to harness energy, • justify the use of a particular energy source.		Harnessing energy sources – *penyadapan sumber tenaga* environmental pollution – *pencemaran alam*
	THEME: PRODUCTION AND MANAGEMENT OF MANUFACTURED CHEMICALS				
	LEARNING AREA : 5. CHEMICALS FOR CONSUMERS				
24	5.1 Analysing soap and detergent	Collect and interpret data on: (a) the history of soap manufacturing, (b) what soap and detergent are, © the additives in detergent such as biological enzymes and whitening agents, (d) the preparation of detergent. Carry out an activity to prepare soap using the saponification process. Investigate the cleansing action of soap and detergent using simulation and computer animation. Discuss: 27 the cleansing action of soap and detergent, (b) the differences in the effectiveness of the cleansing action of soap and detergent. Conduct a competition or carry out a project related to:	A student is able to: • state what soap is, • state what detergent is, • describe soap preparation process, • describe detergent preparation process, ? describe the cleansing action of soap, ? describe the cleansing action of detergent, • compare and contrast the effectiveness of the cleansing action of soap and detergent, • identify the additives in detergent and their respective functions.	The use of banned substances such as alkyl benzene sulphonate to illustrate detergent preparation should be avoided.	Additive – *bahan tambahan* biological enzyme – *enzim biologi* detergent – *detergen* saponification – *saponifikasi*

		(a) the manufacturing of soap, (b) the preparation of detergent for multiple purposes such as shampoo and dish cleaner.			
25	5.2 Evaluating the use of food additives	Collect and interpret data on the various types of food additives in the market. Collect and interpret data on the types of chemicals used in food additives and their functions as: 27 preservatives and antioxidants, e.g. sodium nitrite, sodium benzoate, ascorbic acid, (b) flavouring agents, e.g. monosodium glutamate (MSG), aspartame, © stabilizers and thickening agents, e.g. 18ractic, acacia gum, (d) dyes, e.g. azo compound, triphenyl compound. Carry out a project to collect and observe the labels on food packs and identify the additives used. Discuss: 27 the rationale for the use of food additives, (b) the effect of food additives on health and the environment, (b) life without food additives.	A student is able to: • state the types of food additives and their examples, • state the functions of each type of food additive, • justify the use of food additives, • describe the effects of food additives on health and the environment.		Preservative – *pengawet* antioxidant – *pengantioksida/ antipeongsida* flavouring – *agen perisa* 18ractice18r – *pengstabil* thickener agent – *agen pemekat*
25	5.3 Understanding medicine	Collect and interpret data on various types and functions of medicine, i.e: (a) traditional medicines derived from plants and animals, (b) analgesics such as aspirin, paracetamol and codeine, © antibiotics such as penicillin and streptomycin, (d) psychotherapeutic medicine such as stimulant, antidepressant and antipsychotic.	A student is able to: • state examples of traditional medicine, their sources and uses, • state the types of modern medicine and their examples, • state the functions of each type of modern medicine, • describe the possible side effects of using modern and	Any natural or artificially made chemical which is used as a medicine is called drug. Teacher should also discuss relevant drugs such as Viagra, ecstacy pills and the like.	

		Collect and interpret data on: 27 the side effects of modern and traditional medicines, (b) the correct usage of modern and traditional medicines.	traditional medicine, • describe the correct usage of modern and traditional medicines.		
26	5.4 Appreciating the existence of chemicals	Collect and interpret data on: (a) discovery of chemicals that can improve the quality of life, such as antibiotic and detergent, (b) side effects of chemicals on life and the environment, © describe common traits among scientists in carrying out research, such as patience, meticulousness and perseverance. Carry out an activity to discuss and predict how life would be without chemicals. Discuss and 19ractice proper management of chemicals towards better life, hygiene and health.	A student is able to: • describe that the discovery of chemicals improves quality of life, • state the side effects of chemicals on humans and the environment, • describe common traits among scientists in carrying out research, • describe life without chemicals, • state appreciation and support for proper management of chemicals.		
27 – 30	REVISION				
31, 32, 33	PEPERIKSAAN PERCUBAAN SPM				
34 - 41	REVISION				
	CUTI AKHIR TAHUN				
	PEPERIKSAAN SPM				