## Contents

ATOMIC STRUCTURE AND THE PERIODIC TABLE	_
Atoms, elements and compounds	8
Mixtures and compounds	9
Pure substances and formulations	12
Chromatography	14
Scientific models of the atom	16
Atomic structure	17
Isotopes and relative atomic mass	19
The development of the periodic table and the noble gases	21 23
Electronic structure and the periodic table  Metals and non-metals	25 25
Group 1 – the alkali metals	26
Group 7 – the halogens	28
Displacement reactions in group 7	30
The transition metals	32
Review It!	33
BONDING, STRUCTURE AND THE PROPERTIES OF MATTER	
Bonding and structure	- 34
lons and ionic bonding	36
The structure and properties of ionic compounds	38
Covalent bonds and simple molecules	40
Diamond, graphite and graphene	42
Fullerenes and polymers	44
Giant metallic structures and alloys	45 47
Nanoparticles  Review It!	48
QUANTITATIVE CHEMISTRY	_
Conservation of mass and balancing equations	49
Relative formula masses	51
The mole	53
Reacting masses and using moles to balance equations	55 57
Limiting reactant Concentrations in solutions	57 58
Moles in solution	60
Moles and gas volumes	62
Percentage yield and atom economy	64
Review It!	65
CHEMICAL CHANGES	
Metal oxides and the reactivity series	- 66
Extraction of metals and reduction	68
The extraction of iron in the blast furnace (EDUQAS only)	70
The reactions of acids	72
The preparation of a soluble salt	74
Oxidation and reduction in terms of electrons	76
The pH scale and neutralisation	77 70
Strong and weak acids  The basics of electrolysis and the electrolysis of molten ionic compounds	78 79
The basics of electrolysis and the electrolysis of molten ionic compounds  The electrolysis of copper(II) sulfate and electroplating	79 81
The electrolysis of copper (ii) surface and electropiating  The electrolysis of aqueous solutions	83
The extraction of metals using electrolysis	85
Investigation of the electrolysis of aqueous solutions	86
Determining reacting volumes by titration	88
Review It!	90

Topic 1 Topic 2 Topic 3 Topic 4

	Tonio F	ENERGY CHANGES	
	Topic 5	Exothermic and endothermic reactions	- 91
		Practical: Investigation into the variables that affect temperature changes in chemical reactions	92
		Reaction profiles	94
		The energy changes of reactions	95
		Chemical cells and fuel cells  Review It!	97 99
			99
	Topic 6	RATES OF REACTION AND EQUILIBRIUM	-
		Ways to follow a chemical reaction  Calculating the rate of reaction	100 103
		The effect of concentration on reaction rate and the effect of pressure	100
		on the rate of gaseous reactions	105
		Rates of reaction - the effect of surface area	106
		The effects of changing the temperature and adding a catalyst  An investigation into how changing different factors affects the rate of reaction	107 109
		Reversible reactions	111
		The effect of changing conditions on equilibrium	113
		Review It!	115
	Topic 7	ORGANIC CHEMISTRY	_
	TOPIC 7	Carbon compounds, hydrocarbons and alkanes	116
		Crude oil, fractionation and petrochemicals	118
		The structural formulae and reactions of alkenes	120
		Cracking and alkenes	122
		Alcohols Carboxylic acids	124 126
		Addition polymerisation	128
		Condensation polymerisation	130
		Amino acids and DNA	132
		Review It!	133
	Topic 8	CHEMICAL ANALYSIS	_
		Testing for gases Identifying metal ions using flame tests and flame emission spectroscopy	134 135
		Identifying metal ions using sodium hydroxide solution	137
		Testing for negative ions (anions) in salts	139
		Practical: Identifying ions in an ionic compound  Review It!	141 143
			143
	Topic 9	CHEMISTRY OF THE ATMOSPHERE	-
		The composition and evolution of the Earth's atmosphere Climate change	144 146
		Reducing the carbon footprint	148
		Atmospheric pollutants	150
		Review It!	152
	Topic 10	USING RESOURCES	_
//////	Topic To	Finite and renewable resources, sustainable development	153
		Life cycle assessments (LCAs)	155
		Alternative methods of copper extraction	157
		Making potable water and waste water treatment	159
		Ways of reducing the use of resources Rusting	161 162
		Alloys as useful materials	164
		Ceramics, polymers and composites	166
		The Haber process	168
		Production and uses of NPK fertilisers	170
		Analysis and purification of a water sample  Review It!	171 173
		Glossary/Index	174
4		Answers	178