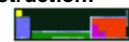


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AP Free Response Summary 1990-2009



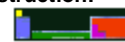
<b>2009</b>	Question #	Parts	Topic(s)
	6	a-d	Electronic Configuration, VSEPR, IMF's
	5	a-f	K <sub>p</sub> , Le Chatelier, Bond Energies, Entropy and Enthalpy
	4	a-c	Net Ionic Equation Writing
	3	a-e	Limiting Reactant, Moles, Photon Wavelength, Mechanisms
	2	a-g	Quantitative Lab; PV=nRT, molar mass of gas
	1	a-d	K <sub>a</sub> and Buffers

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<b>2009 B</b>	Question #	Parts	Topic(s)
	6	a-g	Electrochemistry
	5	a-e	Lewis Structures, Moles, Bond Energies, Entropy, Delta H, Delta S
	4	a-c	Net Ionic Equation Writing
	3	a-f	Quantitative Gases, Oxidation Numbers, REDOX
	2	a-e	Quantitative Lab; Kinetics
	1	a-d	Concentration, K <sub>b</sub> , Buffers

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<b>2008</b>	Question #	Parts	Topic(s)
	6	a, b, c, d	IMF's solubility, IMF's Boiling point, bonding melting point, IMF's boiling point
	5	a, b, c, d, e, f	Ionization energy, Lewis structures, VSEPR, hybridization
	4	a-c	Net Ionic Equation Writing
	3	a, b, c, d, e, f	Electrochem, Delta G, Delta S, Kinetics
	2	a, b, c, ,d, e	Lab question; Hydrated salt, gravimetric analysis
	1	a, b, c, d, e	Kp

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<b>2008 B</b>	Question #	Parts	Topic(s)
	6	a, b, c, d	Delta H, Delta S, Delta G, Le Chat, Delta G
	5	a, b, c, d, e	Qualitative analysis
	4	a-c	Net Ionic Equation Writing
	3	a, b, c, d, e	Solubility rules, stoichiometry, limiting reactant, concentration, solubility rules
	2	a, b, c, d, e, f, g	Kinetics
	1	a, b, c, d	$PV=nRT$ , $K_c$ , mole fraction

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<b>2007</b>	Question #	Parts	Topic(s)
	6	a, b, c, d, e, f, g	Lewis structures, Resonance, Hybridization, Catalysis, Equilibrium
	5	a, b, c, d, e	LAB – Redox Titration
	4	a-c	Net Ionic Equation Writing
	3	a, b, c, d, e, f	Electrolysis, Delta G
	2	a, b, c, ,d, e	Delta G, Equilibrium, Delta H, Bonds/Bond Energy
	1	a, b, c, d, e	Ka, titration, pH

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<b>2007 B</b>	Question #	Parts	Topic(s)
	6	a, b, c, d, e, f	Periodicity
	5	a, b, c	Lewis Structures, Dilution, Buffers (LAB)
	4	a-c	Net Ionic Equation Writing
	3	a, b, c	Stoichiometry, Redox, Electrolysis
	2	a, b, c	Isotopes, Emission Spectra, Bond Energy/Photons
	1	a, b, c, d, e, f	K <sub>p</sub> , Delta G, Delta S, Delta H

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<b>2006</b>	Question #	Parts	Topic(s)
	8	a, b, c, d, e, f	Electronic configuration, electronic configuration, periodicity, electronic configuration, periodicity, stoichiometry/solubility rules
	7	a, b	Lewis structures/hybridization/shape/bond angles, Lewis structures/hybridization/shape/bond angles + oxidation #
	6	a, b, c, d	IMF, H-bonds/polarity, IMF, Kinetics
	5	a, b, c, d, e	Qualitative analysis, precipitation, slat hydrolysis, dilution, solubility/flame test
	4	a-h	Net Ionic Equation Writing
	3	a, b	Combustion Analysis, Gas calculations
	2	a, b, c, ,d, e	Delta H combustion, Delta S, Delta G, Delta G, K in relation to Delta G
	1	a, b, c, d	Ksp

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<b>2006 B</b>	Question #	Parts	Topic(s)
	8	a, b, c, d	Redox, Gases, Bonding, Acid/Base neutralization
	7	a, b, c, d	Periodicity, Lewis Structure & Electron Deficiency, Ionization Energy, Electronic Configuration
	6	a, b	Lewis Structures/Bond Angles/Hybridization/Bond Angles/Polarity
	5	a, b, c, d	Spectrophometric Analysis/Beer's Law
	4	a-h	Net Ionic Equation Writing
	3	a, b, c, d, e, f	Delta G/Delta S/Keq/Delta H
	2	a, b	Voltaic Cell, Nernst Equation
	1	a, b, c	Ka/pH/Buffers, Hydrolysis of Salts, Acid Base Titration/Stoich



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<b>2005</b>	Question #	Parts	Topic(s)
	8	a, b, c, d	Delta G, Delta S, Delta H, Electrolysis
	7	a, b, c, d	IMF's, Ionic Bonding, Ionization Energy, Average Atomic Mass
	6	a, b, c	Lewis Structures, VSEPR/Hybridization, Bonding/Formal Charge
	5	a, b, c	Qualitative Analysis of Gases, Periodicity of Oxides, Solubility/Precipitates
	4	a-h	Net Ionic Equation Writing
	3	a, b, c	Kinetics
	2	a, b, c, ,d, e	Empirical Formula, Freezing Point Depression, Molecular Formula related to Empirical, Organic Functional Group
	1	a, b, c, d, e	Ka, pH, Buffer, Kb/Ka, Acid Strength

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<b>2005 B</b>	Question #	Parts	Topic(s)
	8	a, b, c, d, e	Bonding
	7	a, b, c, d, e	Combustion Equation, Delta H, Formation Equation, Delta S, Bond Energy
	6	a, b, c, d, e	Gases
	5	a, b, c, d	Laboratory (Synthesis of a Salt)
	4	a-h	Net Ionic Equation Writing
	3	a, b, c, d, e, f	Kinetics
	2	a, b, c, d, e, f	Electrolysis, Electrolysis, Stoichiometry, Electrolysis, $PV=nRT$ , Water Vapor Pressure
	1	a, b, c, d	$K_a$ , pH, Acid-Base Equation, moles/Buffers/ $K_w$

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<b>2004</b>	Question #	Parts	Topic(s)
	8	a, b, c, d, e	Lewis diagram, VSEPR, Periodicity, Boyles Law, Gases
	7	a, b, c, d	Inter molecular Bonding, Ionic Bonding, VSEPR, Hydrogen Bonding
	6	a, b, c, d, e, f	Electrochemistry
	5	a, b, c	Qualitative Analysis (Solubility rules – precipitation reactions)
	4	a-h	Net Ionic Equation Writing
	3	a, b, c, d, e	Beers Law, Kinetics, Kinetics, Kinetics (half- life), Kinetics (Graphs)
	2	a, b, c, ,d, e	Stoichiometry, limiting reagent, stoichiometry, Delta G, Delta H, Delta S, Delta H
	1	a, b, c, d, e, f, g	Ksp

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<b>2004 B</b>	Question #	Parts	Topic(s)
	8	a, b, c, d	Equilibrium, Equilibrium, Equilibrium, Organic
	7	a, b, c, d, e	Bond Energies, Entropy, Delta G, Equilibrium constant, Equilibrium constant
	6	a, b, c, d	Electrochemistry
	5	a, b, c, d, e, f, g	Acid Base Titration
	4	a-h	Net Ionic Equation Writing
	3	a, b	Stoichiometry (Density, moles), Kinetics (Graphs, half- life)
	2	a, b, c, d	Empirical Formula, Density of gases, Gases, Gas Stoichiometry
	1	a, b, c, d	Kp, Kp, Kc, Kp

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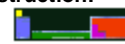
<b>2003</b>	Question #	Parts	Topic(s)
	8	a, b, c, d	Organic nomenclature/bonding, intermolecular bonding, isomerism, hybridization/sigma/pi
	7	a, b, c, d	$\Delta H$ , Entropy, $\Delta G$ , Kinetics (Eact)
	6	a, b, c, d	Acid + carbonate, Colligative properties, Ideal and real gases, kinetic theory
	5	a, b, c, d, e	Dilution, Beers Law, Beers Law, Beers Law, Beers Law, Transition metals
	4	a-h	Net Ionic Equation Writing
	3	a, b, c, d, e	Orders from initial rate data, Rate equation, Rate constant, Ecell, REDOX half-equations
	2	a, b, c, d, e	$PV=nRT$ , $PV=nRT$ (Partial Pressures), Diffusion, Gas Stoichiometry
	1	a, b, c, d, e	$K_b$ , $K_b$ , Buffer calc, titration calc, Indicators

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<b>2003 B</b>	Question #	Parts	Topic(s)
	8	a, b, c, d, e	Radioactivity, Radioactivity, Radioactivity, Kinetics, Radioactivity
	7	a, b, c, d	Ionic Radii, Periodicity, Periodicity, Ionization Energies
	6	a, b, c, d, e	REDOX equation writing, Ecell calculation, Electrochemistry, Electrochemistry, Electrochemistry
	5	a, b, c, d, e	Laboratory (REDOX titration)
	4	a-h	Net Ionic Equation Writing
	3	a, b, c, d	Empirical formula, $PV=nRT$ , $\Delta H$ formation, $Q = m c$ $\Delta T$
	2	a, b	Stoichiometry, Stoichiometry & pH
	1	a, b, c, d, e, f	$K_c$ , $K_c$ , $K_c$ , equilibrium, $K_c$ & $K_p$ , Equilibrium

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<b>2002</b>	Question #	Parts	Topic(s)
	8	a, b, c, d	Thermochemistry, thermochemistry, thermochemistry, equilibrium
	7	a, b, c, d	Kinetics
	6	a, b, c, d	Periodicity, periodicity, bonding, bonding
	5	a, b, c, d, e	Laboratory ( $q = mc\Delta T$ , neutralization)
	4	a-h	Net Ionic Equation Writing
	3	a, b, c, d, e	Equation Writing (Combustion), Stoichiometry (Gases), Energetics, Diffusion, Isomerism
	2	a, b, c, d, e	Stoichiometry (Limiting reagent/concentration), Electrochemistry, Electrochemistry, Electrochemistry
	1	a, b, c, d, e	$K_a$ , $K_a$ , Titration calculation/Salt hydrolysis, Buffers, Acid Strength

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<b>2002 B</b>	Question #	Parts	Topic(s)
	8	a, b, c, d	Titration curves, $K_a$ , Titration curves, Titration
	7	a, b, c, d	Electrochemistry, Electrochemistry, Electrochemistry, Electrochemistry
	6	a, b, c, d	Lewis Structures/Bonding, Polarity/Shape, Shape, Lewis Structures/Shape, Acid Strength
	5	a, b, c, d, e	Laboratory (Qualitative)
	4	a-h	Net Ionic Equation Writing
	3	a, b, c, d	REDOX equation writing, $K_p$ , $\Delta G$ / $\Delta S$ / $\Delta H$ , $\Delta G$ and $K_p$
	2	a, b, c, d	$PV=nRT$ & Partial Pressures, mole fraction, density, Stoichiometry
	1	a, b, c, d	$K_a$ , pH, Buffers, Weak acids



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<b>2001</b>	Question #	Parts	Topic(s)
	8	a, b, c, d	Bonding
	7	a, b, c, d	Electrochemistry
	6	a, b, c, d, e	Kinetics
	5	a, b, c, d, e	BPE, Acid-Base, Solutions, REDOX & Electrochemistry, Solutions
	4	a-h	Net Ionic Equation Writing
	3	a, b, c, d	Stoichiometry, Stoichiometry (combustion), Titration Calculation, Acid-Base
	2	a, b, c, d	$\Delta H$ (combustion), $\Delta G$ , $\Delta S$ , Bond Energies
	1	a, b	Ksp

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<b>2000</b>	Question #	Parts	Topic(s)
	8	a, b, c, d	Acid-Base
	7	a, b, c, d	Atomic Structure, Electron Configuration, Periodicity, Lewis Structure & Shape
	6	a, b, c, d, e	$\Delta H$ , $\Delta S$ , $\Delta G$ , Kinetics, Mechanisms
	5	a, b, c, d	Laboratory (FPD)
	4	a-h	Net Ionic Equation Writing
	3	a, b, c	Stoichiometry, Stoichiometry & Gas Stoichiometry, REDOX Titration Calculation
	2	a, b, c	Electrochemistry
	1	a, b, c, d, e	Equilibrium (Kc)

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<b>1999</b>	Question #	Parts	Topic(s)
	8	a, b	Lewis Structures & Bond Length, Lewis Structures & Shape & Polarity
	7	a, b, c, d	Solutions, FPD, Vapor Pressure, Acid-Base
	6	a, b	$\Delta H$ & $\Delta S$ & $\Delta G$ , $\Delta G$ & Catalysts
	5	a, b, c, d, e	Laboratory (Gases)
	4	a-h	Net Ionic Equation Writing
	3	a, b, c, d	Kinetics
	2	a, b	Electronic configuration
	1	a, b, c, d, e	Kc, Acid-Base, Kb, Acid-Base, Titration Acid-Base Calculation

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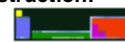
<b>1998</b>	Question #	Parts	Topic(s)
	9	a, b, c, d	Solutions, Transition Metals, Polarity, REDOX
	8	a, b, c, d, e	Electrochemistry
	7	a, b, c, d	Equilibrium (Le Chatelier's Principle)
	6	a, b, c	Kinetics
	5	a, b, c, d, e	Acid-Base
	4	a-h	Net Ionic Equation Writing
	3	a, b, c, d	$\Delta H$ (combustion), $\Delta H$ (formation), $\Delta G$ , Gas Calculation
	2	a, b, c, d	Stoichiometry, FPD, Gases, Stoichiometry
	1	a, b	Ksp, Ksp & Solutions

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<b>1997</b>	Question #	Parts	Topic(s)
	9	a, b, c, d	Laboratory (Stoichiometry)
	8	a, b, c, d	Radioactivity
	7	a, b, c, d	$\Delta S$ , $\Delta G$ , Le Chatelier's Principle, Le Chatelier's Principle
	6	a, b, c, d	Periodicity
	5	a, b, c	Lewis Structure & Shape, Polarity, Bonding
	4	a, b, c, d, e	Kinetics
	3	a, b, c, d, e	Electrochemistry
	2	a, b, c, d	Titration Calculation, Equilibrium, Acid- Base, $K_b$
	1	a-h	Net Ionic Equation Writing

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<b>1996</b>	Question #	Parts	Topic(s)
	9	a, b, c, d	Hydrogen Bonding, Polarity, Bond Length, Expanded octets & Shape
	8	a, b, c, d	Kinetics
	7	a, b, c, d, e	Electrochemistry
	6	a, b, c, d	Acid-Base
	5	a, b, c, d	Gases
	4	a, b, c, d	Stoichiometry
	3	a, b, c, d	$\Delta S$ , $\Delta G$ , Equilibrium Constant, Bond Energies
	2	a, b, c, d, e	Acid-Base
	1	a-h	Net Ionic Equation Writing

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<b>1995</b>	Question #	Parts	Topic(s)
	9	a, b, c, d	Kinetics
	8	a, b, c, d	Entropy, K <sub>sp</sub> , Equilibria, $\Delta G$
	7	a, b, c, d	Paramagnetism, Lewis Structures & Dipoles & Shape, Transition Metals, Bonding
	6	a, b, c, d	Phase Diagrams
	5	a, b, c, d	Laboratory (Bonding)
	4	a-h	Net Ionic Equation Writing
	3	a, b, c, d	Gas Stoichiometry, Equation Writing, Stoichiometry, Stoichiometry
	2	a, b, c, d, e	Equation Writing, Gas Stoichiometry, $\Delta H$ , $\Delta H$
	1	a, b, c, d, e	Equilibrium

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<b>1994</b>	Question #	Parts	Topic(s)
	9	a, b, c, d	Periodicity
	8	a, b, c, d	FPD, Bonding, Bonding, Equation Writing
	7	a, b, c, d	Acid-Base
	6	a, b, c, d	$\Delta S$ , $\Delta G$ , Equilibrium Constant, $\Delta G$
	5	a, b, c, d	Vapor Pressure, BPE, Electrochemistry, Bonding
	4	a-h	Net Ionic Equation Writing
	3	a, b, c, d	Gases
	2	a, b, c, d, e	Kinetics
	1	a, b, c, d	K <sub>sp</sub>



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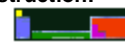
<b>1993</b>	Question #	Parts	Topic(s)
	9	a, b, c, d	Gases
	8	a, b, c, d	$\Delta S$ , $\Delta G$ , $\Delta H$ , Kinetics
	7	a, b, c	Electrochemistry
	6	a, b, c, d	Periodicity, Periodicity, Electronic Structure, Expanded octet/Shape
	5	a, b, c, d	Equation Writing, Bonding, Equation Writing, Acid-Base
	4	a-h	Net Ionic Equation Writing
	3	a, b, c, d, e	Stoichiometry, Stoichiometry, Laboratory (Titration), Gases, Acid-Base
	2	a, b, c, d, e	Empirical Formulae, FPD, Mole Fraction, Vapor Pressure
	1	a, b, c, d	Acid-Base

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<b>1992</b>	Question #	Parts	Topic(s)
	9	a, b, c, d	Lewis Structures, Bond Angles, Hybridization, Dimerization
	8	a, b, c, d	Bonding
	7	a, b, c, d, e	Laboratory
	6	a, b, c, d	Acid-Base
	5	a, b, c, d	Kinetics
	4	a-h	Net Ionic Equation Writing
	3	a, b, c, d	Equilibrium Constant & $\Delta S$
	2	a, b, c, d	Electrochemistry
	1	a, b, c, d	Stoichiometry, Stoichiometry, $K_p$ , Gas Stoichiometry

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<b>1991</b>	Question #	Parts	Topic(s)
	9	a, b, c, d	Nuclear Chemistry (Radioactivity)
	8	a, b, c, d	Bonding
	7	a, b, c, d	Electrochemistry
	6	a, b, c, d	Laboratory (Gases)
	5	a, b, c, d	$\Delta S$ , $\Delta H$ , $\Delta G$ , Equilibrium Constant
	4	a-h	Net Ionic Equation Writing
	3	a, b, c, d	Kinetics
	2	a, b, c, d	Stoichiometry, Stoichiometry, FPD, Stoichiometry
	1	a, b, c, d	Acid-Base

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<b>1990</b>	Question #	Parts	Topic(s)
	9	a, b, c	Laboratory (Stoichiometry)
	8	a, b, c, d	Acid-Base
	7	a, b, c, d	Kinetics
	6	a, b, c, d	Periodicity
	5	a, b, c, d	Bonding
	4	a-h	Net Ionic Equation Writing
	3	a, b, c, d	$\Delta H$ , $\Delta S$ , Equilibrium Constant, Equilibrium Constant
	2	a, b, c	Gas Stoichiometry
	1	a, b, c, d	K <sub>sp</sub>