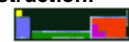


AP Free Response Summary 1990-2011



2011	Question #	Parts	Topic(s)
	6	a-d	Gases, Kinetics
	5	a-g	Lewis diagrams, VSEPR, IMF's, Hydrolysis, REDOX, entropy, bond making/breaking
	4	a-c	Net Ionic Equation Writing
	3	a-g	Delta H, Electrochemistry
	2	a-c	Quantitative Lab, Dilution, Gravimetric Analysis
	1	a-d	pH, Kb, Ka, Buffers



2011 B	Question #	Parts	Topic(s)
	6	a-c	Hybridization, VSEPR, Lewis Structures, H-bonding, Kinetics
	5	a-d	Qualitative Acid Base Titration
	4	a-c	Net Ionic Equation Writing
	3	a-d	Empirical formula, Delta H, $\Delta G = \Delta H - T\Delta S$
	2	a-c	Stoichiometry, Gases, IMF's
	1	a-d	pH, Ksp, Kp, Delta G



2010	Question #	Parts	Topic(s)
	6	a-g	Electronic configuration, Ionization energy, REDOX, Electrochemistry
	5	a-f	Lewis diagram, bond length, shape, inter versus intra, polarity, IMF's
	4	a-c	Net Ionic Equation Writing
	3	a-d	Stoichiometry, $PV = nRT$, Kinetics
	2	a-f	Quantitative Lab; Enthalpy of solution, $\Delta G = \Delta H - T\Delta S$, % error
	1	a-f	Ksp



2010 B	Question #	Parts	Topic(s)
	6	a-h	Kinetics, Mechanisms
	5	a-f	Acid Base Titration
	4	a-c	Net Ionic Equation Writing
	3	a-f	Quantitative Lab; REDOX, Oxidation numbers, REDOX titration
	2	a-f	Electrochemistry, REDOX stoichiometry
	1	a-f	Organic isomerism, IMF's, Kc, PV = nRT



2009	Question #	Parts	Topic(s)
	6	a-d	Electronic Configuration, VSEPR, IMF's
	5	a-f	K _p , 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 _a and Buffers



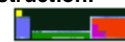
2009 B	Question #	Parts	Topic(s)
	6	a-g	Electrochemistry
	5	a-e	Lewis Structures, Moles, Bond Energies, Entropy, Delta H, Delta S
	4	a-c	Net Ionic Equation Writing
	3	a-f	Quantitative Gases, Oxidation Numbers, REDOX
	2	a-e	Quantitative Lab; Kinetics
	1	a-d	Concentration, Kb, Buffers



2008	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	Electrochemistry, Delta G, Delta S, Kinetics
	2	a, b, c, ,d, e	Lab question; Hydrated salt, gravimetric analysis
	1	a, b, c, d, e	Kp



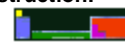
2008 B	Question #	Parts	Topic(s)
	6	a, b, c, d	Delta H, Delta S, Delta G, Le Chat, Delta G
	5	a, b, c, d, e	Qualitative analysis
	4	a-c	Net Ionic Equation Writing
	3	a, b, c, d, e	Solubility rules, stoichiometry, limiting reactant, concentration, solubility rules
	2	a, b, c, d, e, f, g	Kinetics
	1	a,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



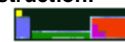
2007	Question #	Parts	Topic(s)
	6	a, b, c, d, e, f, g	Lewis structures, Resonance, Hybridization, Catalysis, Equilibrium
	5	a, b, c, d, e	LAB – Redox Titration
	4	a-c	Net Ionic Equation Writing
	3	a, b, c, d, e, f	Electrolysis, Delta G
	2	a, b, c, ,d, e	Delta G, Equilibrium, Delta H, Bonds/Bond Energy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



2007 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 _p , Delta G, Delta S, Delta H

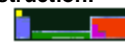


2006	Question #	Parts	Topic(s)
	8	a, b, c, d, e, f	Electronic configuration, electronic configuration, periodicity, electronic configuration, periodicity, stoichiometry/solubility rules
	7	a, b	Lewis structures/hybridization/shape/bond angles, Lewis structures/hybridization/shape/bond angles + oxidation #
	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



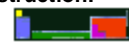
2006 B	Question #	Parts	Topic(s)
	8	a, b, c, d	Redox, Gases, Bonding, Acid/Base neutralization
	7	a, b, c, d	Periodicity, Lewis Structure & Electron Deficiency, Ionization Energy, Electronic Configuration
	6	a, b	Lewis Structures/Bond Angles/Hybridization/Bond Angles/Polarity
	5	a, b, c, d	Spectrophometric 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

Revised August 2011



2005	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

Revised August 2011



2005 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



2004	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 (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

Revised August 2011



2004 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

Revised August 2011



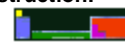
2003	Question #	Parts	Topic(s)
	8	a, b, c, d	Organic nomenclature/bonding, intermolecular bonding, isomerism, hybridization/sigma/pi
	7	a, b, c, d	ΔH , Entropy, ΔG , Kinetics (Eact)
	6	a, b, c, d	Acid + carbonate, Colligative properties, Ideal and real gases, kinetic theory
	5	a, b, c, d, e	Dilution, 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

Revised August 2011



2003 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, $PV=nRT$, ΔH formation, $Q = m c$ ΔT
	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

Revised August 2011



2002	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



2002 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 , ΔG / ΔS / ΔH , ΔG 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

Revised August 2011



2001	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	ΔH (combustion), ΔG , ΔS , Bond Energies
	1	a, b	Ksp



2000	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	ΔH , ΔS , ΔG , 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)



1999	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	ΔH & ΔS & ΔG , ΔG & 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	K_c , Acid-Base, K_b , Acid-Base, Titration Acid-Base Calculation

Revised August 2011



1998	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	ΔH (combustion), ΔH (formation), ΔG , Gas Calculation
	2	a, b, c, d	Stoichiometry, FPD, Gases, Stoichiometry
	1	a, b	Ksp, Ksp & Solutions



1997	Question #	Parts	Topic(s)
	9	a, b, c, d	Laboratory (Stoichiometry)
	8	a, b, c, d	Radioactivity
	7	a, b, c, d	ΔS , ΔG , 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, Kb
	1	a-h	Net Ionic Equation Writing

Revised August 2011



1996	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	ΔS , ΔG , Equilibrium Constant, Bond Energies
	2	a, b, c, d, e	Acid-Base
	1	a-h	Net Ionic Equation Writing



1995	Question #	Parts	Topic(s)
	9	a, b, c, d	Kinetics
	8	a, b, c, d	Entropy, K _{sp} , Equilibria, ΔG
	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, ΔH , ΔH
	1	a, b, c, d, e	Equilibrium

Revised August 2011



1994	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	ΔS , ΔG , Equilibrium Constant, ΔG
	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 _{sp}



1993	Question #	Parts	Topic(s)
	9	a, b, c, d	Gases
	8	a, b, c, d	ΔS , ΔG , ΔH , 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



1992	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 & ΔS
	2	a, b, c, d	Electrochemistry
	1	a, b, c, d	Stoichiometry, Stoichiometry, K_p , Gas Stoichiometry

Revised August 2011



1991	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	ΔS , ΔH , ΔG , 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

Revised August 2011



1990	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	ΔH , ΔS , Equilibrium Constant, Equilibrium Constant
	2	a, b, c	Gas Stoichiometry
	1	a, b, c, d	Ksp